Final Environmental Impact Statement

Drought Management Planning

at the

Kerr Hydroelectric Project Flathead Lake, Montana

March 2010

HDR

ENVIRONMENTAL IMPACT STATEMENT

DROUGHT MANAGEMENT PLANNING AT THE KERR HYDROELECTRIC PROJECT (FERC PROJECT NO. 5), FLATHEAD LAKE, MONTANA

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Acronyms and Short Forms

2,300 *Feet*	References relative elevation above mean sea level (amsl)
ACHP	Advisory Council on Historic Preservation
AIRFA	American Indian Religious Freedom Act
ARM	Administrative Rules of Montana
amsl	above mean sea level
BIA	Bureau of Indian Affairs
BiOp	Biological Opinion
BOR	U.S. Bureau of Reclamation
BPA	Bonneville Power Administration
CFR	Code of Federal Regulations
CEQ	Council on Environmental Quality
cfs	cubic feet per second
CSKT	Confederated Salish and Kootenai Tribes (of the Flathead Nation)
CWA	Clean Water Act
DEIS	Draft Environmental Impact Statement
DMP	Drought Management Plan
DOE	Department of Energy
EA	Environmental Assessment
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FCRPS	Federal Columbia River Power System
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
Commission or FERC	Federal Energy Regulatory Commission
FIIP	Flathead Indian Irrigation Project
FLBS	Flathead Lake Biological Station
FPRI	Flathead Precipitation Runoff Index
FWIS	Fish and Wildlife Implementation Strategy
MEI	Multi-variant El Niño and Southern Oscillation Index
MDFWP	Montana Department of Fish, Wildlife and Parks
MDEQ	Montana Department of Environmental Quality
MOU	Memorandum of Understanding
MPC	Montana Power Company
MSA	Metropolitan Statistical Area
MTNHP	Montana Natural Heritage Program
MW	Megawatt

NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPR	Non-power requirement
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
NWRFC	Northwest River Forecast Center
NWS	National Weather Service
pH	hydrogen ion concentration
PNCA	Pacific Northwest Coordinating Agreement
Secretary	Secretary of Interior
SSURGO	NRCS Soil Survey Geographic database
STATSGO	State Soil Geographic Database
TMDL	Total Maximum Daily Load
USACE	U.S. Army Corps of Engineers
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WPA	Waterfowl Production Area
WY	Water Year

SUMMARY

The United States Department of the Interior, through the Bureau of Indian Affairs (BIA), has prepared this Environmental Impact Statement (EIS) to evaluate the social, economic, and environmental impacts of implementing a Drought Management Plan at the Kerr Hydroelectric Project (Federal Energy Regulatory Commission Project No. 5), referred to as the "Kerr Project." The Kerr Project is located within the Flathead Indian Reservation.

The Kerr Project operates pursuant to a 1985 joint license (as amended) issued by the Federal Energy Regulatory Commission (Commission) to the Montana Power Company and the Confederated Salish and Kootenai Tribes of the Flathead Nation (CSKT). The Montana Power Company transferred their part of the license to PPL Montana, LLC in 1999. The license contains specific operating requirements governing, among other things, lake level elevations (Article 43) and downstream river flows (Article 56). During drought years (defined as years when total runoff entering Flathead Lake from all sources is less than 72.6 percent of normal), the available water supply may not be sufficient to provide the required instream flows while maintaining the required water surface elevation in Flathead Lake.

Recognizing this potential conflict, the Secretary of the Interior (Secretary), pursuant to his authority under the Federal Power Act (Section 4(e) - 16 U.S.C. §§ 791-828c.), required the licensee to develop a Drought Management Plan (Article 60) in an effort to both avoid and resolve potential water use conflicts that may arise under drought conditions. Drought conditions are expected to occur only about one time every 18 years, based on the water history in the basin. Importantly, the critical components of any Drought Management Plan (such as adjustments in lake levels and minimum instream flows) should only be implemented when a drought is anticipated. Neither the Drought Management Plan required under Article 60 nor this EIS process will result in a stand-alone water management plan governing Kerr Project operations under more typical conditions.

Many of the alternatives evaluated in this EIS call for an increase in lake levels during the winter and spring, when forecasting has identified drought conditions as a likely possibility for the following summer. By holding the pool higher over the winter and spring, more water will be available during the summer months to meet and maintain recreational lake levels while continuing to provide minimum stream flows downstream of the Kerr Dam. Maintaining higher lake levels over the winter and spring, particularly during the late spring, may increase the risk of flooding if a substantial rain event were to occur. At all times, including during drought conditions, flood risk reduction is within the purview of the U.S. Army Corps of Engineers (USACE), and actions directed by USACE will at no time be constrained by any proposed facet of a Drought Management Plan. However, operating the Project solely for flood control purposes, particularly during forecasted drought conditions, will increase the likelihood that summertime lake levels cannot be met and maintained during drought years. These considerations will have to be addressed on an annual basis, based on all of the available forecasting indices.

License Article 60 states that the Drought Management Plan will be filed with the Secretary; whose rights to reject, modify, or otherwise alter it are reserved by the article. Article 60 does not provide for Commission review or approval of the plan. Accordingly, because at this time the Commission has no action that would trigger a requirement for environmental review, BIA (representing the Secretary in this case) is the appropriate Lead Agency for purposes of addressing the National Environmental Policy Act (NEPA) (40 CFR §1501.5). The Commission, the U.S. Bureau of Reclamation (BOR), and USACE are Cooperating Agencies (40 CFR §1501.6), and the Commission may ultimately adopt this EIS to support license modifications that may be required in the future (40 CFR §1506.3). They have participated throughout the process and have reviewed and provided input on both the draft and final versions of this EIS.

Significant Revisions from Draft EIS

In addition to editing the Draft EIS (DEIS) for clarity and improved readability and for addressing specific issues raised during the comment period (see Chapter 7) other revisions and analyses were conducted to improve the Final EIS (FEIS). These revisions include:

- Additional assessment of increased flood risk under the preferred alternative. This assessment involved modeling and analysis of the 1964 flood event (an example of floods produced from rain or rain on snow events) and additional requirements in the preferred alternative to coordinate with the official forecasting agencies prior to deviating from the flood control requirements of Article 43.
- Additional assessment of effects on docks (e.g., ice damage, access) under the preferred alternative, specifically, use of bathometric mapping, wind data and water level data to qualitatively assess specific areas on Flathead Lake that have a greater tendency for damage.
- Additional statistical analyses to confirm the accuracy and reliability of the forecasting indices.
- Modifications to the preferred alternative include an adaptive management plan, coordination with Hungry Horse operations, an Article 56 deviations request, and a five-year update requirement of drought indicators.

The DEIS was released in July of 2006. An agency meeting was held on August 29, 2006, in Kalispell, Montana. Two public hearings were held, one on August 29, 2006, in Kalispell, Montana, and the other on August 30 in Polson Montana.

PPL Montana’s Proposed Action

As required by license Article 60, PPL Montana proposed a Drought Management Plan to the Secretary on March 4, 2002 (PPLM 2002). Their plan constitutes the Proposed Action as defined by NEPA – it is not the BIA’s Preferred Alternative, as will be discussed later in this document.

PPL Montana’s proposal uses a tiered approach consisting of changes to Kerr Project operations over an annual period as follows:

- Achieve an annual end-of-December lake elevation of 2,888’ msl in all years (regardless of drought status).
- Analyze runoff predictions and prepare monthly operating curves in consultation with various agencies.
- Revise the target lake elevation from 2,893’ msl to 2,892’ msl for the recreation season from June 15 to September 1 when the system is declared to be in a drought. If it is not possible to achieve this elevation during this period, then implement the next feature.
- Achieve and maintain a reduced summer pool elevation of 2,892’ msl by doing the following:

- Increase flow from the Hungry Horse Project to help attain a Flathead Lake elevation of 2,892’ msl; and
- Modify Article 56 minimum instream flows to maintain a Flathead Lake elevation of 2,892’ msl between June 15 and September 1 by matching outflows to inflows.

Alternatives to PPL Montana’s Proposed Action

During the NEPA scoping process, it became clear that relying substantially on water releases from the Hungry Horse Project to offset drought impacts at the Kerr Project was untenable. The Hungry Horse Project has myriad regulatory requirements unrelated to Kerr Project operations that BOR (the Hungry Horse Project operator) must address. In most cases, environmental mitigation, generation requirements, and operational restrictions at Hungry Horse would substantially limit, if not eliminate water available for the Kerr Project during drought years - greatly limiting the ability of PPL Montana’s proposed process to effectively balance all competing uses of the available water supply.

In light of the limitations at Hungry Horse, BIA determined that early forecasting of drought conditions would allow more flexibility in winter pool elevations and spring refill dates – allowing better use of the limited water supply. Established precipitation and stream flow data for Montana, currently used by the National Oceanic and Atmospheric Administration (NOAA) and discussed in Appendix B, were used to develop a model to forecast oncoming drought conditions.

BIA used this improved forecasting model to develop two additional alternatives: Alternative 1 focuses primarily on the protection of the river environment where drought impacts significantly affect the Reservation and Trust resources, and Alternative 2 balances drought effects on the river and lake ecosystems. Steps 1 through 4 are the same under both alternatives and PPL Montana would be required to consult with the CSKT at all decision-making points in either alternative. PPL Montana would notify the Secretary, BOR, and USACE within one business day of activating a Drought Management Plan.

ALTERNATIVE 1

Under Alternative 1, the minimum instream flow requirements of Article 56 would apply at all times during drought conditions. If insufficient water was available to maintain both lake levels and minimum instream flows, the minimum instream flows would take precedence. This would minimize, to the extent possible, impacts to natural resources downstream of the Kerr Project. The associated Drought Management Plan would therefore require the following actions:

1. **October-December Climate Review**

   The licensee would review climate indicators from October through December. If the indicators forecasted drought conditions, the licensee would activate the Drought Management Plan.

2. Lake Drawdown Deviation

Once the Drought Management Plan was authorized, the licensee may deviate from the provisions of Article 43 to achieve a minimum lake elevation of 2,888' msl from December 31 through April 15. This higher lake elevation would require less water for refill in the spring.

3. January-April Climate Review

In the months of January through April, the licensee would review climate indicators each month. Depending on the ongoing and projected severity of the drought, the Drought Management Plan would either remain in force or be deactivated.

4. Lake Refill Deviation

Beginning April 15 and through June 15, when the Drought Management Plan was activated, the licensee would be required to maintain lake elevations as high as flood control conditions would allow. As discussed above, this would require less water to refill the lake while continuing to provide needed flood protection.

5. Lake Elevation Goals under Minimum Instream Flows

The licensee would make every reasonable effort to achieve a June 15 lake elevation no lower than 2,892.2' msl (higher if possible)[1] and would make every reasonable effort to maintain this minimum lake elevation from June 16 to September 15 – without impacting required minimum stream flows downstream of Kerr Dam.

ALTERNATIVE 2

Under Alternative 2, some flexibility in meeting minimum instream flows would be authorized. As such, in addition to the actions described under steps 1 – 4, above, the licensee would implement the following:

1. Minimum Instream Flows Deviation Decision Process

By no later than April 10, the licensee would obtain runoff volume forecasts to assist in determining whether drought management procedures should be terminated, maintained without a deviation from the minimum instream flow requirements of Article 56, or maintained with a deviation from minimum instream flow requirements. The licensee would request a deviation if runoff volume forecasts indicated that a June 15 lake elevation of 2892.2' msl could not be met if minimum instream flows were maintained. This decision would be made by the licensee following coordination with BOR to determine what, if any, additional water may be available from the Hungry Horse Project. Under these conditions, the licensee would submit a notice of intent to deviate from the flow requirements to the Secretary, BOR, and USACE as follows:

[1] The BIA evaluated the effects of various lake level targets under drought conditions through modeling, data analysis, and qualitative reviews of recreational and economic impacts. As a result of this analysis, the target lake elevation of 2892.2' msl as seen in Alternatives 1 and 2 was selected as being a reasonable value that is both achievable, and minimizes recreational and economic impacts.

a) Requirements of Notice of Intent to Deviate from Article 56

The notice of intent to deviate from Article 56 would include the forecasted runoff percent and volume, the proposed minimum instream flow curve, the June 15 forecasted Flathead Lake elevation, and the expected average summer Flathead Lake elevation (June 16 to September 15). The notice would also include the rationale for the deviation and a summary of the consultation process including discussions with BOR regarding water availability from the Hungry Horse Project and CSKT's position regarding the deviation.

b) Secretary Approval to Reduce Peak Minimum Instream Flows

The Secretary or approved designee would have ten working days to approve, modify, or deny the proposed deviation. If the Secretary or approved designee had not responded after ten working days, the proposed deviation would be considered approved. If approved, the licensee would be allowed to reduce peak minimum instream flows to as low as 8,000 cubic feet per second (cfs), and would be allowed to shift the minimum instream flows peak period by up to two weeks early to coincide with the spring runoff event.

2. Lake Elevation Goals under Minimum Instream Flows Deviation

The licensee would make every reasonable effort to achieve a June 15 lake elevation no lower than 2,892.2' msl (higher if possible) and would make every reasonable effort to maintain this minimum lake elevation from June 16 to September 15.

3. Adaptive Management

Monitoring actual effects on key economic, social, and environmental indicators during periods of drought will help to identify actual effects of, and identify possible improvements to, the Drought Management Plan. As such, within one year of the Record of Decision, the licensee would develop an adaptive management plan for review and approval by the Secretary that would assess: (1) Assumptions and indicators used in developing and implementing the Drought Management Plan; (2) estimates and predictions made in the analysis including environmental, social and economic effects; and (3) recommendations regarding potential modifications to the Drought Management Plan in an effort to minimize adverse effects.

4. Five-Year Review

Alternative 2 also would require the licensee to re-examine the climate indicators and runoff characteristics of the Flathead basin every five years to determine whether the indices need to be modified to account for climatic changes.

NO-ACTION ALTERNATIVE

Under the No-Action Alternative, there would be no Drought Management Plan and the Kerr Project would be operated under the conditions of Article 43 (lake elevations) and Article 56 (minimum instream flows). Conflicts between these requirements in a low-water year would be addressed on an ad hoc basis.

Because Article 60 expressly requires the development and implementation of a Drought Management Plan, the No-Action Alternative would not meet the purpose and need for the project. However, NEPA regulations require analysis of the impacts associated with a no-action alternative to provide a baseline comparison for the action alternatives.

Analysis

This EIS assesses the differences in potential impacts to social, economic, and environmental resources from implementing each of the drought management alternatives. In many cases, the absence of any drought management strategy would result in greater impacts to the full spectrum of the social, economic, and environmental resources of the study area.

To understand the operational impacts of implementing PPL Montana's Proposed Action or the Alternatives, water years from 1939 through 2001 were analyzed to determine how lake elevations and minimum instream flow requirements would have been accommodated by each of the drought management alternatives. Alternatives 1 and 2 have specific criteria and well defined decision making processes that supported use of simulation models (see Appendix B). However, the No-Action Alternative and the Proposed Action did not include specific information sufficient to support similar model runs. As such, historical information was reviewed and analyzed more qualitatively for these water years and the expected results were compared with the results of the Alternatives that were modeled.

Table S.1 provides a summary of the social, economic, and environmental impacts associated with the Proposed Action and Alternatives.

CUMULATIVE EFFECTS AND UNAVOIDABLE ADVERSE EFFECTS

To identify past, present, or reasonably foreseeable future actions that could result in incremental cumulative impacts, BIA consulted representatives of several organizations familiar with the study area. These included the City of Polson, the CSKT, the Flathead Lakers Association, the Flathead Basin Commission, PPL Montana, and the Montana Department of Transportation. These consultations identified six current or future activities for consideration in the cumulative impact analysis. The first of these, rapid regional growth, was the most frequently cited activity. The six activities are:

- Rapid regional growth
- Hungry Horse Dam flood control and fish operations
- The Pacific Northwest Coordinating Agreement

- The Flathead Indian Irrigation Project
- A new domestic water treatment plant
- Upgrades to Kerr Hydroelectric Project turbines

Unavoidable adverse effects arise when license requirements related to lake levels and minimum instream flows cannot both be met. Each alternative would result in impacts associated with deviations from these requirements. All alternatives would result in lower lake levels under severe drought conditions. For the purposes of this EIS, severe drought is when runoff entering Flathead Lake is less than 65 percent of normal conditions. Three of the alternatives would establish revised lake elevation targets for the summer months. One alternative avoids the potential for impacts to the Flathead River below Kerr Dam by prioritizing minimum instream flows.

AGENCY'S PREFERRED ALTERNATIVE

Based on our evaluation of the potential impacts associated with the Proposed Action and alternatives, discussions with other Federal agencies, and comments received throughout the process, we believe Alternative 2 represents the best option for avoiding conflicts and minimizing and balancing potential impacts under drought conditions. Under Alternative 2, tribal Trust resources will be protected and lake level impacts will be minimized during both the recreation and the winter maintenance seasons to the greatest extent possible.

Table S-1 outlines resource impacts for the four considered DMP alternatives, including for the preferred Alternative 2. A total of nineteen resource issues were analyzed, including impacts to project operations, geology, ecology, and socioeconomics. Alternative 2 shows the lowest level of impact to these resources.

Table S-1: Summary of Impacts

Resource	Drought Management Plan (DMP) Alternative			
	No Action Alternative	Proposed Action (PPL Montana Plan)	Alternative 1 (MIF Precedence)	Alternative 2 (MIF Deviation Allowed)
Operations				
Lake Levels	WY 2001 was evaluated as an example of No Action operations during drought years. Neither the April 15 nor the June 15 target elevations were achieved.	2,892' msl lake level target can only be met and maintained during drought years if water from Hungry Horse Project is provided. Unable to quantify frequency of occurrence. Increased risk of winter property damage from icing given higher winter pool elevation of 2,888' msl. Reduced opportunities to conduct winter maintenance given higher lake elevation.	June 15 target lake level of 2,892.2' msl was achieved and maintained in over 70% of drought years evaluated. Recreation season lake elevation exceeded 2892.4' msl in 50% of drought years evaluated.	Target lake level of 2,892.2' msl was achieved and maintained in all drought years evaluated. Recreation season lake elevation exceeded 2,892.4' msl in 80% of drought years evaluated.
Minimum Instream Flows	WY 2001 was evaluated as an example of No Action operations during drought years. Minimum instream flow targets were not sustained under these conditions, increasing impacts to downstream resources.	Deviation from minimum instream flow requirements likely in severe drought years. Flexibility to balance impacts and to more efficiently use limited water resources is reduced due to limited advanced planning and reliance on Hungry Horse water. Minimum instream flow targets not met when outflows matched to inflows, increasing impacts to downstream resources.	Minimum instream flows achieved in all water years evaluated.	Deviation from minimum instream flow requirements required in three of the 10 drought years. 20% of the drought years evaluated required instream flow deviations to 8,000 cfs and 10% required deviations to 10,500 cfs. Temporary, seasonal impacts to certain downstream resources may occur.
Flood Control	Project operators use NWRFC water supply forecasts to develop flood forecasts. Article 43 is followed. No anticipated impacts to flood control.	Unclear how flood control is incorporated into development of flood control rule curves although higher winter lake elevations each water year may increase the risk of flooding on an annual basis.	The 1964 flood event was examined to determine impacts of the DMP on flood levels. Modeling indicates drought indicators would have cancelled the DMP and flood pool would have been available for flood control.	The 1964 flood event was examined to determine impacts of the DMP on flood levels. Modeling indicates drought indicators would have cancelled the DMP and flood pool would have been available for flood control.

Resource	Drought Management Plan (DMP) Alternative			
	No Action Alternative	Proposed Action (PPL Montana Plan)	Alternative 1 (MIF Precedence)	Alternative 2 (MIF Deviation Allowed)
Geology and Soils				
Geology	No effects to geology anticipated.	No effects to geology anticipated.	No effects to geology anticipated.	No effects to geology anticipated.
Soils/Erosion	Difficult to determine; anticipated variability of lake levels during a severe drought year would not concentrate wave energy at any elevation for long durations reducing potential impacts of shoreline erosion.	Potential for increased wave-related erosion at 2,888' msl (winter/early spring) annually and 2,892' msl (summer) under drought conditions. Increased potential for ice damage to docks and shorelines including potential each year to increase late winter flow release causing ice damage to lower river.	Potential for increased risk of wave-related erosion at 2,888' msl (winter/early spring) and at 2,892.2' msl when DMP is activated.	Potential for increased risk of wave-related erosion at 2,888' msl (winter/early spring) when DMP is activated. However, 80% of drought years maintain lake level over 2,892.5' msl reducing newly exposed shoreline areas and minimizing potential impacts.
Land Use (Lake Access)	Vast majority of the lakes 3,000 docking structures are fixed elevation. Use of these structures (e.g., accessibility to deep water craft, usability of docks by elderly and disabled) would be affected in every drought year due to reduced lake levels.	Use of fixed elevation structures would be impacted if flows from Hungry Horse were not available. Impacts range from accessibility to deep water craft to usability of docks by elderly and disabled.	50% of the drought years evaluated resulted in summer lake levels near elevation 2,890' msl impacting docks, shore stations and boat launches during the summer recreation season.	Lake elevations achieved and maintained, minimizing impacts to adjacent land use.
Water Quality	Reduced summer and fall water levels would benefit near shore Flathead Lake WQ. No net change in nutrient loading to lake anticipated. Lower river water quality impacted by temperature increases and higher concentration of irrigation return flows when minimum instream flows are not met.	Reduced summer and fall water levels would benefit near shore Flathead Lake WQ. No net change in nutrient loading to lake anticipated. Lower river water quality impacted by temperature increases and higher concentration of irrigation return flows when minimum instream flows are not met.	Summer recreation season lake levels were reduced for 50% of drought years evaluated. WQ effects under these conditions are similar to the no action and proposed action alternatives. Under the remaining drought years, no water quality benefits in the lake are anticipated. Minimum instream flows are maintained for the lower river, minimizing potential WQ impacts caused by drought downstream of the project.	No anticipated impacts to WQ.

Resource	Drought Management Plan (DMP) Alternative			
	No Action Alternative	Proposed Action (PPL Montana Plan)	Alternative 1 (MIF Precedence)	Alternative 2 (MIF Deviation Allowed)
Ecological Resources				
Land Cover/Habitat	No land cover impacts anticipated. Temporary shore land and riverine habitat impacts associated with lake level and flow variations would occur during all drought years but these could not be quantified.	No land cover impacts anticipated. Temporary shore land and riverine habitat impacts associated with lake level and flow variations would occur when Hungry Horse water was unavailable but these could not be quantified.	No land cover impacts anticipated. Temporary shore land habitat impacts associated with lake level variations would occur during drought years similar to 1940, 1944, 1977 and 2001. No riverine habitat impacts anticipated.	No land cover impacts anticipated. No shore land impacts anticipated. Temporary, limited riverine impacts may occur when instream flow levels were reduced.
Fisheries	Long term assessments indicate reductions in available lower river fisheries habitats when compared to alternatives 1 and 2, particularly spawning and rearing habitats. In general, no lake fisheries impacts are anticipated from lower lake levels.	Deviations from minimum instream flow requirements in severe drought years could negatively impact certain riverine species, particularly by reducing available spawning and rearing habitats. However, exact impacts could not be quantified. In general, no lake fisheries impacts are anticipated from lower lake levels.	No impacts to lower river fisheries are anticipated. In general, no lake fisheries impacts are anticipated from lower lake levels.	Only temporary, minimal impacts to lower river fisheries are anticipated given the levels of discharge that will be maintained. In general, no lake fisheries impacts are anticipated from lower lake levels.

Resource	Drought Management Plan (DMP) Alternative			
	No Action Alternative	Proposed Action (PPL Montana Plan)	Alternative 1 (MIF Precedence)	Alternative 2 (MIF Deviation Allowed)
Terrestrial and Amphibious Species	No impacts to terrestrial species anticipated. Aquatic reptiles and amphibians relying on near shore and riparian areas could be affected if lake level and stream flow deviations occur. Lower river backwater areas may not receive flows due to deviations, potentially increasing mortality in these areas.	No impacts to terrestrial species anticipated. Aquatic reptiles and amphibians relying on near shore and riparian areas could be affected if lake level and stream flow deviations occur. Lower river backwater areas may not receive flows due to deviations, potentially increasing mortality in these areas.	No impacts to terrestrial species anticipated. Impacts to amphibious species surrounding Flathead Lake may occur during extreme drought years (i.e., when summer lake levels are lower then the 30-year average). No impacts to lower river species.	No impacts to terrestrial species anticipated. Aquatic reptiles and amphibians relying on near shore and riparian area could be affected. In WY similar to 1944, 1977 and 2001. Under severe drought conditions, temporary, reduced impacts to lower river species could occur due to reductions in instream flows.
Avian Species	Potential for impacts to waterfowl foraging and nesting areas if lake levels are low in late spring/summer; more likely in severe drought years. Some lower river water fowl may be impacted if back water areas do not receive sufficient water.	Potential for impacts to waterfowl foraging and nesting areas if lake levels are low in late spring/summer; more likely in severe drought years. Some lower river water fowl may be impacted if back water areas do not receive sufficient water.	Potential for impacts to waterfowl foraging and nesting areas if lake levels are low in late spring/summer; more likely in drought years similar to 1940, 1941, 1944, 1977 and 2001. No impacts to lower river species anticipated.	Some potential for impacts to waterfowl foraging and nesting areas in the lower river, although to a lesser extent than under the no action and proposed action alternatives. Lake level targets generally met so no lake habitat impacts anticipated.
Species of Concern	No impacts to bald eagles anticipated. Slightly less bull trout spawning and rearing habitats available in two of three study sights.	No impacts to bald eagles anticipated. This option was not modeled for fisheries impacts although matching outflows to inflows is considered detrimental to bull trout habitat.	No impacts to bald eagles anticipated. Slight increases in available bull trout habitat shown through modeling (two of the study sites show increases in bull trout spawning habitat).	No impacts to bald eagles anticipated. Slight increases in available bull trout habitat shown through modeling (two of the study sites show increase in bull trout spawning habitat). Only a few percentage points in available habitat separate Alternatives 1 and 2.

Resource	Drought Management Plan (DMP) Alternative			
	No Action Alternative	Proposed Action (PPL Montana Plan)	Alternative 1 (MIF Precedence)	Alternative 2 (MIF Deviation Allowed)
Wetlands/ Riparian Areas/Flooding Concerns	Wetlands may be impacted by lower summer lake levels and reduced flows below Kerr Dam during severe drought conditions. The project would be operated primarily for flood control, limiting flooding concerns.	Wetlands may be impacted by lower summer lake levels and reduced flows below Kerr Dam during severe drought conditions. The project would be operated for flood control although higher winter lake elevations may reduce flood control flexibility.	Lake-related wetlands may be impacted by lower summer lake levels during water years similar to 1940, 1941, 1944, 1977, and 2001. No impacts to riparian areas below Kerr Dam anticipated. Although pool remains higher during spring, forecasting tools allow adequate time to evacuate lake in case of late winter flood events.	Temporary impacts to riparian habitats below Kerr Dam may occur in severe drought years (i.e., when instream flows are reduced). Although pool remains higher during spring, forecasting tools allow adequate time to evacuate lake in case of late winter flood events.
Tribal Resources	Tribal trust resources such as protection of lake elevations, minimum flows, and lower river benefits versus lake benefits not balanced during time of drought. No specific plan to protect tribal resources**.**	The plan calls for impacts to both lake and lower river tribal resources in terms of lower lake level targets, higher winter water levels, and potentially lower river flows.	Lower river tribal resources are protected through adherence to minimum instream flows. Lake elevations similar to water years 1940, 1941, 1944, 1977, and 2001 will cause impacts to tribal resources around Flathead Lake.	Slight impact to lower river resources during water years similar to 1944, 1977, and 2001 as the result of lower minimum instream flows. Lake level impacts to tribal resources are mitigated by this alternative.
Socioeconomic Resources				
Income and Employment	Less likely to mitigate local economic impacts during drought, resulting in impacts to both lower river and lake resources and opportunities.	Calls for lower summer lake recreation water levels than alternatives 1 and 2, which may affect tourism during drought years. Annual 2,888' msl winter lake elevation creates the potential for more repair work on shore stations and docks at the expense of property owners.	Supports local economy by maintaining recreational lake elevations in 5 of 10 drought years.	Supports local economy by maintaining recreational lake elevations under all but most severe conditions.

Resource	Drought Management Plan (DMP) Alternative			
	No Action Alternative	Proposed Action (PPL Montana Plan)	Alternative 1 (MIF Precedence)	Alternative 2 (MIF Deviation Allowed)
Property Values	Lower summer lake levels during drought conditions could adversely impact properties with shallow lake access, potentially reducing property values.	Lower summer lake levels during drought conditions could adversely impact properties with shallow lake access, potentially reducing property values. Properties with access structures below 2,888 'msl could be affected annually by ice damage, further reducing property values.	Maintains recreational lake elevation for 50% of drought years evaluated, reducing potential effects on property values when compared to the no action and proposed action alternatives.	Maintains recreational lake elevation for 80% of drought years evaluated, reducing potential effects on property values when compared to the other alternatives.
Recreation and Tourism	Lower summer lake levels during severe drought conditions could make several access sites and marinas unusable by watercraft. Lower flows in the lower flathead river could affect rafting and cool water fisheries.	Lower summer lake levels during severe drought conditions could make some access sites and marinas unusable by watercraft, although these impacts may be offset if Hungry Horse water were available. Matching outflows to inflows in summer months could reduce lower river flows, impacting rafting and cool water fisheries.	No effect on recreational lake levels for 50% of the drought years evaluated. No impacts to lower river recreational resources.	No effect on recreational lake levels for 80% of the drought years evaluated. Lower river flows reduced for 30% of drought years, slightly impacting river recreation and cool water fisheries during those years.
Power Generation	Loss of power generation potential due to lack of operational flexibility.	Loss of power generation potential if winter/early spring lake draft was eliminated or deviations from minimum instream flows were approved. End of December elevation of 2,888' msl reduces operational flexibility for hydro-power production.	Climate indicators create more flexible operations in most water years. Prioritizing instream flows during drought years will increase generation over all other alternatives.	Climate indicators create more flexible operations in most water years. Lower river flows reduced for 30% of drought years, slightly reducing generation when compared with Alternative 1.

Resource	Drought Management Plan (DMP) Alternative			
	No Action Alternative	Proposed Action (PPL Montana Plan)	Alternative 1 (MIF Precedence)	Alternative 2 (MIF Deviation Allowed)
Environmental Justice	Minimum instream flow deviations would disproportionately affect the minority population of the Flathead Reservation.	Minimum instream flow deviations would disproportionately affect the minority population of the Flathead Reservation.	No disproportionately high or any adverse impacts to minority or low income populations anticipated.	Minimum instream flow deviations would disproportionately affect the minority population of the Flathead Reservation, although advanced drought management planning under and reductions in lake elevations would help to offset these impacts to some degree.

NEXT STEPS

Although we have identified Alternative 2 as the Preferred Alternative, the final decision will be made in a separate document – called a Record of Decision (ROD). The ROD will identify the specific actions and procedures that must be included in the final Drought Management Plan and will state specifically the next steps required by PPL, Montana and the CSKT in finalizing the plan. Neither this EIS nor the ROD includes a “stand alone” Drought Management Plan, as required by license article 60, although the ROD will have all of the fundamental components of the final plan identified. We have developed the process in this manner to facilitate integration of final Drought Management Plan requirements with specific operational procedures unique to the Kerr Project. We anticipate that the final Drought Management Plan will be developed by PPL, Montana and the CSKT in consultation with USACE, BOR, and BIA and filed with the Commission by the fall of 2010.

CHAPTER 1.0 INTRODUCTION

The United States Department of the Interior, through the Bureau of Indian Affairs (BIA), has prepared this Final Environmental Impact Statement (FEIS) to evaluate the Drought Management Plan proposed by PPL Montana for the Kerr Hydroelectric Project on Flathead Lake, Montana (Kerr Project), and reasonable alternatives to that plan. The EIS was prepared in accordance with the National Environmental Policy Act (NEPA), 42 U.S.C. §§ 4321 et seq., applicable NEPA regulations promulgated by the Council on Environmental Quality, 40 CFR Parts 1500- 1508, and the BIA National NEPA Handbook (BIA 2005).

The EIS describes the purpose of and need for agency action; discusses the proposed Drought Management Plan and reasonable alternatives; describes the key social, economic, and environmental resources in the study area; analyzes the likely impacts to these resources from implementing the proposed Drought Management Plan and alternatives; documents coordination with other Federal, state, and local agencies; and documents the process by which the public commented on the proposed Drought Management Plan, the alternatives, and effects on social, economic and environmental resources.

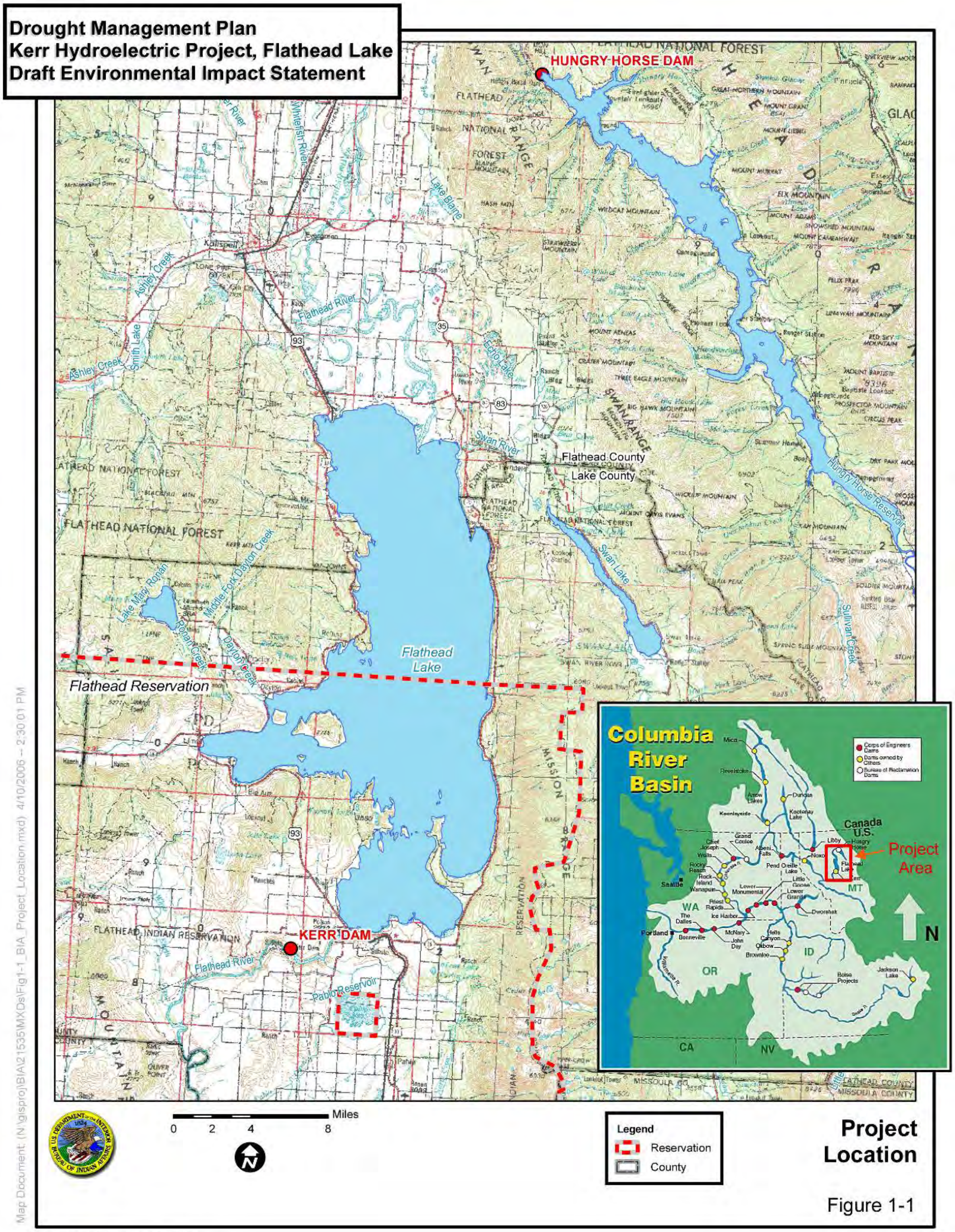
1.1 BACKGROUND

1.1.1 LOCATION AND FUNCTION OF FLATHEAD LAKE AND THE KERR PROJECT

Flathead Lake is located on the Flathead River in northwestern Montana, on the western slope of the Rocky Mountains, as shown in Figure 1-1. Flathead Lake is the largest natural freshwater lake in the western United States. It is 28 miles long and, at its broadest point, 15 miles wide. Inflow to the lake from the upper Flathead River is generated from a watershed of 8,600 square miles. Water flowing out of the lake is released into the lower Flathead River. Prior to dam construction the lake fluctuated between elevation 2,883’ and 2,896’ msl. The aquatic ecosystems of the Flathead basin evolved under these natural water fluctuations. These natural fluctuations have been mediated by construction of the Kerr Project; however, the lake is still significantly influenced by natural hydrologic and climatic cycles.

The southern half of Flathead Lake is within the Reservation of the Confederated Salish and Kootenai Tribes of the Flathead Nation (CSKT), which encompasses 1,244,000 acres. Within the Reservation is the Kerr Project, which includes a dam and powerhouse located approximately four miles downstream from the natural outlet of Flathead Lake, as shown in Figure 1-1. Kerr Project operations address multiple purposes, including hydroelectric generation, flood control, recreation, irrigation, and conservation of fish and wildlife resources.

Figure 1-1: Project Location



Data sources: USGS 7' quad

1.1.2 LICENSING AND OPERATION OF THE KERR PROJECT

The Federal Energy Regulatory Commission (Commission) licenses and inspects non-Federal hydropower projects through its authority under the Federal Power Act (16 U.S.C. §§ 791-828c.). The Kerr Project currently operates under a joint license issued by the Commission to the Montana Power Company and the CSKT in 1985. The license has been subsequently amended on several occasions and was transferred in 1999 from the Montana Power Company to the current operator, PPL Montana, LLC. Among other things, the current license includes the Secretary of the Interior's (Secretary) license conditions for the protection and utilization of the Flathead Reservation, submitted pursuant to section 4(e) of the Federal Power Act (FERC 1985). Section 4(e) authorizes the Secretary to place conditions in hydropower licenses that are "necessary for the adequate protection and utilization" of reservations within the Secretary's jurisdiction, including Indian reservations (16 U.S.C. § 797[e]).

The Secretary's section 4(e) conditions include Article 56, which establish minimum flow requirements from the Kerr Project into the lower Flathead River downstream of the Project. Article 56 minimum instream flow requirements are as follows:

August 1 to April 15	–	continuous flow at 3,200 cubic feet per second (cfs).
April 16 to April 30	–	increased from 3,200 to 5,000 cfs at 120 cfs per day.
May 1 to May 15	–	increased from 5,000 to 12,700 cfs at 510 cfs per day.
May 16 to June 30	–	continuous flow at 12,700 cfs.
July 1 to July 15	–	reduced from 12,700 to 6,400 cfs at 420 cfs per day.
July 16 to July 31	–	reduced from 6,400 to 3,200 cfs at 200 cfs per day.

The definition of "minimum instream flows" and other terms of art can be found in Chapter 8 – Glossary.

These minimum instream flow requirements, along with other section 4(e) operational requirements discussed below, were developed to protect tribal resources on the lower Flathead River and its tributaries. The section 4(e) operational requirements are described in more detail in Chapter 3.0, section 3.1.3.2**.**

In addition to the Secretary's section 4(e) conditions, Article 43 of the Kerr Project license requires the operator to regulate Flathead Lake in accordance with a 1962 Memorandum of Understanding (MOU), as amended in 1965, between the Montana Power Company and the U.S. Army Corps of Engineers (USACE). The relevant provision from the MOU provides:

> Conditions permitting, the lake will be drawn down to elevation 2883 feet, the minimum level under the license, by April 15th and will be raised to elevation 2890 feet by Memorial Day (May 30th) and to elevation 2893 feet, the maximum level under license by June 15th…When the lake reaches elevation 2886 feet, in a moderate or major flood year, the Licensee will gradually open its spill-gates to maintain free flow and will not

> close the gates until after the danger of exceeding elevation 2893 feet has passed. (MPC and USACE 1982)

The purpose of the MOU includes providing for flood control by drawing down Flathead Lake every spring which is conducted in coordination with USACE who has overall responsibility and authority for flood control in the Columbia River System.

Prior to the construction of the Kerr Project, Flathead Lake elevations fluctuated more frequently, and the full pool lake elevation (2,893' msl) was reached and sustained for a much shorter period of time than under current operations (NWREL 1999).

1.2 PURPOSE OF AND NEED FOR AGENCY ACTION

During low-water years there may be an insufficient volume of water to achieve Article 43 lake levels while maintaining the minimum instream flow requirements of Article 56. Recognizing this potential conflict, and in response to comments received on the Department's proposed section 4(e) conditions, the Secretary also included Article 60 in the Kerr Project license. Article 60 specifically requires the development of a Drought Management Plan:

> The licensees, in consultation with the U.S. Army Corps of Engineers, the Bureau of Reclamation, the Bureau of Indian Affairs, and the Montana Department of Environmental Quality (MDEQ), shall develop and implement a Drought Management Plan for Flathead Lake, which shall be filed with the Secretary. The Drought Management Plan shall include, but not be limited to, provisions for re-evaluation and adjustment of Flathead Lake flood control requirements and other provisions necessary to facilitate compliance with lower Flathead River minimum instream flow requirements designated by the Secretary. The Secretary reserves the right to reject, modify, or otherwise alter the Drought Management Plan in whole or in part (FERC 1998).

The Drought Management Plan would set forth operational provisions to both avoid and resolve potential water use conflicts in years where there is insufficient water to meet the requirements of Articles 43 and 56 (referred to in this EIS as a drought condition – specifically, years when runoff entering Flathead Lake is less than 72.6 percent of normal). Historically, this type of drought condition occurs about once every 18 years.[2] Importantly, the critical components of any Drought Management Plan – such as adjustments in Article 43 lake levels and Article 56 minimum instream flows requirements – would be implemented only during such drought conditions. Neither the Drought Management Plan nor the EIS process is intended to develop a stand-alone water management plan for Flathead Lake.

[2] The conflict anticipated by Article 60 occurred during the spring and summer of 2001 when adherence to the flood control rule curve resulted in deviations to both minimum instream flows and lake levels.

In addition to Articles 43 and 56, other operational requirements in the license are potentially relevant to a decision regarding a Drought Management Plan. These include the following section 4(e) conditions:

- Article 55 requires operation of the Kerr Project as a baseload facility, which precludes load-following or peak power generation.
- Article 57 prescribes maximum between-day flow changes except as necessary to meet flood control requirements.
- Article 58 prescribes hourly maximum ramping rates except as necessary to meet flood control requirements.
- Article 59 requires development of a ramping rate study, subject to certain timelines and conditions.
- Article 61 requires consultation and coordination with the U.S. Bureau of Reclamation on releases of water from Hungry Horse Dam related to certain requirements under the Endangered Species Act (ESA).
- Article 62 requires the licensees to provide an annual operational schedule and monthly updates.

1.3 ROLE OF THE DEPARTMENT OF INTERIOR – BUREAU OF INDIAN AFFAIRS

Pursuant to Article 60, PPL Montana submitted its proposed Drought Management Plan on March 4, 2002, to the Secretary for consideration. It will serve as PPL Montana’s Proposed Action in the EIS. For a summary of PPL Montana’s proposed plan, see Chapter 2.0, section 2.1.

Under Article 60, the Secretary has the authority to reject, modify, or otherwise alter the proposed Drought Management Plan in whole or in part. Accordingly, the Secretary needs to determine whether, and to what extent, to approve, modify, or reject PPL Montana’s proposed plan. The Drought Management Plan ultimately approved by the Secretary will govern how the Kerr Project licensees will prepare for and operate the Project during drought conditions and will benefit the public by minimizing drought effects to the extent possible.

The Secretary has determined that implementation of a Drought Management Plan constitutes a major Federal action that could significantly affect the quality of the human environment. NEPA therefore requires preparation of an EIS. On June 20, 2002, BIA published a Notice of Intent in the Federal Register informing agencies and the public of their intent to prepare an EIS for a Drought Management Plan and initiating the formal scoping process (See Appendix A). The Notice of Intent encouraged comments and participation in the process and included meeting dates, times, and locations.

Ultimately, the NEPA process will allow the Secretary to issue a Record of Decision selecting an alternative regarding a Drought Management Plan. The point of contact for the EIS is:

Mr. Bob Dach
Hydropower Program Manager
Bureau of Indian Affairs
911 NE 11th Avenue
Portland, OR 97232
(503) 231-6711

1.4 COOPERATING AGENCIES

As the lead agency, BIA supervised preparation of the EIS as set forth in Council on Environmental Quality (CEQ) regulations (40 CFR 1501.5). BIA requested that the following agencies participate as cooperating agencies for the preparation of this EIS:

Bureau of Reclamation (BOR)

Federal Energy Regulatory Commission

National Marine Fisheries Service (NMFS)

U.S. Army Corps of Engineers

U.S. Fish and Wildlife Service (USFWS)

Montana Department of Environmental Quality

Montana Department of Fish, Wildlife and Parks

A cooperating agency has jurisdiction by law or special expertise with respect to environmental impacts involved with the proposal and is involved in the NEPA analysis. The following agencies accepted cooperating agency status through a letter response to BIA:

Bureau of Reclamation

Federal Energy Regulatory Commission

U.S. Army Corps of Engineers

BIA has continued to coordinate with all interested agencies throughout the EIS process.

1.5 RELATED NEPA AND OTHER DOCUMENTS

Several related documents have been developed or are in the process of being developed that have bearing on the Drought Management Plan EIS. The first of these is the 1996 Final EIS for Proposed Modifications for the Kerr Hydroelectric Project (FERC 1996). The other documents include:

- The December 2000 U.S. Fish and Wildlife Service and the NMFS Biological Opinions regarding Federal Columbia River Power System Operations, the NMFS Revised 2004

Biological Opinion, and the NMFS Revised 2008 Biological Opinion (USFWS 2000, NMFS 2000, 2004, 2008).

- The March 2002 BOR Voluntary Environmental Assessment (EA) for Interim Operation of the VARQ Flood Control Plan at Hungry Horse Dam, Montana (BOR 2002).
- The September 2004 BOR Hydrologic Analysis of Upper Columbia Alternative Operations, including the VARQ Flood Control Plan at Hungry Horse Dam, Montana (BOR 2004).
- The December 2002 USACE/BOR Final EA for Upper Columbia Alternative Flood Control and Fish Operations Interim Implementation at Libby and Hungry Horse Dams – Montana, Idaho, and Washington (USACE and BOR 2002).
- Final EIS for the Upper Columbia Alternative Flood Control and Fish Operations issued on April 28, 2006. The USACE signed a Record of Decision (ROD) implementing the selected plan on June 06, 2008 for Libby Dam. BOR is currently working on their own ROD for the Hungry Horse Project.

1.5.1 1996 Federal Energy Regulatory Commission FEIS

The Commission evaluated the potential environmental consequences, economic costs, and related benefits of the Montana Power Company Kerr Project Mitigation and Management Plan that was developed to mitigate impacts to fish and wildlife resources in the Flathead Lake area. This plan was the proposed action in the 1996 EIS and was developed pursuant to Articles 45, 46, and 47 of the Kerr Project operating license. These articles required the licensee to conduct fish and wildlife studies by a specified date and propose mitigation measures to reduce impacts to Flathead Lake and the lower Flathead River from Kerr Project operations.

As discussed above, in 1995, DOI filed license conditions pursuant to section 4(e) of the Federal Power Act after receiving public comments; the Commission evaluated these conditions as an alternative to the Mitigation and Management Plan. The no-action alternative was also evaluated.

The Mitigation and Management Plan proposed operational modifications focused on new monthly instantaneous minimum and maximum target flows. It also proposed non-operational mitigation, including land acquisition for replacement habitat, erosion control structures at the north end of Flathead Lake, on-site habitat development, and improvement and construction of a fish hatchery.

The section 4(e) conditions included operational modifications requiring that the Kerr Project change from a peaking facility to a baseload facility to reduce flow variability and related downstream impacts. The conditions also called for maximum between-day flow rates, maximum ramping rates, and minimum instream flow requirements. Non-operational mitigation conditions included acquisition and development of fish and wildlife habitat, fishery supplementation and reintroduction, and erosion control structures for the north shore of Flathead Lake. The no-action alternative was defined as maintaining pre-EIS operating conditions.

1.5.1.1 Analysis

In the EIS, the Commission's alternatives analysis indicated that fish and wildlife resources would benefit from implementation of either action alternative as compared to the no-action alternative. According to the Commission, the Mitigation and Management Plan would have less of an economic impact on the Kerr Project than the section 4(e) conditions, but would not provide the improvements to the lower river conditions that could lead to the recovery of native fish species. The section 4(e) conditions would provide the opportunity for native fish species recovery. The Commission also found that both action alternatives would have stabilized the north shore of Flathead Lake, provided erosion protection for existing habitat, promoted the development of shoreline vegetation, and established additional wetlands along the north shore.

Hydrologic modeling conducted for the 1996 EIS indicated that during extremely wet or dry periods, it is possible that the target lake elevations and outflows could not be met simultaneously under either alternative. However, the Secretary's section 4(e) conditions called for the development of a Drought Management Plan and better coordination with the upstream Hungry Horse Project to reduce impacts to Flathead Lake during low-water years.

1.5.1.2 Conclusions

Upon review of the 1996 EIS analysis, the Commission concluded that the section 4(e) conditions provided the greatest benefit to fish and wildlife resources and that the economic impacts to the Kerr Project were reasonable and did not jeopardize the potential for the Kerr Project to be converted to a low-cost provider of baseload power. In addition, the Commission required:

- Additional erosion control measures for the eastern portion of the north shore of Flathead Lake.
- Development of a mitigation plan for impacts associated with implementation of the erosion control measures; this plan would be developed in consultation with the USFWS, the Montana Department of Fish, Wildlife and Parks (MDFWP), and the CSKT.
- Acquisition of an additional 1,058 acres of property for habitat mitigation.
- Development of a Fish and Wildlife Implementation Strategy for the protection of fish and wildlife resources.
- Inclusion of the Flathead Joint Board of Control as an agency to be consulted during the Drought Management Plan development process.

1.5.2 Kerr Project Endangered Species Act Consultation and 2000 Biological Opinion

Section 7(a)(2) of the ESA (16 USC §1531-1544), as amended in 1988, requires Federal agencies to consult with the USFWS and NMFS (depending on the species affected) for actions which may affect species listed as threatened or endangered under the statute. The USFWS and NMFS are generally required to produce a biological opinion (BiOp) analyzing the effects of the proposed action on the listed species and prescribing appropriate alternatives or measures to minimize such effects.

In July 1998, the USFWS notified the Commission of the June 1998 listing of bull trout as a threatened species under the ESA. The USFWS further informed the Commission that certain activities contemplated in the Fish and Wildlife Implementation Strategy were likely to result in the incidental take of bull trout. In addition, the USFWS found that continued Kerr Project operations under the Commission's 1997 license order needed to be assessed for effects on threatened bull trout. Following coordination and consultation with the Tribes, PPL Montana, and the USFWS, the Commission provided a biological assessment to the USFWS in August 2000. The biological assessment concluded that Kerr Project operations under the license and an April 2000 settlement proposal were likely to adversely affect the Columbia River Distinct Population Segment of bull trout. The Commission therefore requested formal consultation under section 7 of the ESA with the USFWS.

On November 2, 2000, the USFWS filed a BiOp, concluding that Kerr Project operations and the settlement proposal would not jeopardize the continued existence of bull trout. The USFWS found, however, that various license activities may result in the incidental take of juvenile, sub-adult, and adult bull trout. The BiOp therefore included an incidental take statement, which set forth reasonable and prudent measures to minimize incidental take of bull trout, along with several terms and conditions to implement these measures. The Commission included the terms and conditions in the Kerr Project license by order dated December 14, 2000. Among other things, the USFWS terms and conditions require that the Article 60 Drought Management Plan consider the needs of protecting bull trout during drought.

Chapter 3.0, section 3.4.5.1, provides information on bull trout habitat present in the project area and Chapter 4.0, section 4.6, discusses potential impacts to bull trout habitat from the implementation of Drought Management Plan alternatives.

1.5.3 FEDERAL COLUMBIA RIVER POWER SYSTEM/HUNGRY HORSE ENDANGERED SPECIES ACT CONSULTATION AND 2000, 2004, AND 2008 BIOLOGICAL OPINIONS

The Hungry Horse Project, constructed in 1953 and operated by BOR, includes one of 14 major reservoirs in the Federal Columbia River Power System (FCRPS). The project is operated for multiple purposes including hydropower generation, flood control, fish and wildlife conservation and recreation. The Hungry Horse Project is operated by BOR for flood control and other authorized project purposes, subject to USACE's flood control authority under the Section 7 of the Flood Control Act of 1944. Releases from the Hungry Horse Project flow from the South Fork of the Flathead River to the mainstem upper Flathead River, eventually reaching Flathead Lake.

The Bonneville Power Administration (BPA; a Department of Energy [DOE] agency responsible for electric transmission and wholesale power marketing), USACE, and BOR entered into ESA consultation with NMFS and USFWS in December 1999 to consider the effects of actions related to FCRPS configuration, operations, and maintenance on species listed as threatened or endangered.

The resulting December 2000 BiOps, issued separately by NMFS and USFWS, address the operation of the FCRPS. USFWS' focus was on effects to threatened bull trout and endangered Kootenai River white sturgeon. NMFS' focus was on endangered anadromous salmon and steelhead within the Columbia River Basin. The 2000 NMFS BiOp was challenged in *National Wildlife Federal v. NMFS*, CIV. NO. 01-640 (D.Or)(Redden). The court found the BiOp invalid and remanded it to NMFS.

NMFS issued a second BiOp in 2004 which was subsequently challenged and also found to be invalid by the court. The 2004 BiOp was remanded back to NMFS with the direction to collaborate with affected Federal Agencies, Native American Tribes, and States during the subsequent consultation process. A new BiOp was issued in May 2008. USACE and BOR signed RODs implementing the BiOp in August and September 2008, respectively. This latest BiOp is also currently being challenged in District Court. As such, the effects of any potential future changes on Hungry Horse Operations remain unknown at this time.

The remand process was completed when the 2008 BiOp was finalized. BOR and USACE are, however, operating pursuant to a court order regarding spill and transport operations, as well as implementing other provisions of the 2008 BiOp. Under the order issued on June 10, 2009, Hungry Horse Project operations are to occur according to the “Montana operation,” as set forth in the Reasonable and Prudent Alternative in the 2008 BiOp. Under this new operation, the Hungry Horse Project reservoir will be drafted to an elevation 10 feet from full pool by September 30 in the wettest 80 percent of water years, which is a significant departure from previous operations. Under the 2000 and 2004 BiOps, the Hungry Horse Project reservoir was drafted to an elevation 20 feet from full pool by August 31.

The 2000 USFWS BiOp was challenged in 2003 in *Center for Biological Diversity v. U.S. Fsih and Wildlife*, CIV NO. 03-29 (D.MT)(Molloy) as to the effect of Libby Dam operations on Kootenai River white sturgeon and bull trout. The USFWS issued a subsequent BiOp in 2006 which was also challenged and resulted in a settlement agreement in 2008.

NMFS and USFWS coordinated development of these BiOps, and their recommendations and requirements are intended to be consistent. Among other things, these two BiOps partially dictate Hungry Horse Project operations and include provisions that are relevant to any Drought Management Plan for Flathead Lake.

Specifically, the relevant provisions include:

- Hourly and daily ramping rate restrictions on Hungry Horse Project releases.
- Minimum instream flow requirements for the South Fork Flathead River immediately below the Hungry Horse Dam and for the mainstem Flathead River at Columbia Falls.
- Implementation of a modified flood control strategy known as variable discharge (VARQ).

- Operations to provide flow augmentation water in summer and fall to support salmon outmigrations on the mainstem Columbia River.
- Operations to reduce or minimize the creation of a ‘second peak’ between flows for bull trout and anadromous fish.
- Operations to avoid spills that would result in a violation of the state water quality standard for Total Dissolved Gas.
- Exceptions for Emergency Situations.
- Provisions for annual operations’ plans with monthly updates to NMFS and USFWS.
- Requirements for section 7 consultation with NMFS for commitment of uncontracted Hungry Horse Project water.
- Maintaining high lake levels at Hungry Horse Reservoir to provide suitable habitat for threatened bull trout.

These requirements have been evaluated through the alternative refinement process as discussed in Chapter 2.0 and Appendix B (Technical Support Document).

1.5.4 MARCH 2002 BOR VOLUNTARY ENVIRONMENTAL ASSESSMENT

In March 2002, BOR issued a Voluntary EA for the Hungry Horse Project and implemented an alternative flood controlled strategy (VARQ) on an interim basis, starting in 2002, while a separate EIS was being prepared. VARQ is a flood control operation that reduces the wintertime reservoir drawdown at Hungry Horse for floodwater storage and provides better assurances of reservoir refill in the summer. Changes in the timing and volumes of water released from Hungry Horse have a direct effect on the amount of water available for Flathead Lake. Therefore, understanding the implications of VARQ at Hungry Horse is critical for the development of a Drought Management Plan for Flathead Lake.

BOR’s Voluntary EA of the Interim VARQ Operation at Hungry Horse notes that implementation of VARQ is expected to have the following impacts:

- Under VARQ operation, the Hungry Horse Project would continue to operate within its historical and normal operating range of elevations and releases. VARQ allows Hungry Horse reservoir to be fuller during the winter drawdown period in some low and moderate runoff years, which would result in the desired higher, more natural reservoir releases during the spring refill. VARQ would result in the Upper Rule Curves for the reservoir to be increased by approximately 20’ msl during the winter in some years (BOR 2002, p. 4).
- Discharges from the Hungry Horse Project under the VARQ flood control rule curves would generally be higher in May and June and lower in April, and have less variability from month to month than if VARQ were not implemented. Under the VARQ operation there would be less likelihood of having to spill water in April to reach the target flood control elevation and then decreasing the discharge to minimum flows once the flood control target elevation was met (BOR 2002, p. 4).

- There would be no expected increase in flooding as a result of VARQ on the Flathead River at Columbia Falls, Montana, and no significant effects on the Pend Oreille River at Cusick, Washington. Enough flood control space would remain behind Hungry Horse Dam to drop discharges to minimums during high runoff events when natural, uncontrolled flow were causing flooding downstream (BOR 2002, p. 4).
- Implementation of VARQ is expected to benefit the operation of Flathead Lake with respect to helping refill the lake and meeting the new Kerr Project minimum outflow requirements. This is a direct result of having less water storage available at Hungry Horse, increasing the available water supply at Flathead Lake, especially in below-average water years (BOR 2002, p. 5).

The Voluntary EA of the Interim VARQ Operation at the Hungry Horse Project also notes that:

> In many years, operation of the Hungry Horse Project for other uses would draft the reservoir well below the flood control space requirement under either alternative (standard flood control or VARQ). For example, the Columbia Falls minimum flows in the Flathead River and system power demands will often draw the reservoir down to elevations more comparable to, or even lower than specified by standard flood control. This is especially true under drought and power emergency conditions such as those that occurred in 2001 (BOR 2002, p. 4).

Drafting Hungry Horse reservoir could have implications for the availability of water at Flathead Lake; the potential for these impacts were considered in Kerr Project operational models.

1.5.5 September 2004 BOR Hydrologic Analysis of Upper Columbia Alternative Operations, including the VARQ Flood Control Plan at Hungry Horse Dam, Montana

In 2004, BOR conducted additional analyses of Hungry Horse Project operations under VARQ, including examination of potential impacts on the Upper Columbia System, including Kerr Project/Flathead Lake operations. This study compared standard flood control operations with VARQ flood control operations at the Hungry Horse Project using hydrologic modeling techniques. The study considered the following issues:

- Hungry Horse Project operations, including reservoir elevations, discharges, and lost power generation potential due to required spill.
- Local flood effects at Columbia Falls, Montana (located downstream of the Hungry Horse Dam and upstream of Flathead Lake).
- Effects at the Kerr Project and Flathead Lake.
- Effects at Albeni Falls Dam and Pend Oreille Lake.

The analysis indicated that implementation of the VARQ flood control plan at the Hungry Horse Project would result in minor changes in reservoir elevation and river flows as compared to the standard flood control plan. These results applied not only to Hungry Horse, but to the Upper Columbia System from Hungry Horse to the Pend Oreille River below the Albeni Falls Project. Furthermore, the study supported the conclusions of BOR 2002 Voluntary EA, confirming that under VARQ operations, Flathead Lake would be more likely to refill to full or near full pool, and would be able to stay at or near full pool for more of the summer season.

1.5.6 December 2002 USACE/BOR Final Environmental Assessment

In December 2002, USACE and BOR issued a Final EA for Upper Columbia Alternative Flood Control and Fish Operations Interim Implementation for Libby and Hungry Horse Dams (USACE and BOR 2002). This EA supports and supplements the Voluntary EA prepared by BOR, and addresses the combined effects of Libby and Hungry Horse Project operation under VARQ in the Columbia River below its confluence with the Pend Orielle River, as well as the effects of the Libby Dam operation on the Kootenai River system.

1.5.7 USACE Upper Columbia Alternative Flood Control and Fish Operations EIS

USACE, in cooperation with BOR, completed an EIS that evaluates implementation of VARQ flood control throughout the FCRPS, focusing on the Hungry Horse, Libby, and Grand Coulee projects. The Notice of Intent to prepare this EIS was published in the Federal Register on October 1, 2000. A final Scoping Document was released in April 2002; based on that document, one of the alternatives under consideration was the implementation of VARQ with modifications to Flathead Lake flood control. The Draft EIS was released for public and agency review and comment in fall 2005; the Final EIS was released in April 2006. USACE issued its ROD implementing VARQ at Libby Dam in 2008. BOR's ROD for Hungry Horse is forthcoming.

1.6 SUMMARY OF AGENCY AND PUBLIC INVOLVEMENT PROCESS

The BIA held an agency scoping meeting to solicit agency input on PPL Montana's proposed Drought Management Plan. The meeting took place in Kalispell, Montana on July 9, 2002. Representatives from 13 Federal, tribal, state, and local agencies were present at the meeting. Participants offered a number of comments and recommendations regarding the NEPA process, the proposed Drought Management Plan, Kerr Project operations, the modeling process, and impacts to socioeconomic and environmental resources. The BIA considered these comments during development of the Draft EIS.

In addition, two public scoping meetings and four public workshops were held as follows:

- Agency Scoping Meeting, July 9, 2002 – Kalispell, Montana
- Public Scoping Meetings, July 9-10, 2002 – Kalispell and Charlo, Montana
- Drought Management Plan Alternative Development Workshop, August 27-28, 2002 – Kalispell, Montana

- Drought Management Plan Alternative Development Workshop – Phase 2, October 22-23, 2002 – Kalispell and Polson, Montana

Public comments during these meetings and workshops included questions about the NEPA process and the BIA's role in the process; increasing local involvement in the process; need for a Drought Management Plan; project history and particulars of the Kerr Project operations and license; alternatives and their development; concerns about lake level impacts; impacts to water, fish and wildlife resources, and tribal resources; and socioeconomic concerns. One of the key concerns mentioned during the scoping process was the need for early drought indicators. The BIA also considered these comments during development of the Draft EIS.

A detailed summary of the comments received during public and agency scoping meetings and workshops can be found in the August 8, 2003 BIA report "Results of Scoping."

BIA conducted additional public and agency coordination during the development of the DEIS. These efforts included:

- Discussions with BOR regarding the Flathead Lake model, and how to more effectively capture the effects of Hungry Horse operations.
- Meetings with the CSKT regarding the results of the updated modeling and continued discussion of social, economic, and environmental issues.
- Discussions with USACE regarding the use of climate indicators to augment or as an alternative to standard runoff forecasting techniques.

BIA also held supplemental public information meetings on September 21 and 22, 2005 in Polson, Montana. These meetings provided the public and interested agencies an update on the progress of the Drought Management Plan EIS. Eighteen people attended these meetings. The BIA presented information regarding:

- The environmental review process.
- Activities completed to date; including scoping, alternatives development, and EIS documentation.
- A summary of the incorporation of Hungry Horse operations into the Flathead Lake model.
- A review of climate indicator identification, development, and application for the Drought Management Plan.
- A review of runoff hydrographs for wet, normal, and dry years.
- A review of the topic areas that will be addressed in the EIS.
- The anticipated project schedule.

The Draft EIS was released for public comment on July 26, 2006. An agency hearing was held on August 29, 2006 in Kalispell, Montana. Six agencies were represented at the agency hearing including BIA, USACE, BOR, Environmental Protection Agency (EPA), CSKT, and DOI. In addition, 16 comment letters were received from agencies, community organizations, and individuals and included 248 individual comments on the DEIS. Approximately 70 people attended two public hearings that were held on August 29 and August 30, 2006 in Kalispell and Polson, Montana.

A summary of all public and agency comments on the DEIS and the accompanying DOI responses is provided in Chapter 7 and Appendix C of this document.

1.7 SCOPE OF THIS EIS

This FEIS evaluates the social, economic, and environmental impacts of implementing the Drought Management Plan proposed by PPL Montana, along with several alternatives to PPL Montana's plan (e.g., the proposed action). These alternatives were developed after consideration of the agency and public scoping comments, using a process described in Appendix B (Technical Support Document).

For the proposed action and alternatives, the EIS analyzes potential impacts to affected resources including land use, water quality, biological resources, tribal resources, recreation and tourism, socioeconomic impacts, and environmental justice. Direct, indirect, and cumulative impacts are addressed. Suggested measures to mitigate unavoidable adverse effects are presented.

The remainder of this FEIS is organized as follows:

Chapter 2 – Description of the Proposed Action and Alternatives
Chapter 3 – Affected Environment
Chapter 4 – Environmental Consequences
Chapter 5 – List of Preparers
Chapter 6 – List of Recipients
Chapter 7 – Public Involvement and Agency Coordination
Chapter 8 – Glossary
Chapter 9 – References
Chapter 10 – Index

In addition, several appendices accompany the EIS:

Appendix A	Notice of Intent, Notice of Availability, and other Legal Notices
Appendix B	Technical Support Document
Appendix C	Public and Agency Comments / Responses
Appendix D	PPL Montana Drought Management Plan (2002)

CHAPTER 2.0 DESCRIPTION OF PPL MONTANA'S PROPOSED ACTION AND ALTERNATIVES

CEQ regulations require that an EIS analyze all reasonable alternatives that would accomplish the agency's purpose of and need for the action. This chapter presents the Drought Management Plan (DMP) proposed by PPL Montana (the proposed action), the process by which potential alternatives to the proposed action were developed and screened, the alternatives carried forward for detailed evaluation in the EIS including BIA's preferred alternative, and the alternatives that have been eliminated from further evaluation in the EIS.

2.1 PPL MONTANA'S PROPOSED ACTION

As required by license Article 60, PPL Montana proposed a DMP to the Secretary on March 4, 2002 (PPLM 2002). Their plan constitutes the Proposed Action as defined by NEPA. The proposal uses a tiered approach consisting of changes to Kerr Project operations over an annual period as follows:

- Achieve an annual end-of-December lake elevation of 2,888' msl in all years (regardless of drought status).
- Analyze runoff predictions and prepare monthly operating curves in consultation with various agencies.
- Revise the target lake elevation from 2,893' msl to 2,892' msl for the recreation season from June 15 to September 1 when the system is declared to be in a drought. If it is not possible to achieve this elevation during this period, then implement the next feature.
- Achieve and maintain a reduced summer pool elevation of 2,892' msl by doing the following:
    - Increase flow from the Hungry Horse Project to help attain a Flathead Lake elevation of 2,892' msl; and
    - Modify Article 56 minimum instream flows to maintain a Flathead Lake elevation of 2,892' msl between June 15 and September 1 by matching outflows to inflows.

Proposed Higher Lake Elevation at the End of December

The PPL Montana DMP proposes a target lake elevation of 2,888' msl at the end of each calendar year. PPL Montana notes that there is some risk associated in retaining more water in the reservoir at this time of year. However, PPL Montana indicates that an elevation of 2,888' msl should adequately protect shoreline improvements from ice-related damage and also provides sufficient storage capacity to absorb large runoff volumes to protect against flooding on the river both above and below Flathead Lake. PPL Montana also indicates that a higher late season lake elevation provides for more efficient and economic use of water (PPLM 2002).

Development of Minimum Volume Runoff Curves, and Review of Runoff Forecasts

Under the PPL Montana DMP, on the first day of each January through June, PPL Montana and the CSKT would develop runoff volume curves that would satisfy all license requirements. These runoff curves would provide a baseline for comparison with future runoff forecasts. If runoff volume forecasts were below the minimum needed to meet license requirements under Articles 43 and 56, then the project would be declared to be in a drought and all provisions of the DMP would be activated.

Development of Modified Operating Curve

Once it was determined that the forecasted runoff would be insufficient to allow the Kerr Project to meet its operating license requirements under Articles 43 and 56, PPL Montana and the CSKT, with input from USACE, DOI, and BOR, would prepare an annual operating curve for Flathead Lake. According to the plan, this would allow for development of target lake elevations based on current and forecasted water conditions. The operating curve and associated target lake elevations would be made available to the public. The operating curve would be reevaluated as new runoff forecasts became available, and the operating curve would be modified (in consultation with the CSKT, USACE, DOI, and BOR) as appropriate.

Revised Target Lake Elevation for June 15 through September

The PPL Montana DMP states that if the operating curve modifications conducted in the previous step do not meet the minimum instream flow requirement as defined in Article 56, the next step would be to reduce the target elevation of Flathead Lake from the full pool elevation of 2,893’ msl as of June 15 to 2,892’ msl (PPLM 2002).

Reduction of Minimum Instream Flows below the Kerr Project, or Increase in Water Contribution from Hungry Horse Dam

In the event that the previous steps do not allow for meeting the revised target lake elevation of 2,892’ msl and minimum instream flow requirements, PPL Montana would request DOI approval of a protocol that revises minimum instream flow releases, ramping rates, and between-day flow changes and may include a request for BOR to release additional water from the Hungry Horse Project[3]. This approach is intended to balance or supplement inflows and maintain lake levels at 2,892’ msl. PPL Montana further suggests that if minimum instream flows remain at least 6,000 to 8,000 cubic feet per second, impacts to bull trout and west slope cutthroat trout spawning and aquatic habitat would be minimal. Therefore, the PPL Montana DMP considers 6,000-8,000 cfs the lower limit for minimum instream flows (PPLM 2002).

[3] The Hungry Horse Project has a myriad of regulatory requirements unrelated to Kerr Project operations that BOR (the Hungry Horse Project operator) must address. Implementation of PPL Montana’s Proposed Action would impact BOR’s ability to, among other things, fulfill downstream salmon recovery obligations. It would also result in less water in the Hungry Horse reservoir - to the detriment of ESA listed bull trout. In most cases, environmental mitigation, generation requirements, and operational restrictions at Hungry Horse would substantially limit, if not eliminate water available for the Kerr Project during drought years.

2.2 DEVELOPMENT OF ALTERNATIVES

The scoping process, discussed previously in Chapter 1.0, section 1.6, resulted in the development of various components of potential alternatives to the proposed action. BIA conducted further technical modeling and analyses to develop and combine these components into reasonable alternatives that would allow meaningful analysis of potential environmental impacts of drought management planning for Flathead Lake. Various periods of record were used in the analysis based upon Kerr Project operations during that period of time and the availability of reliable data. The following components were considered during the alternatives development process.

- Use of early drought indicators
- Use of early decision making tool
- Adjustments to the winter pool elevations for Flathead Lake when the DMP is activated
- Modification of the timing of Flathead Lake refill
- Adjustments to target refill elevations for Flathead Lake
- Adjustments to minimum instream flow requirements
- Modification of the timing of minimum instream flow requirements
- Modification of Hungry Horse Project operations

Further development of the drought indicators and simulation of Kerr Project operations were the primary activities conducted during the development of alternatives. These activities are discussed below and described in detail in Appendix B (Technical Support Document).

For the purposes of analysis, drought conditions were defined as less than 72.6 percent of average April through September runoff from all tributary sources (i.e., runoff volume of less than 5,100 thousand acre-feet); under these conditions there are potential conflicts between Articles 43 and 56 of the Kerr Project license. A severe drought is considered less than 65 percent of average April through September runoff.

2.2.1 PERIODS OF RECORD

The construction of the Kerr Dam was completed in 1938 and water level and flow release data associated with the Kerr Project is available beginning in the 1940 water year. Several different periods of record are discussed and used in the analysis contained within the EIS. Different periods of record are needed based upon the data being analyzed, establishing a frame of reference or for testing alternatives to a wide range of weather extremes. In addition, the scoping process, development of alternatives and the Draft EIS occurred during the years 2002 to 2004. As various drafts were developed, analyses were updated to add water years 2003 and 2004 since those data sets were available. The following summarizes these periods of record and their use:

Water years 1950-2002 – Flathead Basin and Montana Division 1 Precipitation used in initial climate indicator screening during alternative development phase. This was the best available information at the time the alternatives analysis process began.

Water years 1951 – 2003 – Multi-variant El Niño and Southern Oscillation Index (MEI) indicator data used in analysis. MEI data was not directly collected prior to 1951. Use of MEI indicator in alternatives modeling for water years prior to 1951 is based upon estimates using best available data. This was the best available information at the time for development of a MEI indicator.

Water years 1965 to 2004 – Period of Record chosen for the analysis of the affected environment and effects of alternatives on the affected environment. WY 1965 is the year in which the Article 43 operations were initiated. This period of record also contains seven drought years which were used in the affected environment analysis. During this period of record, several different minimum instream flow requirements were implemented. This period contained the most reliable data from which to discuss the effects of conflicts between Article 56 and Article 43 of the license.

Water years 1940 to 2004 – Water flow and lake level data used in applying operating logic for Alternatives 1 and 2 to test their ability to resolve conflicts between Article 43 and Article 56 of the Kerr Project license. Of specific interest were the droughts that occurred in the 1940's. Note that climate indicators were estimated for the periods 1940 to 1950 based upon best available information. This long period of record was used to test the resiliency of the DMP alternatives to a wide variety of climatic and hydrologic conditions.

2.2.2 DROUGHT INDICATORS

During the scoping process, BIA determined that a DMP should include an early drought indicator system based on established climate indicators, along with a description of the climate conditions that would activate the plan. Preliminary data collection by BIA indicated that climate indicators can predict the potential occurrence of drought, aid in the early activation of a DMP, and improve the reliability of DMP decisions (BIA 2003).

Detailed analyses were conducted to develop climate indicators specifically for drought prediction and decision making relative to Drought Management Planning for Flathead Lake. The analyses indicated that a prognostic indicator, the Multi-variant El Niño Index (referred to as the MEI) is an effective predictor of drought conditions early in the water year (the water year starts on October 1 and ends on September 30). The MEI relates to, and is a measure of temperatures in the tropical Pacific Ocean, which have been shown to affect climate and precipitation in northern latitudes. This indicator is linked with the position of the jet stream and the magnitude and frequency of fall/winter storms that cross the Montana mountain ranges.

The climate analyses used Montana Climate Division 1 precipitation data to determine the potential for drought conditions. However, Montana Climate Division 1 covers 10 counties in the northwest and west central portions of Montana. To provide an indicator that would be more representative of the Flathead basin, the diagnostic Flathead Precipitation Runoff Index was developed by BIA for use in this EIS. The Flathead Precipitation Runoff Index (FPRI) is based on observations of precipitation from October through April at eight precipitation stations located in the key sub-basins affecting the Flathead basin.

The BIA also examined existing water supply forecasting methods and found that they combine existing data with future predictions based on average runoff and/or precipitation values. In drought years, this skews the forecast to be wetter than would be expected in a drought year. In addition, the methods provided here are intended as indicators to activate or deactivate a DMP. The official forecasts would still be used to make water management decisions relative to flood control or other operations within the context of the activated DMP.

Ultimately, the climate analysis process resulted in the use of a combination of the prognostic MEI indicator and the diagnostic FPRI indicator. The MEI would be used to anticipate the potential for a drought year from October to December whereas the FPRI would be used from January through April to measure the water content in the snow pack of the Flathead basin. Specifically, a DMP would be activated if the MEI value was greater than or equal (≥) to 0.50 (El Niño)[4]. During the alternatives development process, a screening analysis which used data for water years 1951 to 2003 was conducted. The analysis indicated that use of the MEI results may provide a greater than 70 percent correct DMP activation decision when applied from October to December. This analysis was subsequently confirmed through use of a logistic regression model which confirmed that 75 percent of the observed drought years were forecasted correctly (See Appendix B).

Application of the regression modeling to the FPRI in January and February in concert with the MEI, demonstrated a potential for an 86 percent correct DMP activation decision. Application of the regression modeling to the FPRI alone in March and April demonstrated a potential for a correct DMP activation decision 96 percent of the time for water years 1951 to 2003[5]. A concern with using traditional regression modeling is the potential for multicolinearity among predictor variables, which can influence the overall regression model fit and compromise the results – that is, use of overlapping information would affect the accuracy of the forecast. A principal components analysis was conducted to address the multicolinearity issue. The analysis found that while there is multicolinearity among the regression model variables, it does not affect the overall results of the prediction.

A key factor in these combined FPRI/MEI indicators is that no low runoff years are missed by the indicator scheme. This scheme of the drought indicators does over-predict the occurrence of low runoff

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4 The MEI is made up of six separate components that assist in forecasting storm tracks and jet stream positions that affect weather patterns in Montana. These components are combined to make the index. Index values greater than 0.5 are considered El Nino, 0.5 to -0.5 are considered a Neutral phase and values less than a -0.5 are considered La Nina. An MEI value greater than 0.50 is statistically correlated to low water years in the Flathead Basin.

5 MEI values were not calculated prior to 1951.

years. However, the monthly evaluations provide the opportunity to deactivate the DMP in time for Article 43 flood control operations to resume, minimizing any additional risk of flooding.

Detailed information regarding the analysis and development of the climate indicators, including the MEI and FPRI, can be found in Appendix B.

2.2.3 KERR PROJECT SIMULATIONS

The alternatives development process used a simulation model of the Kerr and Hungry Horse projects that was constructed using version 7.01 of STELLA™ software, a graphical and object-based hydrologic modeling software package developed by High Performance Systems, Inc. The simulation model of the Kerr and Hungry Horse projects allows the user to specify operational logic for both facilities and view the resulting impacts to Flathead Lake water levels and Kerr Project flow releases. It is useful as a planning tool when used to evaluate potential system responses to selected operational changes.

However, it must be recognized that simulation results may not capture all the nuances of real-time operations. As discussed in Chapter 1.0, the Kerr Project currently operates under a joint license issued by the Commission. The license contains multiple articles or conditions governing Project operations. In addition, the Kerr Project operates as part of the FCRPS and must coordinate its daily operations as part of an overall system of dams on the Columbia River System. Currently, a number of the real-time operational decisions relative to the Kerr and Hungry Horse projects are based on project needs, operations, weather, and stream flow forecasts, and cannot be explicitly modeled.

Recognizing these limitations, simulation modeling results were used to help identify operational changes that might alleviate or minimize conflicts between Article 43 (lake level requirements) and Article 56 (minimum instream flow requirements) of the Kerr Project license. Use of this model allowed an evaluation of Flathead Lake water levels and Kerr releases resulting from various Kerr and Hungry Horse operational assumptions. The impacts were measured as changes in water levels and instream flows. The operational model for the Kerr Project used BOR modeling of Hungry Horse operations under VARQ. Therefore, impacts of Hungry Horse operations are reflected in the Kerr operation modeling results.

Dozens of simulations were conducted to assist in establishing target Flathead Lake water levels for use in the Alternatives Analysis. Of particular importance was the end of December target elevation. The simulation analysis concurred with the 2,888' msl elevation used as part of the proposed action. This elevation provides reasonable assurance to respond to both drought and flood conditions as the snow pack accumulates. During drought conditions, the simulations demonstrated that the May 31 target elevation of 2,890' msl was not necessary as its purpose is to pass or to store flood waters as required for flood control operations.

Alternatives were developed using various combinations of the climate indicators and simulations of Kerr Project operations (see sections 2.3 and 2.4). These alternatives were modeled for the 10 driest water years between 1940 and 2001. As represented in Table 2-1, runoff volumes in each of these years would have activated the DMP. (Note: Data prior to 1940 was not available).

Table 2-1: Water Years Modeled (10 Driest Years between 1940 and 2001)

Water Year	Percentage of Normal Runoff
2001	56.5
1994	75.8
1992	63.0
1988	66.0
1987	72.1
1977	55.6
1973	71.8
1944	51.6
1941	47.2
1940	66.8

Detailed information regarding the model development can be found in Appendix B.

2.3 ALTERNATIVES

Based on the results of preliminary modeling analyses as described in Appendix B, BIA developed the following alternatives for full consideration in the EIS.

2.3.1 NO-ACTION ALTERNATIVE

Under the No-Action Alternative, there would be no DMP and the Kerr Project would operate under the conditions of Article 43 (lake elevations) and Article 56 (minimum instream flows) of the license. In other words, the lake would be managed to meet lake elevations as defined in Article 43, as well as the minimum instream flows in Article 56. Conflicts between these requirements in a low-water year would have to be dealt with on an ad hoc basis.

Currently, Columbia Basin project operators use the Northwest River Forecast Center (NWRFC) water supply forecasts to guide reservoir operations. These water supply forecasts are also used by USACE to develop flood control operating criteria for projects throughout the Columbia Basin. The NWRFC forecasts are coordinated with the Natural Resources Conservation Service (NRCS) and consider both existing conditions and National Weather Service (NWS) short-term predictions of future conditions.

Current drought management activities also use the official consensus runoff forecast in the decision making process. In the past, this forecast involved obtaining actual snow pack and precipitation values for the month of the forecast, then adding the historical average snow pack/precipitation values for future months. This forecasting method has recently been modified to look at a range of future snow pack/precipitation values in an attempt to encompass the potential for higher than average (up to 125 percent of the historical average) and lower than average (as low as 75 percent of the historical average) precipitation. However, both of these forecasting methods use the historical average of the full period of record and do not attempt to segregate drought years from wet years when forecasting future precipitation. As a result the current forecasting scheme does not provide a specific indicator to declare the Flathead basin in drought such that a DMP can be activated.

Because Article 60 expressly requires the development and implementation of a DMP, the No-Action Alternative would not meet the purpose and need for the project. However, NEPA regulations require analysis of the impacts associated with a no-action alternative to provide a baseline comparison for the action alternatives.

2.3.2 ALTERNATIVE 1 (MINIMUM INSTREAM FLOWS PRECEDENCE)

Under this alternative, if runoff volumes were insufficient to support both lake levels and minimum instream flows, the latter would take precedence. Steps 1 through 4 are the same under both alternatives and the licensee would be required to consult with the CSKT at all decision-making points in either alternative. The only difference between these alternatives is the treatment of minimum instream flows. USACE may supersede any of the steps below, based on the official forecast from the NWS, if they consider it necessary to reduce the risk of flooding. Any actions implemented by USACE for flood protection purposes may reduce the likelihood that target lake elevations are met and maintained during the recreation season.

Under Alternative 1 a DMP would require the following actions:

1. October-December Climate Review

The licensee would review the climate indicators from October through December; if at any time during this period the indicators predict drought conditions the licensee would activate the DMP and notify the Secretary within one business day. Specifically, on or about October 10, the licensee would obtain MEI values for April/May, May/June, June/July, July/August, and August/September from the National Oceanic and Atmospheric Administration (NOAA) Climate Diagnostics Center (currently available at http://www.cdc.noaa.gov/people/klaus.wolter/MEI/table.html) and average them. For subsequent months, the MEI values to be averaged would shift accordingly (i.e. on or about November 10, average May/June through September/October MEI values; on or about December 10, average June/July through October/November values). If during any of those periods the MEI average value was ≥ 0.50 (El Niño), the licensee would activate the DMP, notify the Secretary, and be required to achieve an end of December lake level no lower than 2,888' msl. If the MEI value was <0.50, the DMP would not be activated and licensee would be free to operate the Project consistent with terms of the other license articles. The DMP may be deactivated beginning in January based on the FPRI (see below).

2. Lake Drawdown Deviation

The licensee would be required to file a notice of the intent to deviate from Article 43 with USACE when the DMP was activated. This notice would include the rationale for the deviation and a summary of the CSKT consultation process, including the CSKT's position regarding the deviation. USACE would have ten working days to approve, deny, or comment on the proposed deviation from Article 43 and 1962 MOU. The licensee would be required to provide the Secretary with a copy of the notice at the same time it was filed with USACE.

If the deviation were approved by USACE, then the licensee would achieve a minimum lake elevation of 2,888' msl from December 31 through April 15, subject to the requirements of Article 57 (between-day flow change restrictions), Article 58 (hourly ramping rate maximums) and continuing review by USACE. The licensee would also have to provide to USACE an update on the effect of the Article 43 deviation on potential flood control operations no later than the tenth day of each month that the DMP is activated. The update would include an analysis of the climate indicators, a discussion of the consensus Flathead Lake forecasts from the River Forecasting Center and a summary of NWS 10-day and 30-day weather forecasts which may have impact on Kerr drought and flood control operations. USACE would consider other factors as they determined appropriate and would direct operations based on all appropriate information, consistent with their flood protection responsibilities.

3. January-April Climate Review

In the months of January through April, the licensee would obtain the MEI average value for July/August through November/December period and would also calculate the FPRI (in accordance with procedures outlined in the DMP) by no later than the 10th day of each month. The MEI average and FPRI would be used in the following manner:

a. Early January:

   1. If the January FPRI is ≤ 2,300[6] and the MEI average is > -0.50 (neutral or El Niño), the DMP would be activated or continue in force.
   2. If the January FPRI is ≤ 3,000 and the MEI average is ≥ 0.50 (El Niño), the DMP would be activated or continue in force.
   3. If these conditions do not apply, then a previously activated DMP would be deactivated. Monitoring climate indicators would continue.

b. Early February:

   1. If the DMP is in force and the February FPRI is ≤ 4,300, then the plan would remain in force.

[6] The FPRI value is an index value which represents the total volume of water contained in the Flathead basin snow pack in thousand acre-feet (kaf).

2. If the DMP is not in force, the February FPRI is ≤ 3,700, and the MEI average obtained in January is > -0.50 (neutral or El Niño), then the plan would be activated.
3. If the DMP is not in force, the February FPRI is ≤ 4,300, and the MEI average obtained in January is ≥ 0.50 (El Niño), then the plan would be activated.
4. If none of the above conditions are met, then the plan would not be activated or a previously activated DMP would be deactivated. Monitoring climate indicators would continue.

c. Early March:

1. If the DMP is in force and the March FPRI is ≤ 4,800, then the plan would remain in force.
2. If the DMP is not in force and the March FPRI is ≤ 4,800, then the plan would be activated.
3. If none of the above conditions are met, then the plan would not be activated or a previously activated DMP would be deactivated. Monitoring climate indicators would continue.

d. Early April:

1. If the DMP is in force and the April FPRI is ≤ 5,100, then the plan would remain in force.
2. If the DMP is not in force and the April FPRI is ≤ 5,100, then the plan would be activated.
3. If none of the above conditions are met, then the plan would not be activated or a previously activated DMP would be deactivated. Monitoring climate indicators would continue.

4. Lake Refill Deviation

Beginning April 15 and through June 15, when the DMP was activated, the licensee would be required to maintain lake elevations as high as flood control elevations, as determined by USACE, are allowed. It is recognized that this would result in a deviation from Article 43 requirements; specifically the April 15 requirement for a lake elevation of 2,883’ msl and a May 30 requirement for an elevation of 2,890’ msl.

5. Lake Elevation Goals under Minimum Instream Flows

The licensee would make every reasonable effort to achieve a June 15 lake elevation no lower than 2,892.2’ msl (higher if possible)[7] and would make every reasonable effort to maintain this minimum lake

[7] During the summer recreation period, elevation 2892.2 feet would have been achieved or exceeded under the Drought Management Plan in six of the seven drought years that occurred between 1965 and 2004. The 1965 through 2004 time frame was chosen because it includes the affect of Kerr Project operations under Article 43 conditions.

elevation from June 16 to September 15 – without impacting required minimum stream flows downstream of Kerr Dam

Alternative 1 also would require the licensee to re-examine the climate indicators and runoff characteristics of the Flathead basin every five years to determine if the indices need to be modified to account for climatic changes.

2.3.3 ALTERNATIVE 2 (MINIMUM INSTREAM FLOWS VARIANCE ALLOWED) – PREFERRED ALTERNATIVE

Under this alternative, some flexibility would be allowed with respect to meeting minimum instream flows. Steps 1 through 4 are the same for Alternatives 1 and 2, the only difference between the two alternatives being management of minimum instream flows. USACE may supersede any of the steps below, based on the official forecast from the NWS, if they consider it necessary to reduce the risk of flooding. Any actions implemented by USACE for flood protection purposes may reduce the likelihood that target lake elevations are met and maintained during the recreation season.

In addition to steps 1 through 4 as discussed in Section 2.3.2, the Alternative 2 DMP would require the following activities:

1. Minimum Instream Flows Deviation Decision Process

By no later than March 10, the licensee would obtain runoff volume predictions from the FPRI and the “Official March Final” forecast from the NWS – Northwest River Forecast Center. The licensee would use the forecast that predicts the lower runoff volume when applying the following decision process:

a. If the runoff volume, as measured between April and September, is forecasted to be >72.6 percent of normal (FPRI of 5,100), the licensee would deactivate the DMP and comply with Article 43 and Article 56.

b. If the runoff volume is forecasted to be >65 percent but ≤72.6 percent of normal (FPRI between 4,566 and 5,100), the DMP would remain in force, allowing lake refill to occur earlier than it would normally occur.

c. If the runoff volume is forecasted to be ≤65 percent of normal (FPRI of 4,566), the licensee would be required to submit a notice of intent to deviate from Article 56 to the Secretary of Interior and the BIA staff person(s) assigned to the Kerr Project.

2. Requirements of Notice of Intent to Deviate from Article 56

By no later than April 10, the licensee would obtain runoff volume forecasts to assist in determining whether drought management procedures should be terminated, maintained without a deviation from the minimum instream flow requirements of Article 56, or maintained with a deviation from minimum instream flow requirements. The licensee would request a deviation if runoff volume forecasts indicated that Article 43 lake levels could not be met if minimum instream flows were maintained. This decision would be made by the licensee following coordination with BOR to determine what, if any, additional water may be available from the Hungry Horse Project. Under these conditions, the licensee would submit a notice of intent to deviate from the flow requirements to the Secretary as follows:

a) Requirements of Notice of Intent to Deviate from Article 56

The notice of intent to deviate from Article 56 would include the forecasted runoff percent and volume, the proposed minimum instream flow curve, the June 15 forecasted Flathead Lake elevation, and the expected average summer Flathead Lake elevation (June 16 to September 15). The notice would also include the rationale for the deviation and a summary of the consultation process including discussions with BOR regarding water availability from the Hungry Horse Project and CSKT's position regarding the deviation.

b) Secretary Approval to Reduce Peak Minimum Instream Flows

The Secretary or approved designee would have ten working days to approve, modify, or deny the proposed deviation. If the Secretary or approved designee had not responded after ten working days, the proposed deviation would be considered approved. If approved, the licensee would be allowed to reduce peak minimum instream flows to as low as 8,000 cfs, and would be allowed to shift the minimum instream flows peak period by up to two weeks early to coincide with the spring runoff event.

3. Lake Elevation Goals under Minimum Instream Flows Deviation

The deviation plan would make every reasonable effort to achieve a June 15 lake elevation no lower than 2,892.2' msl and higher if possible. The deviation plan would make every reasonable effort to achieve an average lake elevation of no lower than 2,892.2' msl during the June 16 to September 15 period and higher if possible. These lake elevations would be required only if drought conditions were such that minimum instream flow deviations were also required.

Alternative 2 also would require the licensee to re-examine the climate indicators and runoff characteristics of the Flathead basin every five years to determine if the indices need to be modified to account for climatic changes.

4. Adaptive Management

Monitoring actual effects on key economic, social, and environmental indicators during periods of drought will help to identify actual effects of, and identify possible improvements to, the DMP. As such, within one year of the Record of Decision, the licensee would develop an adaptive management plan for review and approval by the Secretary that would assess: (1) Assumptions and indicators used in developing and implementing the DMP; (2) estimates and predictions made in the analysis including environmental, social, and economic effects; and (3) recommendations regarding potential modifications to the DMP in an effort to minimize adverse effects.

2.4 ALTERNATIVES ELIMINATED FROM FURTHER STUDY

In addition to the alternatives described in section 2.3 above, BIA considered three other alternatives that relied on existing procedures, without the use of climate forecasting tools, to respond to drought conditions. They included: (1) Giving priority to sustaining lake levels by reducing instream flows; (2), giving priority to meeting the minimum instream flows by reducing lake levels, and (3) allowing flexibility relative to timing and magnitude of the minimum instream flows to benefit lake levels.

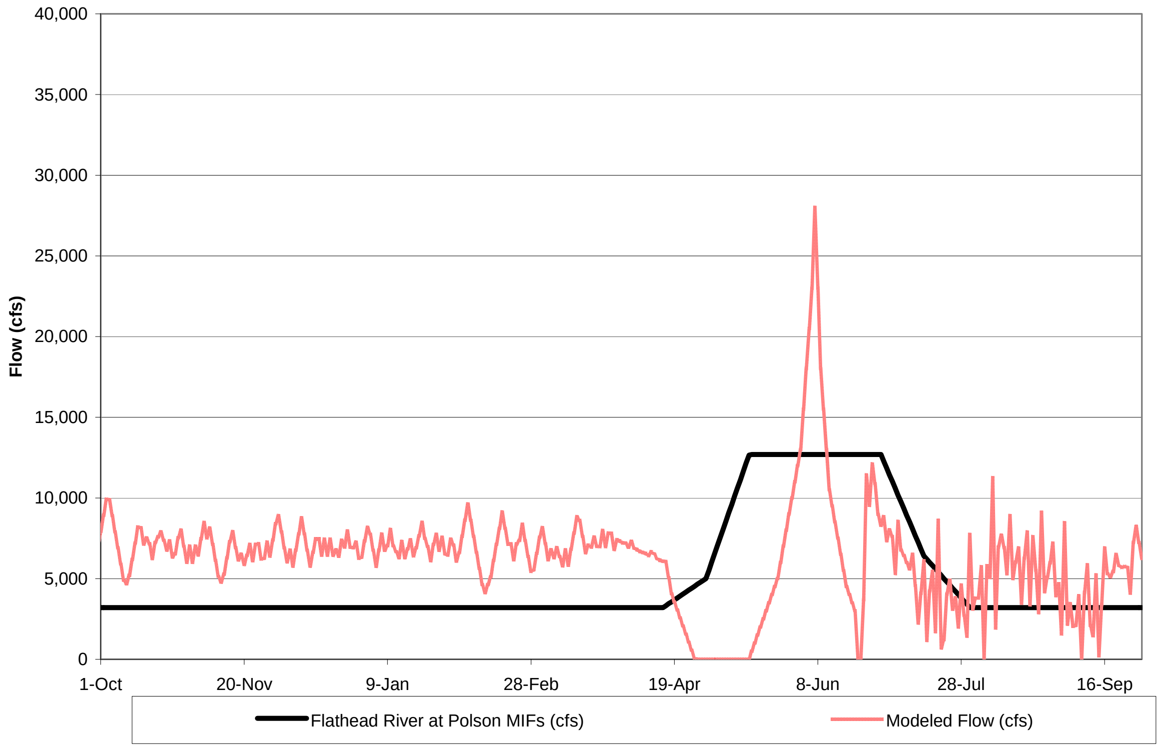
Based on additional technical work (described in Appendix B), BIA concluded that implementation of alternatives that do not resolve conflicts between lake levels and minimum instream flows would negatively affect either the Flathead River below the Kerr Project or Flathead Lake elevations or both. In addition, since these alternatives did not effectively resolve conflicts between the requirements of Article 43 and Article 56 as required by Article 60, they did not meet the purpose and need for agency action and have been eliminated from further study.

2.4.1 DROUGHT RELIEF THROUGH MODIFIED INSTREAM FLOWS

Under this alternative, Kerr Project operations would be modified by reducing instream flows as necessary to meet lake level targets (subject to the maximum between-day ramping rate restrictions, hourly ramping rate maximums, and the natural channel capacity constraints of Flathead Lake). The year end lake level would remain unchanged (2,883 ’msl) and operational modifications would not begin until after the spring flood period had ended.

Modeling indicated that, under drought conditions, giving preference to sustaining lake levels at the expense of minimum instream flows would lead to periods of severely diminished to no-flow conditions below the Kerr Project. As an example, Figure 2-1 shows the modeled Kerr releases for 2001 and demonstrates that under the Modified Instream Flow Alternative, no flow would have occurred during late April and early May; similar results were achieved for the other nine low water years between 1940 and 2001. In addition, the modeling suggests multiple spikes in flow rates below the Kerr Project, which would be undesirable for downstream resources (BIA 2004).

Figure 2-1: Simulated Kerr Project Releases for Modified Instream Flows Alternative – 2001



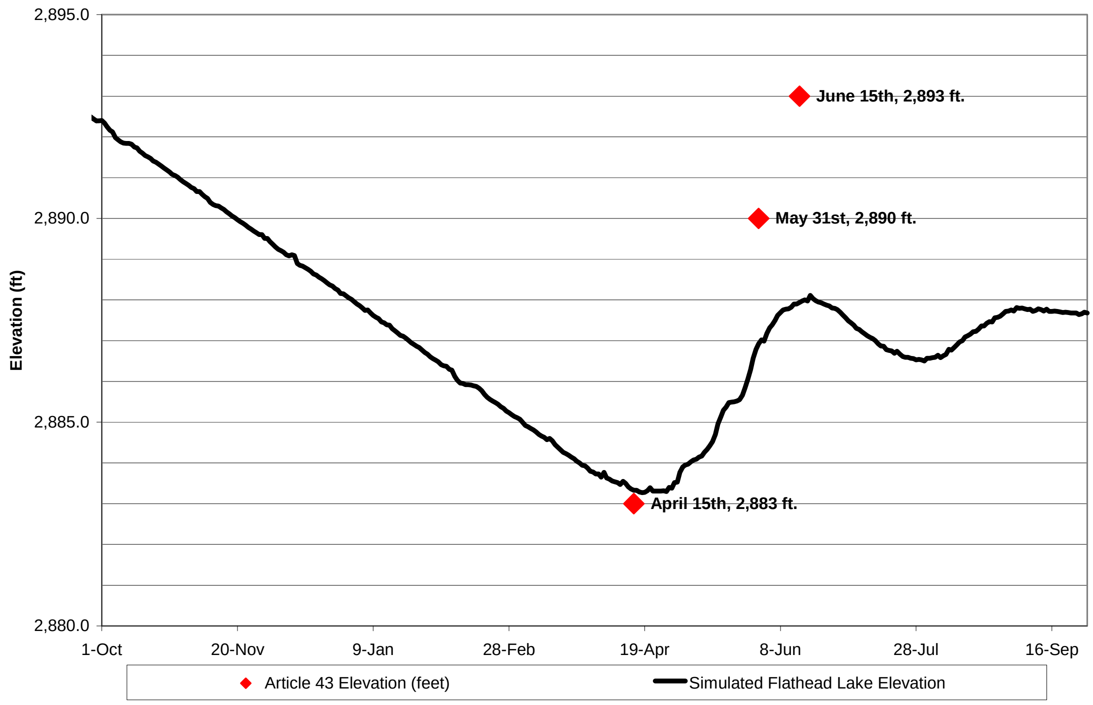
Implementation of the Modified Instream Flow Alternative would likely result in very low or no-flow conditions below Kerr Dam, which would jeopardize natural resources in the lower Flathead River and potentially shut down power production. For this reason, this alternative was eliminated from further consideration in the EIS.

2.4.2 DROUGHT RELIEF THROUGH MODIFIED LAKE LEVELS ALTERNATIVE

Under this alternative, Kerr Project operations would be modified by reducing lake elevations to meet minimum instream flows. As discussed above, the year end lake level would remain unchanged (2,883' msl). However, beginning after April 15 and depending on the flood potential at that time, more rapid refill of the lake would occur. This rapid refill would reduce potential impacts on lake elevations as instream flows were prioritized – although the main purpose of maximizing storage would be to insure that instream flows were met.

Modeling of this alternative indicated that under drought conditions, lake elevations well below those established by Article 43 may occur during the summer recreation season. In addition, instream flows could be unintentionally reduced as the natural capacity of the channel between Flathead Lake and the Kerr Dam, under low lake elevations, could limit discharge into the lower Flathead River. As an example, Figure 2-2 shows that lake elevations for 2001 would not have reached either the end of May elevation of 2,890' msl or the June 15 elevation of 2,893' msl. In fact, 2,893' msl would not have been met at any time thereafter (Ibid). For the year 2001, the highest refill level that would have been reached under this alternative was approximately 2,888' msl in mid-June, with a low of approximately 2,886.7' msl in late July. Similar results were achieved for the other nine low water years between 1940 and 2001.

Figure 2-2: Simulated Flathead Lake Elevations under the Modified Lake Level Alternative



Water Year 2001 Hydrology

Therefore, implementation of the Modified Lake Level Alternative would likely result in lake elevations well below full pool (significantly affecting lake recreation) and possibly instream flows below Article 56 requirements. For these reasons, this alternative was eliminated from further study.

2.4.3 BALANCING LAKE LEVELS AND INSTREAM FLOWS ALTERNATIVES

A series of analyses were conducted to determine if varying flow rates, timing, and lake level targets in various combinations would produce a viable alternative. Hydrologic modeling was used to evaluate a variety of options to resolve the conflicts between Article 43 and 56 in a reasonable and flexible manner. Two options were further refined—one led to Alternative 1 and the other led to Alternative 2—which were more fully developed and analyzed in this EIS. The two other options, which were ultimately rejected, are discussed in sections 2.4.3.1 and 2.4.3.2. Under all of these balancing options:

- Climate indicators would be used, i.e., the MEI and FPRI.
- When the DMP was activated, the target end-of-December lake elevation would be 2,888' msl.
- From January through April, lake levels would remain as high as flood control would allow, subject to minimum instream flows.

- Refill could be initiated at a date earlier than April 15.
- Flathead Lake would be refilled as soon as flood control would allow (refill dates and lake levels would be relaxed).

2.4.3.1 Lake Level Priority Option (automatic minimum instream flow deviations)

Under this option, the DMP would allow deviation from minimum instream flows required by Article 56 by automatically reducing the minimum instream flow peak to 8,000 cfs and beginning the increase in minimum instream flows one to three weeks early. Modeling results indicated that this option would substantially meet lake level goals for the ten driest years between 1940 and 2001 (see Table 2-1). Using this approach, however, the DMP would allow immediate deviation from minimum instream flows without reference to runoff forecasts. In minor drought years, this would likely result in unnecessary minimum instream flow deviations. Modeling Kerr Project operations for minor drought years indicates that by allowing lake refill to occur earlier in the spring, summer lake levels are likely to be near normal without requiring deviations from minimum instream flows. Thus, BIA developed Alternative 2 for added flexibility under a defined set of drought and operating conditions, and eliminated the Lake Level Priority Option from further study in the EIS.

2.4.3.2 Balanced Approached Based upon Runoff Forecasts Option

Under this option, the DMP would allow the licensee to adjust the minimum instream flows required by Article 56, based upon March and April runoff forecasts as follows:

- If the runoff forecast was 65 to 72.6 percent of normal, no minimum instream flow deviation would be allowed.
- If the runoff forecast was 60 to 65 percent of normal, deviation to a peak minimum instream flow of 10,500 cfs with a potential one week shift in the timing of lake refill would be allowed.
- If the runoff forecast was 55 to 60 percent of normal, deviation to a peak minimum instream flow of 9,000 cfs with a potential two week shift in the timing of lake refill would be allowed.
- If the runoff forecast was below 55 percent of normal, deviation to a peak minimum instream flow of 8,000 cfs with a potential three week shift in the timing of lake refill would be allowed.

Modeling the potential minimum instream flow deviations outlined in this option indicated that setting multiple minimum instream flow deviation levels would not allow the licensee the flexibility necessary to react to worsening drought conditions in late spring. Specifically, if the forecasts predicted a mild to moderate drought year and drought conditions turned severe, lake levels would drop. Similarly, if forecasts predicted a severe drought year and drought conditions improved, an unnecessary deviation from minimum instream flow requirements could occur. For this reason, this option was eliminated from further study in the EIS.

2.5 SUMMARY AND COMPARISON OF ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVES

Based on the information and analysis presented in Chapter 4.0, Environmental Consequences, this section briefly discusses the environmental consequences of the alternatives and the primary differences among the alternatives evaluated in the EIS. It compares the anticipated environmental impacts of PPL Montana's Proposed Action and the Alternatives. Table 2-2, Summary of Impacts, provides information to help distinguish among the alternatives. Alternative 2 is BIA's preferred alternative.

Table 2-2: Summary of Impacts

Resource	Drought Management Plan Alternative			
	No Action Alternative	Proposed Action (PPL Montana Plan)	Alternative 1 (MIF Precedence)	Alternative 2 (MIF Deviation Allowed)
Operations				
Lake Levels	WY 2001 was evaluated as an example of No Action operations during drought years. Neither the April 15 nor the June 15 target elevations were achieved.	2,892' msl lake level target can only be met and maintained during drought years if water from Hungry Horse Project is provided. Unable to quantify frequency of occurrence. Increased risk of winter property damage from icing given higher winter pool elevation of 2,888' msl. Reduced opportunities to conduct winter maintenance given higher lake elevation.	June 15 target lake level of 2,892.2' msl was achieved and maintained in over 70% of drought years evaluated. Recreation season lake elevation exceeded 2892.4' msl in 50% of drought years evaluated.	Target lake level of 2,892.2' msl was achieved and maintained in all drought years evaluated. Recreation season lake elevation exceeded 2892.4' msl in 80% of drought years evaluated.
Minimum Instream Flows	WY 2001 was evaluated as an example of No Action operations during drought years. Minimum instream flow targets were not sustained under these conditions, increasing impacts to downstream resources.	Deviation from minimum instream flow requirements likely in severe drought years. Flexibility to balance impacts and to more efficiently use limited water resources is reduced due to limited advanced planning and reliance on Hungry Horse water. Minimum instream flow targets not met when outflows matched to inflows, increasing impacts to downstream resources.	Minimum instream flows achieved in all water years evaluated.	Deviation from minimum instream flow requirements required in three of the 10 drought years. 20% of the drought years evaluated required instream flow deviations to 8,000 cfs and 10% required deviations to 10,500 cfs. Temporary, seasonal impacts to certain downstream resources may occur.
Flood Control	Project operators use NWRFC water supply forecasts to develop flood forecasts. Article 43 is followed. No anticipated impacts to flood control.	Unclear how flood control is incorporated into development of flood control rule curves although higher winter lake elevations each water year may increase the risk of flooding on an annual basis.	The 1964 flood event was examined to determine impacts of the DMP on flood levels. Modeling indicates drought indicators would have cancelled the DMP and flood pool would have been available for flood control.	The 1964 flood event was examined to determine impacts of the DMP on flood levels. Modeling indicates drought indicators would have cancelled the DMP and flood pool would have been available for flood control.

Resource	Drought Management Plan Alternative			
	No Action Alternative	Proposed Action (PPL Montana Plan)	Alternative 1 (MIF Precedence)	Alternative 2 (MIF Deviation Allowed)
Geology and Soils				
Geology	No effects to geology anticipated.	No effects to geology anticipated.	No effects to geology anticipated.	No effects to geology anticipated.
Soils/Erosion	Difficult to determine; anticipated variability of lake levels during a severe drought year would not concentrate wave energy at any elevation for long durations reducing potential impacts of shoreline erosion.	Potential for increased wave-related erosion at 2,888' msl (winter/early spring) annually and 2,892' msl (summer) under drought conditions. Increased potential for ice damage to docks and shorelines including potential each year to increase late winter flow release causing ice damage to lower river.	Potential for increased risk of wave-related erosion at 2,888' msl (winter/early spring) and at 2,892.2' msl when DMP is activated.	Potential for increased risk of wave-related erosion at 2,888' msl (winter/early spring) when DMP is activated. However, 80% of drought years maintain lake level over 2892.5' msl reducing newly exposed shoreline areas and minimizing potential impacts.
Land Use (Lake Access)	Vast majority of the lakes 3,000 docking structures are fixed elevation. Use of these structures (e.g., accessibility to deep water craft, usability of docks by elderly and disabled) would be affected in every drought year due to reduced lake levels.	Use of fixed elevation structures would be impacted if flows from Hungry Horse were not available. Impacts range from accessibility to deep water craft to usability of docks by elderly and disabled.	50% of the drought years evaluated resulted in summer lake levels near elevation 2,890' msl impacting docks, shore stations and boat launches during the summer recreation season.	Lake elevations achieved and maintained, minimizing impacts to adjacent land use.

Resource	Drought Management Plan Alternative			
	No Action Alternative	Proposed Action (PPL Montana Plan)	Alternative 1 (MIF Precedence)	Alternative 2 (MIF Deviation Allowed)
Water Quality	Reduced summer and fall water levels would benefit near shore Flathead Lake WQ. No net change in nutrient loading to lake anticipated. Lower river water quality impacted by temperature increases and higher concentration of irrigation return flows when minimum instream flows are not met.	Reduced summer and fall water levels would benefit near shore Flathead Lake WQ. No net change in nutrient loading to lake anticipated. Lower river water quality impacted by temperature increases and higher concentration of irrigation return flows when minimum instream flows are not met.	Summer recreation season lake levels were reduced for 50% of drought years evaluated. WQ effects under these conditions are similar to the no action and proposed action alternatives. Under the remaining drought years, no water quality benefits in the lake are anticipated. Minimum instream flows are maintained for the lower river, minimizing potential WQ impacts caused by drought downstream of the project.	No anticipated impacts to WQ.
Ecological Resources				
Land Cover/Habitat	No land cover impacts anticipated. Temporary shore land and riverine habitat impacts associated with lake level and flow variations would occur during all drought years but these could not be quantified.	No land cover impacts anticipated. Temporary shore land and riverine habitat impacts associated with lake level and flow variations would occur when Hungry Horse water was unavailable but these could not be quantified.	No land cover impacts anticipated. Temporary shore land habitat impacts associated with lake level variations would occur during drought years similar to 1940, 1944, 1977 and 2001. No riverine habitat impacts anticipated.	No land cover impacts anticipated. No shore land impacts anticipated. Temporary, limited riverine impacts may occur when instream flow levels were reduced.

Resource	Drought Management Plan Alternative			
	No Action Alternative	Proposed Action (PPL Montana Plan)	Alternative 1 (MIF Precedence)	Alternative 2 (MIF Deviation Allowed)
Fisheries	Long term assessments indicate reductions in available lower river fisheries habitats when compared to alternatives 1 and 2, particularly spawning and rearing habitats. In general, no lake fisheries impacts are anticipated from lower lake levels.	Deviations from minimum instream flow requirements in severe drought years could negatively impact certain riverine species, particularly by reducing available spawning and rearing habitats. However, exact impacts could not be quantified. In general, no lake fisheries impacts are anticipated from lower lake levels.	No impacts to lower river fisheries are anticipated. In general, no lake fisheries impacts are anticipated from lower lake levels.	Only temporary, minimal impacts to lower river fisheries are anticipated given the levels of discharge that will be maintained. In general, no lake fisheries impacts are anticipated from lower lake levels.
Terrestrial and Amphibious Species	No impacts to terrestrial species anticipated. Aquatic reptiles and amphibians relying on near shore and riparian areas could be affected if lake level and stream flow deviations occur. Lower river backwater areas may not receive flows due to deviations, potentially increasing mortality in these areas.	No impacts to terrestrial species anticipated. Aquatic reptiles and amphibians relying on near shore and riparian areas could be affected if lake level and stream flow deviations occur. Lower river backwater areas may not receive flows due to deviations, potentially increasing mortality in these areas.	No impacts to terrestrial species anticipated. Impacts to amphibious species surrounding Flathead Lake may occur during extreme drought years (i.e., when summer lake levels are lower then the 30-year average). No impacts to lower river species.	No impacts to terrestrial species anticipated. Aquatic reptiles and amphibians relying on near shore and riparian area could be affected. In WY similar to 1944, 1977 and 2001. Under severe drought conditions, temporary, reduced impacts to lower river species could occur due to reductions in instream flows.
Avian Species	Potential for impacts to waterfowl foraging and nesting areas if lake levels are low in late spring/summer; more likely in severe drought years. Some lower river water fowl may be impacted if back water areas do not receive sufficient water.	Potential for impacts to waterfowl foraging and nesting areas if lake levels are low in late spring/summer; more likely in severe drought years. Some lower river water fowl may be impacted if back water areas do not receive sufficient water.	Potential for impacts to waterfowl foraging and nesting areas if lake levels are low in late spring/summer; more likely in drought years similar to 1940, 1941, 1944, 1977 and 2001. No impacts to lower river species anticipated.	Some potential for impacts to waterfowl foraging and nesting areas in the lower river, although to a lesser extent than under the no action and proposed action alternatives. Lake level targets generally met so no lake habitat impacts anticipated.

Resource	Drought Management Plan Alternative			
	No Action Alternative	Proposed Action (PPL Montana Plan)	Alternative 1 (MIF Precedence)	Alternative 2 (MIF Deviation Allowed)
Species of Concern	No impacts to bald eagles anticipated. Slightly less bull trout spawning and rearing habitats available in 2 of 3 study sites.	No impacts to bald eagles anticipated. This option was not modeled for fisheries impacts although matching outflows to inflows is considered detrimental to bull trout habitat.	No impacts to bald eagles anticipated. Slight increases in available bull trout habitat shown through modeling (two of the study sites show increases in bull trout spawning habitat).	No impacts to bald eagles anticipated. Slight increases in available bull trout habitat shown through modeling (two of the study sites show increase in bull trout spawning habitat). Only a few percentage points in available habitat separate Alternatives 1 and 2.
Wetlands/ Riparian Areas/Flooding Concerns	Wetlands may be impacted by lower summer lake levels and reduced flows below Kerr Dam during severe drought conditions. The project would be operated primarily for flood control, limiting flooding concerns.	Wetlands may be impacted by lower summer lake levels and reduced flows below Kerr Dam during severe drought conditions. The project would be operated for flood control although higher winter lake elevations may reduce flood control flexibility.	Lake-related wetlands may be impacted by lower summer lake levels during water years similar to 1940, 1941, 1944, 1977, and 2001. No impacts to riparian areas below Kerr Dam anticipated. Although pool remains higher during spring, forecasting tools allow adequate time to evacuate lake in case of late winter flood events.	Temporary impacts to riparian habitats below Kerr Dam may occur in severe drought years ((i.e., when instream flows are reduced). Although pool remains higher during spring, forecasting tools allow adequate time to evacuate lake in case of late winter flood events.
Tribal Resources	Tribal trust resources such as protection of lake elevations, minimum flows, and lower river benefits versus lake benefits not balanced during time of drought. No specific plan to protect tribal resources**.**	The plan calls for impacts to both lake and lower river tribal resources in terms of lower lake level targets, higher winter water levels, and potentially lower river flows.	Lower river tribal resources are protected through adherence to minimum instream flows. Lake elevations similar to water years 1940, 1941, 1944, 1977, and 2001 will cause impacts to tribal resources around Flathead Lake.	Slight impact to lower river resources during water years similar to 1944, 1977, and 2001 as the result of lower minimum instream flows. Lake level impacts to tribal resources are mitigated by this alternative.

Resource	Drought Management Plan Alternative			
	No Action Alternative	Proposed Action (PPL Montana Plan)	Alternative 1 (MIF Precedence)	Alternative 2 (MIF Deviation Allowed)
Socioeconomic Resources				
Income and Employment	Less likely to mitigate local economic impacts during drought, resulting in impacts to both lower river and lake resources and opportunities.	Calls for lower summer lake recreation water levels than alternatives 1 and 2, which may affect tourism during drought years. Annual 2,888' msl winter lake elevation creates the potential for more repair work on shore stations and docks at the expense of property owners.	Supports local economy by maintaining recreational lake elevations in 5 of 10 drought years.	Supports local economy by maintaining recreational lake elevations under all but most severe conditions.
Property Values	Lower summer lake levels during drought conditions could adversely impact properties with shallow lake access, potentially reducing property values.	Lower summer lake levels during drought conditions could adversely impact properties with shallow lake access, potentially reducing property values. Properties with access structures below 2,888 'msl could be effected annually by ice damage, further reducing property values.	Maintains recreational lake elevation for 50% of drought years evaluated, reducing potential effects on property values when compared to the no action and proposed action alternatives.	Maintains recreational lake elevation for 80% of drought years evaluated, reducing potential effects on property values when compared to the other alternatives.
Recreation and Tourism	Lower summer lake levels during severe drought conditions could make several access sites and marinas unusable by watercraft. Lower flows in the lower flathead river could affect rafting and cool water fisheries.	Lower summer lake levels during severe drought conditions could make some access sites and marinas unusable by watercraft, although these impacts may be offset if Hungry Horse water were available. Matching outflows to inflows in summer months could reduce lower river flows, impacting rafting and cool water fisheries.	No effect on recreational lake levels for 50% of the drought years evaluated. No impacts to lower river recreational resources.	No effect on recreational lake levels for 80% of the drought years evaluated. Lower river flows reduced for 30% of drought years, slightly impacting river recreation and cool water fisheries during those years.

Resource	Drought Management Plan Alternative			
	No Action Alternative	Proposed Action (PPL Montana Plan)	Alternative 1 (MIF Precedence)	Alternative 2 (MIF Deviation Allowed)
Power Generation	Loss of power generation potential due to lack of operational flexibility.	Loss of power generation potential if winter/early spring lake draft was eliminated or deviations from minimum instream flows were approved. End of December elevation of 2,888' msl reduces operational flexibility for hydro-power production.	Climate indicators create more flexible operations in most water years. Prioritizing instream flows during drought years will increase generation over all other alternatives.	Climate indicators create more flexible operations in most water years. Lower river flows reduced for 30% of drought years, slightly reducing generation when compared with Alternative 1.
Environmental Justice	Minimum instream flow deviations would disproportionately affect the minority population of the Flathead Reservation.	Minimum instream flow deviations would disproportionately affect the minority population of the Flathead Reservation.	No disproportionately high or any adverse impacts to minority or low income populations anticipated.	Minimum instream flow deviations would disproportionately affect the minority population of the Flathead Reservation, although advanced drought management planning under and reductions in lake elevations would help to offset these impacts to some degree.

CHAPTER 3.0 AFFECTED ENVIRONMENT

3.1 STUDY AREA AND REGIONAL SETTING

Flathead Lake is the largest naturally occurring fresh water lake in the United States west of the Mississippi. The lake is approximately 28 miles long and, at its maximum, over 14 miles wide. The surface area of Flathead Lake is approximately 126,000 acres, and the lake has over 140 miles of shoreline (FERC 1996). The northern half of the study area includes lands owned by the State of Montana, U.S. Forest Service, Plum Creek Timber, and others. The southern half of the study area is on the Flathead Indian Reservation, which is governed by the CSKT.

Flathead Lake lies within the Flathead River basin. The Flathead River basin covers approximately 8,600 square miles in British Columbia (Canada) and Montana. The basin is comprised of six sub-basins, including:

- North Fork Flathead
- Middle Fork Flathead
- South Fork Flathead
- Swan
- Stillwater
- Flathead Lake (State of Montana 2005)

The average annual inflows to Flathead Lake are 11,700 cfs. Contributions from each sub-basin are as follows:

- South Fork Flathead – 32 percent
- North Fork Flathead – 26 percent
- Middle Fork Flathead – 25 percent
- Swan – 11 percent
- Flathead (small creeks flowing directly into the lake or into the Upper Flathead River between the lake and West Glacier) – 2 percent
- Stillwater – 1 percent (FERC 1996)

The above total accounts for 97 percent of the Flathead Lake inflows. Additional inflows from direct drainages and ground water could account for the additional inflows. As with any hydrologic system, there is significant year to year variation in the relative contributions from the various tributary sources.

For the purposes of this EIS, the study area, as shown in Figure 3-1, consists primarily of Flathead Lake, including the developed and undeveloped shore land; the upper Flathead River (generally referring to all portions of the Flathead River upstream from Flathead Lake) from its discharge point at Flathead Lake upstream to its confluence with the Stillwater River (approximately one and one half miles southeast of Kalispell); and the lower Flathead River from the Kerr Project downstream to its confluence with the Clark Fork. This area would potentially be affected by variations in lake elevation and Kerr Project water releases caused by the implementation of a DMP. However, the affected environment discussion may extend beyond this study area for certain issues, especially the role Hungry Horse Project operations may have in shaping Kerr Project operations (to the extent Hungry Horse Project operations affect the implementation of a DMP).

The lower Flathead River is important ecological and cultural feature of the Flathead valley. A diverse river and floodplain ecosystem developed sustaining wildlife and the indigenous people. The ecosystem was supported by an annual hydrograph that, among other things, included an annual base flow and a large spring runoff freshet that created the floodplain habitats. Construction of the Kerr project had a significant negative environmental and cultural effect on the ecology of the Lower Flathead River by disrupting this hydrograph.

3.1.1 PHYSICAL ENVIRONMENT

3.1.1.1 General Topography

The study area, like much of the Rocky Mountains in the northwestern United States, has highly variable topography with elevations ranging from approximately 2,300’ msl to over 9,500’ msl. Flathead Lake lies in the Flathead River valley which is bounded by the Mission Range and Swan Range to the east and by the Salish Mountains to the west. Flathead Lake itself lies at an elevation of approximately 2,890’ msl but varies from approximately 2,883’ msl in April to approximately 2,893’ msl during the recreation season (approximately June 15 through September 15). These lake elevations are controlled by the operation of the Kerr Project located approximately 4.5 river miles downstream from Flathead Lake. Below the dam, the Lower Flathead River elevation varies depending on distance downstream and the volume of water released from the Kerr Project.

Geology/Hydrogeology

The geology of the study area is dominated by two primary components - bedrock uplifted during the development of the Rocky Mountains at higher elevations; and glacial and river deposits in the valley floors. The Mission and Swan Ranges as well as the Salish Mountains are comprised of various metamorphosed sedimentary formations of the Precambrian Belt Series. These formations include the Appekunny argillite, the Grinnel argillite, the Missoula group, the Piegan group, the Pricard formation, the Ravalli group, the Siyeh limestone, and the Wallace formation. The area is heavily faulted as a result of bedrock compression during uplift of the Rocky Mountains. A major fault extends along the eastern edge of Flathead Lake and the Flathead River valley below the lake.

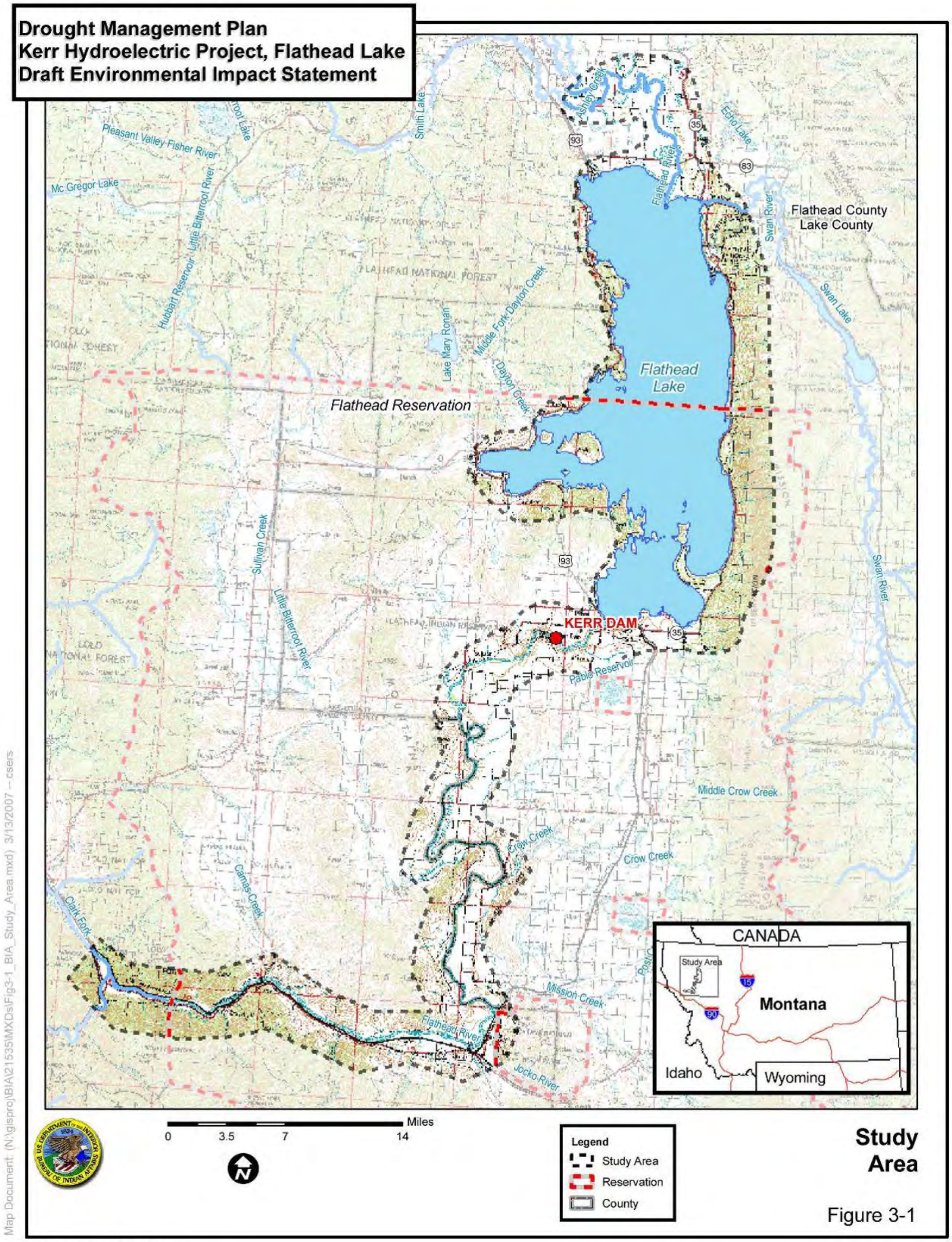
The valleys in the study area were carved deeper and wider by the advancement of glaciers during the past several hundred thousand years. Surficial deposits in the Flathead River valley above and below the lake consist of glacial ground and end moraine, glacial lake deposits, and alluvial deposits; these deposits may be as deep as 4,000’ msl (LaFave 2002). Review of aerial photography, topographic maps, and floodway mapping reveals that the Upper Flathead River has meandered back and forth across the Flathead Valley above the lake; several oxbow lakes and former river channels are present in this area.

Flathead Lake was formed from melting glacial ice. The melt water was trapped by end moraines present at the south end of the lake. The runoff from the melting glacier eroded through the end moraine until it encountered an area of higher elevation bedrock at the west edge of current day Polson. The runoff then eroded what is now the current Flathead River gorge south and west of Flathead Lake.

There are two primary groundwater regimes in the study area - the water table aquifer and a deeper aquifer system comprised of a combination of buried alluvial/glacial deposits and fractured bedrock. The water table aquifer generally ranges between zero and 50 feet below ground surface in the river valleys and is generally greater than 50 feet below ground surface in the mountains. The water table aquifer is generally recharged directly by precipitation and surface water; the deeper aquifer is recharged by fracture flow from the mountain fronts. Groundwater flow is generally toward Flathead Lake or toward the Flathead River. The deeper aquifer unit is generally the groundwater resource used most for water supply and irrigation purposes in the study area.

Groundwater quality is generally good in the deeper aquifer, with low dissolved solid concentrations and relatively few indications of contamination from surficial activities such as herbicide, pesticide, and fertilizer application to agricultural lands. Isolated areas may have greater connectivity between the water table aquifer and the deeper aquifer. In these areas, there is some evidence of elevated nitrate levels, although they remain below health standards for drinking water (LaFave 2002).

Figure 3-1: Study Area



Data sources: USGS 7' quad

3.1.1.2 Soils

Review of the NRCS State Soil Geographic Database (STATSGO) for the study area indicates that soils north of, surrounding, and south of Flathead Lake consist of a variety of loamy soils – typical of glacial deposits (i.e., mixing of parent materials by the advancement and recession of glaciers results in variably textured soils with clay, silt, sand, and gravel components). Similarly, the Flathead River and its tributaries deposit soil materials ranging from clay to gravel depending on the flow rate of the water. Table 3-1 provides soil unit names and associated textures.

More detailed soils information was available for much of the study area through the NRCS Soil Survey Geographic database, generally referred to as SSURGO. The SSURGO data identified multiple soils types in two mapping areas (area 617, which covers the northern shore of Flathead Lake; and area 629 which covers the eastern, southern, and much of the western shore of Flathead Lake) at or adjacent to the Flathead Lake shoreline. Specific information regarding the erodibility of these soils was not available; however, steep slope soils (generally considered as soils with a slope greater than 12 percent) are generally more likely to erode than level soils. However, level soils in a river or lake environment can also be subject to significant erosion from normal and flood-level currents, and wave action.

Table 3-1: STATSGO Soil Types

STATSGO Soil Unit Name	Soil Texture
Bata	Gravelly silt
Bigarm	Cobbly loam
Flathead	Very fine sandy loam
Horseplains	Fine sandy loam
Irvine	Silty clay
Kalispell	Loam
Kingspoint	Gravelly loam
Lonepine	Silty loam
McCollum	Fine sandy loam
Polson	Silty loam
Round Butte	Silty clay loam
Rumblecreek	Gravelly loam
Sacheen	Loamy fine sand
Swims	Silty clay loam
Waldbillig	Silty loam with gravel
Wilden	Gravelly loam
Winkler	Very gravelly loam

As noted previously, operation of the Kerr Project artificially maintains higher lake levels than would occur naturally during much of the year. This has resulted in the inundation and erosion of shoreline throughout much of the lake (FERC 1996). The 1996 FERC EIS stated that impacts associated with the higher lake levels include:

- Inundation of Upper Flathead River banks as far north as the confluence with the Stillwater River.
- Extensive shoreland inundation, especially during early dam operations between 1938 and 1946.
- Continued shoreland erosion due to wave action during higher lake elevation periods.
- Potential loss of natural sediment loading due to the presence of Hungry Horse Dam upstream of Flathead Lake.

Studies of shoreland erosion have continued though the present day. The University of Montana Flathead Lake Biological Station is assessing erosion and deposition issues at East Bay, Blue Bay, and Polson Spit. Flathead Lake level management since Kerr Project construction has been demonstrated to interfere with natural erosion and deposition patterns. In some cases, mitigation strategies have been identified and implemented to minimize such interference (Lorang 2002, 2004).

3.1.1.3 Climate

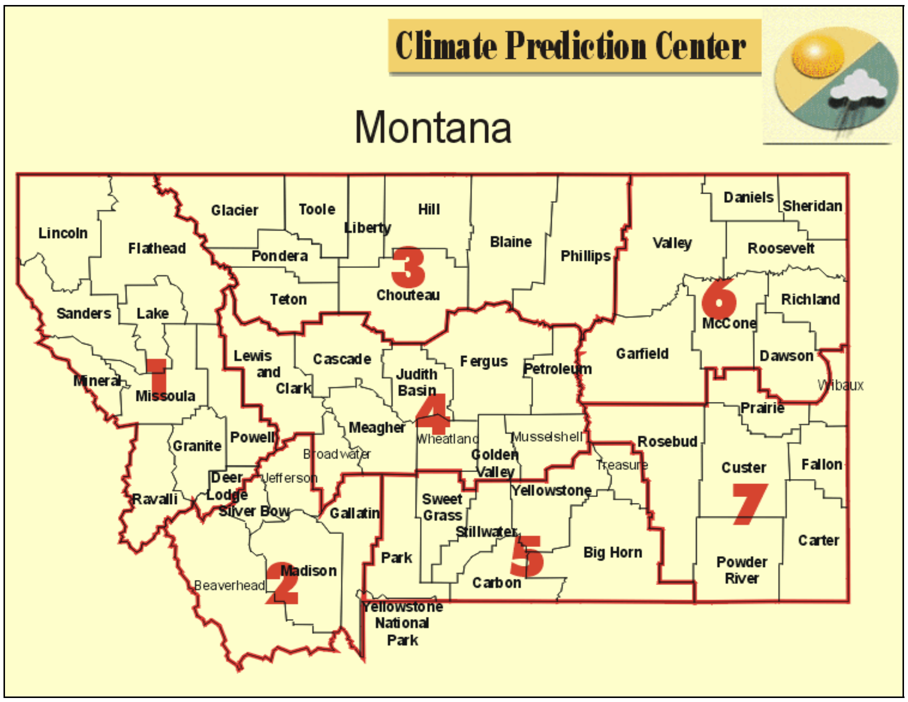
Pacific coastal weather patterns dominate the Flathead Basin although continental air masses over the U.S. and Canadian Great Plains regions may periodically supersede the coastal weather patterns. Average temperatures in Polson range from 26 to 37 degrees Fahrenheit (^{o}F) in the winter and from 61 to 67 ^{o}F in the summer. Average temperatures in Kalispell range from 21 to 31 ^{o}F in the winter and from 58 to 64 ^{o}F in the summer. Average annual precipitation is 16.6 inches in Kalispell and 17.1 inches in Polson. However, the variable topography results in a wide range of annual precipitation values in the region. In the Flathead River valley, average annual precipitation is generally less than 20 inches, while at higher elevations average annual precipitation can be 80 to 90 inches. In general, greater precipitation is found primarily in the Mission and Swan Ranges in the eastern portions of the study area. The lower Salish Mountains to the west tend to be drier.

Through the scoping and alternatives development processes, a more detailed understanding of the history of drought and runoff in the Flathead Lake area was obtained. Montana Climate Division 1 (located in western and northwestern Montana – see Figure 3-2) precipitation data was obtained for the October through March period[8] dating back to water year 1896. The average precipitation over this period was approximately 10.4 inches. The 10 driest water years during the period of record had October through March precipitation of 5.35 to 6.93 inches (52 percent to 67 percent of average). This information was used as a starting point for development of climate indicators as discussed in Chapter 2.0 and Appendix B. In addition, the development of climate indicators has shown the general relationship of climate phenomena (El Niño/La Niña) on Flathead Lake runoff and precipitation. The MEI and FPRI developed for the DMP would be updated every five years to address climate change.

[8] The October through March period was used as a reasonable timeframe for the development of snowpack in the mountains, which drives spring runoff and Flathead Lake refill. October is also the start of the water year (October 1 through September 30).

Wind in the Flathead Lake region is variable in velocity, but highly affected by the topography. Data obtained from weather stations in Kalispell and Polson for 2004 indicate that winds tend to blow from the north or south, and rarely blow from the east or west. Therefore, Flathead Lake shorelines with a northern or southern exposure tend to have more wave-related erosion and deposition activity.

Figure 3-2
Montana Climate Divisions



3.1.2 HUMAN ENVIRONMENT

The human environment in the Flathead Lake area consists of the modifications made to the natural environment in the course of human use of the area. These modifications include towns and cities; transportation infrastructure; power and energy infrastructure; sewer and water; building development for human habitation, commercial/industrial activity, and recreational/social/community activity (outside of towns and cities); conversion of land for agricultural purposes; and other anthropogenic changes to the natural environment.

3.1.2.1 Towns and Cities

Several communities lie within or immediately adjacent to the study area. These include:

- Kalispell – located near the Upper Flathead River/Stillwater River confluence.
- Somers – located at the northwest corner of Flathead Lake.
- Bigfork – located where the Swan River discharges into Flathead Lake.

- Woods Bay – located on the east shore of Flathead about five miles south of Bigfork.
- Polson – located at the southern end of Flathead Lake east of Kerr Dam.
- Big Arm and Elmo – located on the south and west sides of Big Arm Bay of Flathead Lake.
- Dayton, Rollins, and Lakeside – located on the west shore of Flathead Lake between Big Arm Bay and Somers.

3.1.2.2 Transportation Infrastructure

Transportation infrastructure in the study area consists primarily of roadways, although two railways are also present. The Montana Rail Link line extends south from Polson to Missoula, Montana. The Burlington Northern Santa Fe operates a line between Kalispell and Somers.

Roadways in or adjacent to the study area include: US Highway 93, which generally follows the south and west shores of Flathead Lake; State Highway 35, which generally follows the east shore of Flathead Lake; State Highway 82, which connects the towns of Somers and Bigfork and crosses the Upper Flathead River just north of Flathead Lake; and hundreds of miles of local and county roads that provide access to farms, ranches, isolated residences, lakeshore developments, and other infrastructure.

3.1.2.3 Power and Energy Infrastructure

Two of the most notable power/energy related infrastructures in the study area are the Kerr Project, a 200-plus megawatt hydroelectric facility located approximately five miles west of Polson on the Flathead River; and the Hungry Horse Dam, a 428-megawatt hydroelectric facility located approximately 19 miles north-northeast of the confluence of the Upper Flathead River and Flathead Lake. Associated with this facility are multiple substations and transmission lines, the majority of which lie outside the study area. Hundreds of miles of aboveground and underground distribution lines carry electric power to consumers throughout the study area and surroundings.

No crude or refined petroleum pipelines are located within the study area. A natural gas pipeline system is located near Kalispell; this system brings natural gas from Canada to the northwestern portion of Montana (MDEQ 2005).

3.1.2.4 Sewer and Water

Several cities and towns, including Polson, Kalispell, Big Fork, and Lakeside, have improved water supply and distribution systems and wastewater collection and treatment systems. The smaller towns and individual farms, ranches, and residences in the study area rely on water supply wells and septic systems. Storm water is generally allowed to flow overland and infiltrate into the groundwater or enter Flathead River or Flathead Lake. However, in areas with greater development concentrations (i.e., towns and cities) or a high degree of impervious surface (e.g., roadways), storm water may be collected and treated in storm water ponds prior to discharge to surface water bodies.

There are numerous water individual water rights which derive water directly from Flathead Lake, the Upper Flathead River or from shallow aquifers immediately adjacent to either of these water bodies. The largest water user on Flathead Lake is the Flathead Indian Irrigation Project (FIIP) which has a pumping station on the south end of Flathead Lake just above Kerr Dam.

3.1.2.5 Building Development

A large number of buildings have been constructed outside of the cities and towns identified above. Much of the east and west shorelines of Flathead Lake have been developed with seasonal or year-round cabins, homes, and resorts, as well as supporting commercial facilities such as convenience stores, restaurants, and gift shops. State park facilities are present at various locations around the lake. Few public or private buildings are present along the Upper or Lower Flathead Rivers.

3.1.2.6 Agricultural Development

Much of the land surrounding the Upper and Lower Flathead River has been developed as farmland. Irrigation systems, especially in the Flathead River Valley below Flathead Lake, have been developed to support farming and ranching. Portions of the shoreland areas of Flathead Lake have been converted to cherry orchards, especially on the east side of the lake. Large areas of land north of Flathead Lake have also been converted to farmland.

3.1.3 Flathead Lake History and Use

This section provides background on the history and use of Flathead Lake since the construction of the Kerr Project. Special attention is given to the time period between 1996 and the present, since that is when the DOI section 4(e) conditions were incorporated in the Kerr Project license. The section 4(e) conditions provide the baseline for purposes of comparing DMP alternatives.

3.1.3.1 Kerr Hydroelectric Project

Prior to construction of the Kerr Project, Flathead Lake elevations fluctuated more frequently and the full pool lake elevation (2,893’ msl) was reached and sustained for a much shorter period of time than under current operations.

In 1930, the Federal Power Commission (predecessor to the Commission) issued the original operating license for the Kerr Project to the Rocky Mountain Power Company. Construction of the Kerr Project was initiated in 1930, was delayed by funding issues associated with the Great Depression, and was reinitiated in 1936 by Montana Power Company (MPC). MPC completed construction of the dam and began generating power in 1938.

In 1976, MPC and CSKT filed competing applications for a new operating license (the original license expired in 1980). In order to allow time for the resolution of a number of operational and environmental issues arising in part from the competing license applications, the Commission allowed MPC to continue operating the Kerr Project under a series of annual licenses from 1980 to 1985.

In 1985, the Commission approved a settlement agreement related to Kerr Project relicensing and issued a joint 50-year license to the Montana Power Company and the CSKT. Under this settlement, Montana Power would operate the Project for the first 30 years of the new license term and the CSKT (upon payment of a conveyance fee) would have the option of becoming the sole licensee for the remaining 20 years of the 50-year license. The settling parties also agreed that the Secretary could impose conditions to protect tribal and environmental concerns as authorized by section 4(e) of the Federal Power Act.

Pursuant to this authority, DOI submitted to a number of amendments to the Kerr Project license in 1996 for the protection and utilization of the Flathead Indian Reservation.[9] The Commission subsequently completed an EIS for and issued a "Record of Decision on Proposed Modifications to the Kerr Hydroelectric Project" (see Chapter 1.0, section 1.5.1), and issued an amended license in 1997. The primary modifications to the Kerr Project license were the Secretary's section 4(e) conditions. The key aspects of the section 4(e) conditions are discussed in the following sections.

In 1999, the Commission approved the transfer of the MPC interest in the license to PPL Montana, the current operator of the Kerr Project.

3.1.3.2 License Requirements and Section 4(e) Conditions

The pertinent license provisions for a drought management plan and this EIS are Articles 43, 55, 56, 57, 58, 59, 60, 61, and 62 of the current license. With the exception of Article 43, these license articles were part of the Secretary's section 4(e) conditions included in the Kerr Project license in 1997. These license articles are summarized in Table 3-2.

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9 Montana Power objected to a number of the new license articles and ultimately sought review of the Commission's orders imposing the Secretary's conditions with the United States Court of Appeals for the District of Columbia Circuit. In 2000, the parties again reached settlement to resolve the pending appeals and the license was amended accordingly.

Table 3-2: Relevant Kerr Project License Requirements

Article	Brief Description
Article 43	Requires the Kerr Project to be operated in accordance with a 1962 MOU, as amended in 1965, between MPC and USACE. The MOU calls for certain lake elevations at certain times of the year primarily to address flood control issues.
Article 55	Requires the Kerr Project to be operated as a base-load facility.
Article 56	Requires minimum instream flows to be maintained at certain levels during certain times of the year to more closely match natural runoff patterns.
Article 57	Establishes maximum between-day variations in flow to eliminate or minimize impacts from frequently oscillating flow volumes.
Article 58	Establishes hourly maximum ramping rates to eliminate or minimize impacts from frequently oscillating flow volumes.
Article 59	Requires a ramping rate study to be conducted by the CSKT and MPC to determine if revisions to the ramping rates set forth in Article 58 would be beneficial.
Article 60	Requires the development of a DMP to avoid and resolve potential conflicts between Articles 43 and 56 when drought conditions prevail.
Article 61	Requires coordination with BOR regarding the operation of Hungry Horse Reservoir.
Article 62	Requires the licensees to provide an annual operating schedule to be supplemented on a monthly basis.

3.1.3.3 Minimum Instream Flows

As discussed above, Article 56 established minimum instream flows for the Kerr Project in order to more closely mimic the natural runoff conditions in the Flathead River downstream of Flathead Lake. As flow increases from 3,200 cfs to approximately 8,000 cfs, the Flathead River maintains itself primarily within the main river channel. As flows exceed 8,000 cfs to 12,700 cfs, the river expands into its flood plain. The intent of the minimum instream flows is to re-create a more natural flow regime that supports a healthy river and flood plain environment. The minimum instream flow requirements are:

August 1 to April 15 – continuous flow at 3,200 cfs.
April 16 to April 30 – increased from 3,200 to 5,000 cfs at 120 cfs per day.
May 1 to May 15 – increased from 5,000 to 12,700 cfs at 510 cfs per day.
May 16 to June 30 – continuous flow at 12,700 cfs.
July 1 to July 15 – reduced from 12,700 to 6,400 cfs at 420 cfs per day.
July 16 to July 31 – reduced from 6,400 to 3,200 cfs at 200 cfs per day.

In addition to the minimum instream flow requirements, Articles 57 and 58 establish maximum between-day and hourly flow changes in accordance with the following schedule:

Table 3-3: Article 57 – Between-Day Flow Variation Limitations

Mean Flow (cfs – 24 hour average)	Maximum Allowable Flow Change (cfs)
Less than 5,000	500
5,000 to 10,000	1,000
10,000 to 20,000	2,500
20,000 to 40,000	5,000
40,000 to 60,000	10,000

Table 3-4: Article 58 – Maximum Ramping Rates

Mean Flow (cfs – 24 hour average)	Ramping Rate
Between 3,200 and 7,500	250 cfs/hour
Over 7,500	1,000 cfs/hour

3.1.3.4 Operating History and Power Production

Since coming on line in 1938, the Kerr Project has been operated for power generation. The facility consists of a 200-foot high concrete arch dam built roughly four miles west-southwest from the natural outlet of Flathead Lake. Because the dam structure is located within the outlet channel, the maximum and minimum flows are limited by the channel depth and width and not by dam operations. Three tunnels have been excavated through the bedrock from the reservoir immediately above the dam to the powerhouse located roughly 1,400' msl downstream from the dam. The tunnels and associated turbines can handle a maximum flow of approximately 14,000 cfs (FERC 1996).

According to the 2000 Inventory of Non-utility Electric Power Plants (published in 2003 by the DOE Energy Information Administration), the nameplate capacity of each of the three existing generators is 70.6 Megawatts (MW), for a total of 211.8 MW. The inventory indicates net summer capacities of 68.8 MW, 73.0 MW, and 73.0 MW for the current generators at the facility. Similar information was obtained from the PPL Montana website, which indicates that the Kerr Project has a winter capacity rating of 196 MW. Discussions with PPL Montana representatives indicated that the Project can generate approximately 40 MW at flows of 3,200 cfs (the minimum instream flow during summer, fall, and winter). The Kerr Project represents approximately 36.5 percent of PPL Montana's hydroelectric generating capacity, approximately 16.7 percent of PPL Montana's total electric generating capacity, and approximately 4 percent of the total electric generating capacity in the state of Montana.

Prior to 1996, the facility generally operated at full capacity during periods of high water, and was used for baseload, peaking, and load-following during periods when flows were below maximum powerhouse capacity. According to the 1996 EIS issued by the Commission, flows below the Kerr Project fluctuated significantly as the facility responded to changes in electricity demand. The range between daily minimum and maximum flows prior to 1996 was often as much as 10,000 cfs. This variation caused significant negative impacts to the aquatic environment below Kerr Dam, including reduction of available fisheries and aquatic habitat and stranding of immature fish in backwater areas. Since 1996, PPL Montana has operated the Kerr Project as a baseload facility, and has been subject to the hourly ramping rate and between-day flow change limitations discussed above.

3.1.3.5 Water Discharge and Lake Elevation

In order to better understand the potential environmental impacts of the proposed action and alternatives, BIA reviewed actual lake level data from 1965[10] to 2004 - paying special attention to the 1997 to 2004 period when the current minimum instream flows were established.

As noted previously, license Article 43 requires lake elevation targets to be met at various times of the year. Article 43 incorporates by reference a 1965 MOU between PPL Montana's predecessor, Montana Power Company, and USACE. That MOU states that:

> … (1) The Licensee and Corps of Engineers will cooperate in exchanging data and coordinating operations for flood control. (2) Conditions permitting, the lake will be drawn down to elevation 2,883 feet, the minimum level under the license, by April 15 and will be raised to elevation 2,890 feet by Memorial Day (May 30) and to elevation 2,893 feet, the maximum level under license, by June 15. (3) When the lake reaches elevation 2,886 feet, in a moderate or major flood year, the Licensee will gradually open its spill-gates to maintain free flow and will not close the gates until after the danger of exceeding elevation 2,893 feet has passed.

To consistently analyze the proposed action and alternatives, BIA defined the recreation season as June 16 to September 15. June 16 is the day following the Article 43 maximum lake level target and September 15 is the typical end of summer recreational activities. The Kerr Project has historically been operated to maintain lake levels as near 2,893' msl as possible during the recreation season to benefit area residents and business owners who depend on full pool.

Beginning in 1965, Article 43 established lake level target elevations for specific dates throughout the water year. These target elevations, especially the June 15 target of 2,893' msl, are of critical concern to recreational users of Flathead Lake, although review of actual lake level data from 1965 to 2004 indicates

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[10] 1965 was selected as the beginning of the period of record for this EIS because Article 43 was modified in 1965 to incorporate the MOU between MPC and USACE, calling for certain lake levels at certain times of the year. Prior to 1965, there was a lack of consistency in managing lake levels from year to year. For that reason, using years prior to 1965 would introduce unnecessary variability in the data analysis. It is important to note that this applies to the use of historic data only for the purposes of establishing the affected environment. Modeling techniques were used to evaluate and mimic the entire period of record under current license requirements as modified by Alternatives 1 and 2.

that the June 15 lake elevation requirement has not been precisely met. In fact, 2,893' msl was reached less than 10 percent of the time during this period.

Figure 3-3 compares the average daily lake level from 1965 to 2004 to the average daily lake level of the seven drought years which occurred during that same time period.

Figure 3-3 indicates that meeting the April 2,883' msl target level is much more realistic during drought years. It also shows that maintaining lake levels after June 15 is more of a challenge due to low runoff volumes.

Figure 3-4 is an elevation-frequency curve for the period of record from 1965 to 2004 on June 15. It illustrates that under wet to average conditions, Flathead Lake is normally maintained below the target elevation in order to provide flood protection from late spring rain events. Drought conditions occurred seven times over this period, six times prior to implementation of the Article 56 minimum instream flows. For those six drought years, water was allocated to meeting target lake levels. During the seventh year (2001), water was allocated to minimum instream flows and the lake did not meet the June 15th target.

Figure 3-3: Comparison of Average Lake Elevations for 1965 to 2004 to Average Elevation for Seven Drought Years ('73, '77, '87, '88, '92, '94, '01) – Flathead Lake, Montana

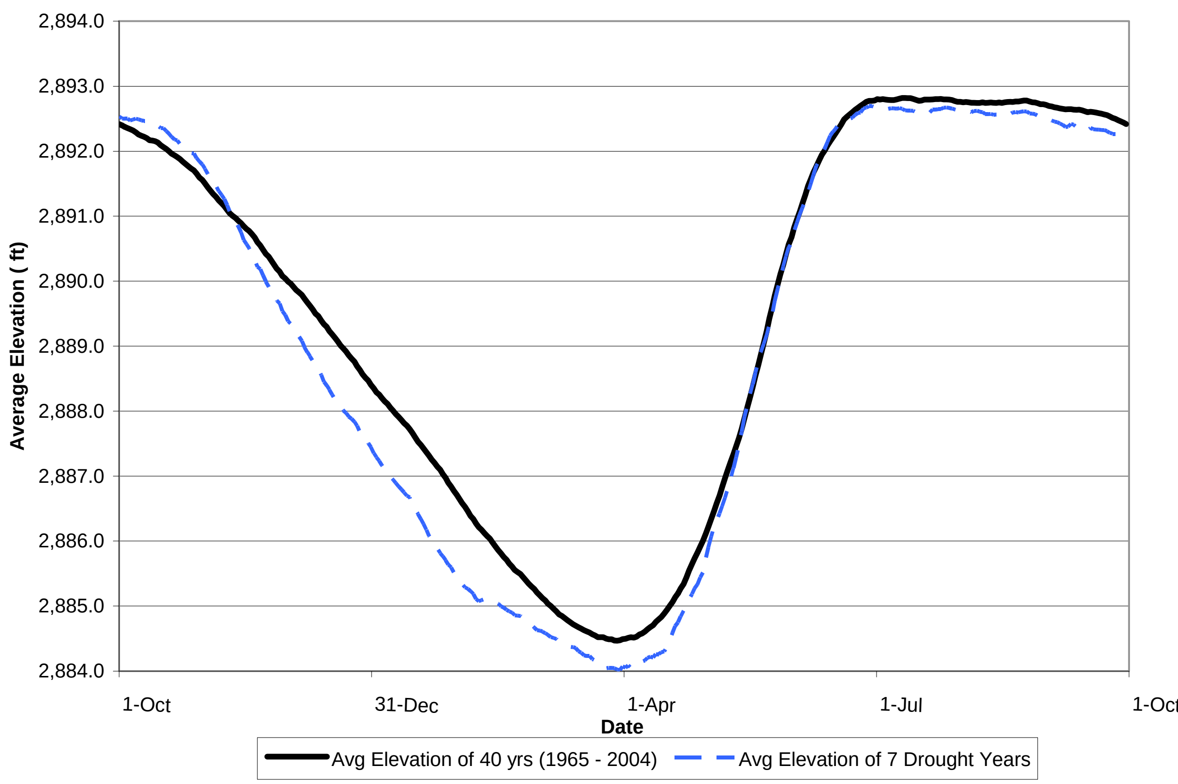


Figure 3-5 illustrates the elevation frequency curves for June 16 through September 15 for water years 1965 to 2004 and for the seven drought years which occurred during that time period. According to this graph, drought year water levels match the period of record average 60 percent of the time. However, two of the seven drought years experienced average recreation season water levels below the long term average.

The effect of drought years on lake levels is also shown in

Figure 3-3 – 3.5. The dashed line on these graphs depicts the lake level information for the seven drought years between 1965 and 2004 (1973, 1977, 1987, 1988, 1992, 1994, and 2001).

Figure 3-4: Comparison of Elevation Frequency Analysis Curves for Flathead Lake on June 15 1965 to 2004 Compared to Seven Drought Years

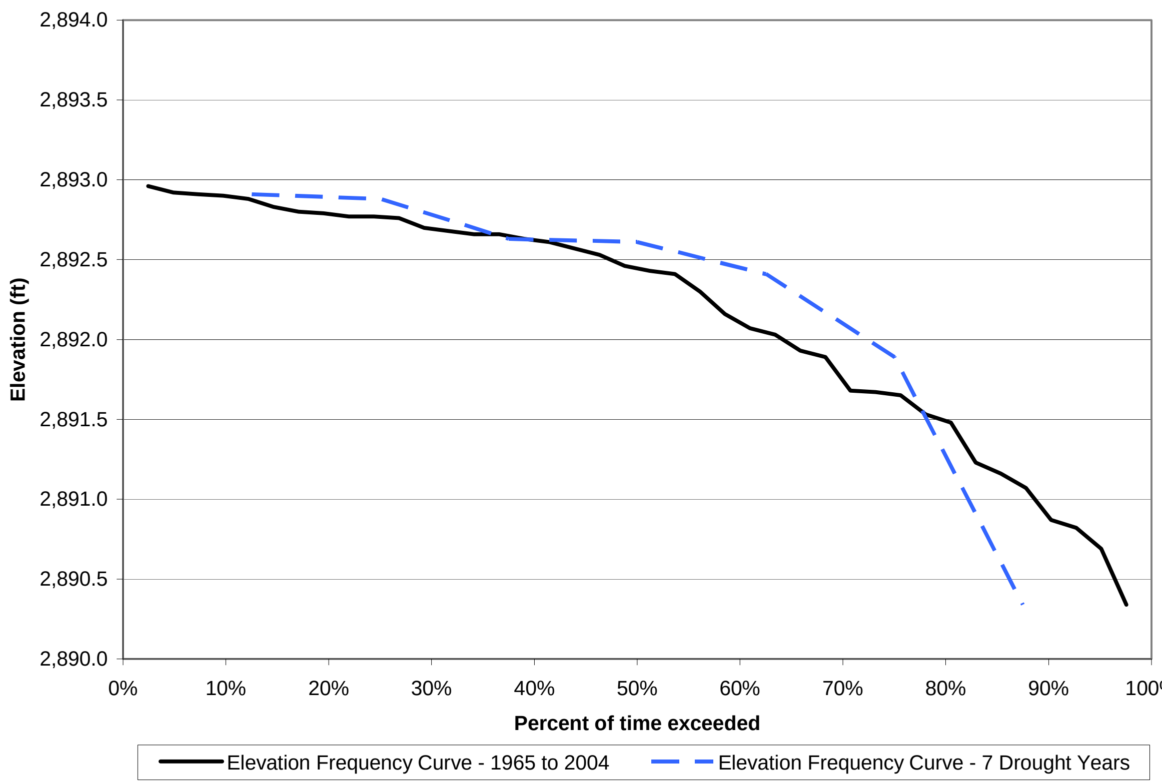
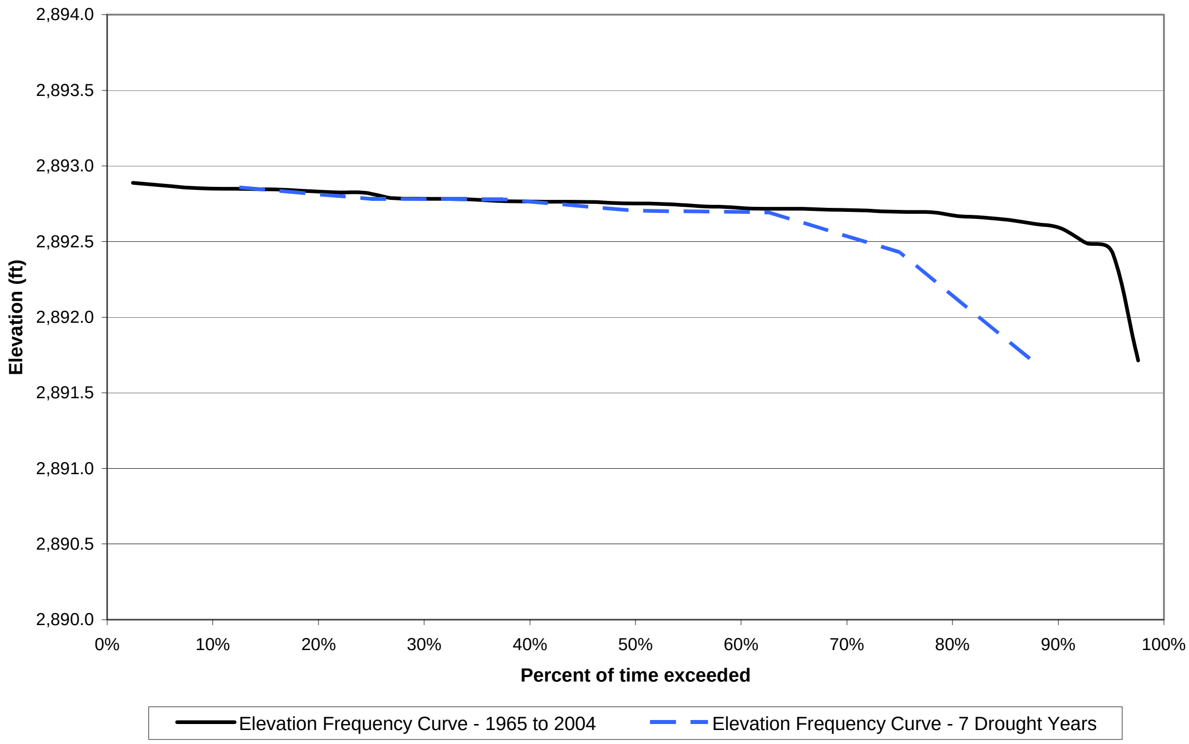


Figure 3-5: Comparison of Elevation Frequency Analysis Curves for Flathead Lake Average of June 16 through September 15, 1965 to 2004 Compared to Seven Drought Years



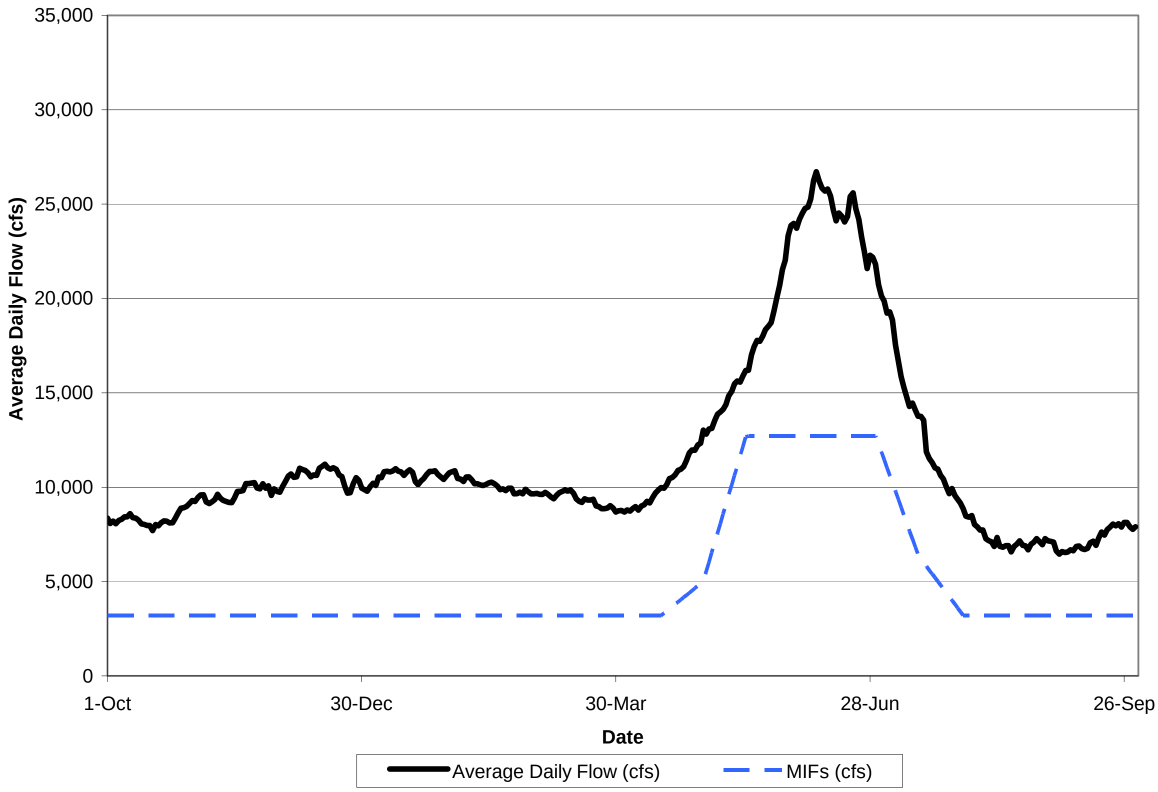
The Flathead Lake water level analysis demonstrates the following:

1) Meeting the April 15 target elevation of 2883’ msl has been more consistent during drought years.
2) Meeting the June 15 target elevation of 2,893’ msl during drought years was accomplished prior to Article 56 minimum instream flows by allocating water to meet lake level requirements.
3) Meeting June 15 target elevations during average and above average water years was affected by flood control considerations which called for keeping Flathead Lake water levels lower than the target elevation.
4) Sustaining lake elevations near long term averages did not occur in two of the seven drought years.

Although lake level targets have been consistent since 1965, minimum instream flows were modified in 1985 and 1997. From 1965 to 1985, there were no minimum flow targets and Flathead Lake was operated as a peaking and load following facility, seriously damaging aquatic resources in the lower Flathead River. In 1985, the Commission reissued the Kerr Project license with a requirement to meet minimum instream flows of 3,200 cfs “provided that at times during the period between July 1 and September 15 when the elevation of Flathead Lake is below 2,892.7’ msl, the outflow may be reduced below 3,200 cfs to a rate equal to the greater of (i) the average of the past 15 days' deduced inflow into the lake, or (ii) 2,200 cfs." In 1997, the 4(e) conditions - including the minimum instream flow requirements outlined in license Article 56 – were included in the license.

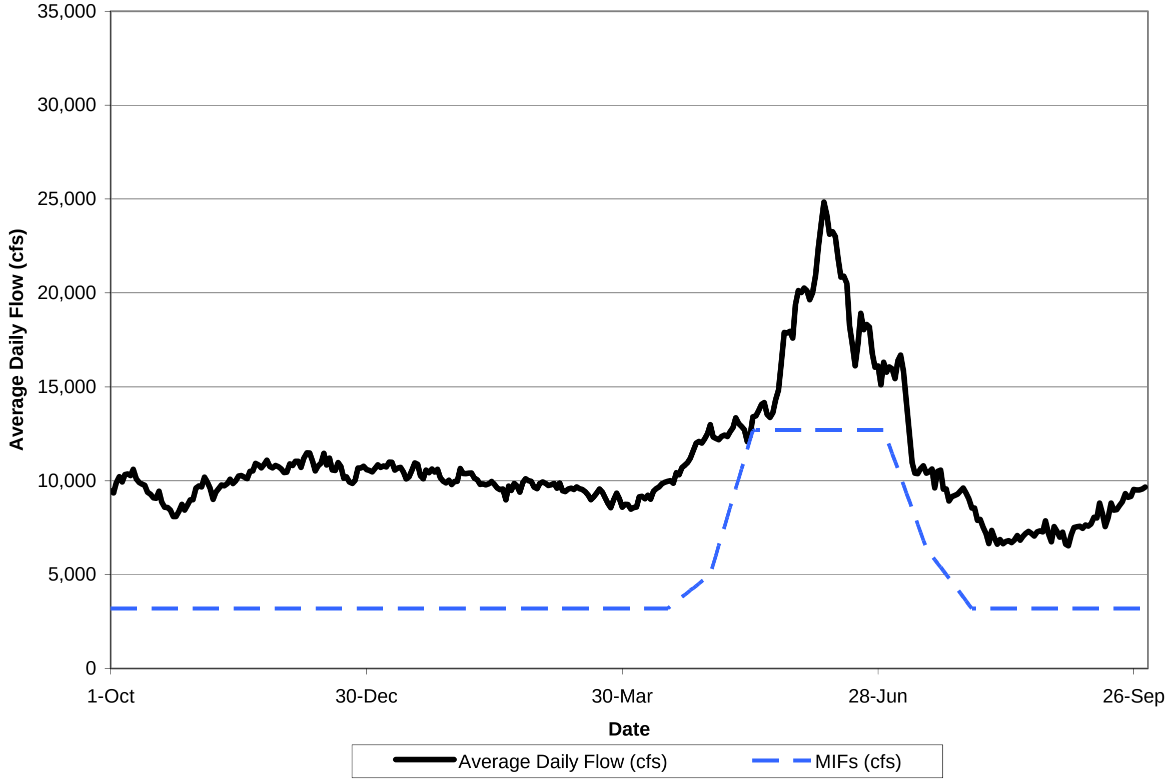
For the 1965 to 2004 period, average daily flow releases in the fall, winter, and early spring ranged from approximately 8,000 cfs to 12,000 cfs. In April, average daily flows tended to increase in response to the runoff from spring snow melt. Peak average daily flows of around 27,000 cfs were generally observed in June; by the end of June, flows tended to drop and level off at around 7,000-8,000 cfs for the late summer and early fall months. These flows, along with Article 56 minimum instream flows, are shown in Figure 3-6.

Figure 3-6: Average Daily Kerr Releases, Water Years 1965 to 2004



The release data from 1985 to 1996, the period of the first minimum flow requirements (depicted in Figure 3-7) shows a similar general pattern as Figure 3-5. Notable differences include the greater variability in flows and the lower overall total volume released (as determined by comparing the area beneath the curves). Higher variability is likely due to differences in averaging 12 years of data versus 40 years of data. The difference in total volume released is due to the four drought years (1987, 1988, 1992, and 1994) that occurred from 1985 to 1996. Figure 3-7 also shows that on average, Kerr Project operations from 1985 to 1996 resulted in instream flows greater than 3,200 cfs. In addition, the figure shows that, on average, current minimum instream flow requirements were met during average and above average water years.

Figure 3-7: Average Daily Kerr Releases, Water Years 1985 to 1996



Taking the average of all water years, however, does not capture the impact of drought year operations. Aquatic resources are particularly sensitive to flow regimes, temperature, water quality and availability of aquatic habitats which are all more substantially affected during periods of drought. Examination of average daily Kerr flow release data for the seven drought years between 1965 and 2004 (Figure 3-8) shows that during the fall and early winter months, releases were generally similar to the entire 1965 to 2004 period. The average daily spring runoff in these drought years reached a maximum of approximately 12,000 cfs but was typically 10,000 cfs or less. From late March to early April, flows dropped to between 6,000 and 7,000 cfs. In all years except 2001, the required minimum instream flows (3,200 cfs) were either met or exceeded. In 2001, minimum instream flows were reduced (as required by the Secretary’s 4(e) conditions) and as the water level and flow information demonstrates, neither lake levels nor instream flow requirements were met. As such, a closer examination of water year 2001, and the seven drought years in general, is necessary to determine how tribal trust resources and the environment have been impacted by Kerr Project operations.

**Figure 3-8: Average Daily Kerr Releases,
Seven Drought Years ('73, '77, '87, '88, '92, '94, '01)**

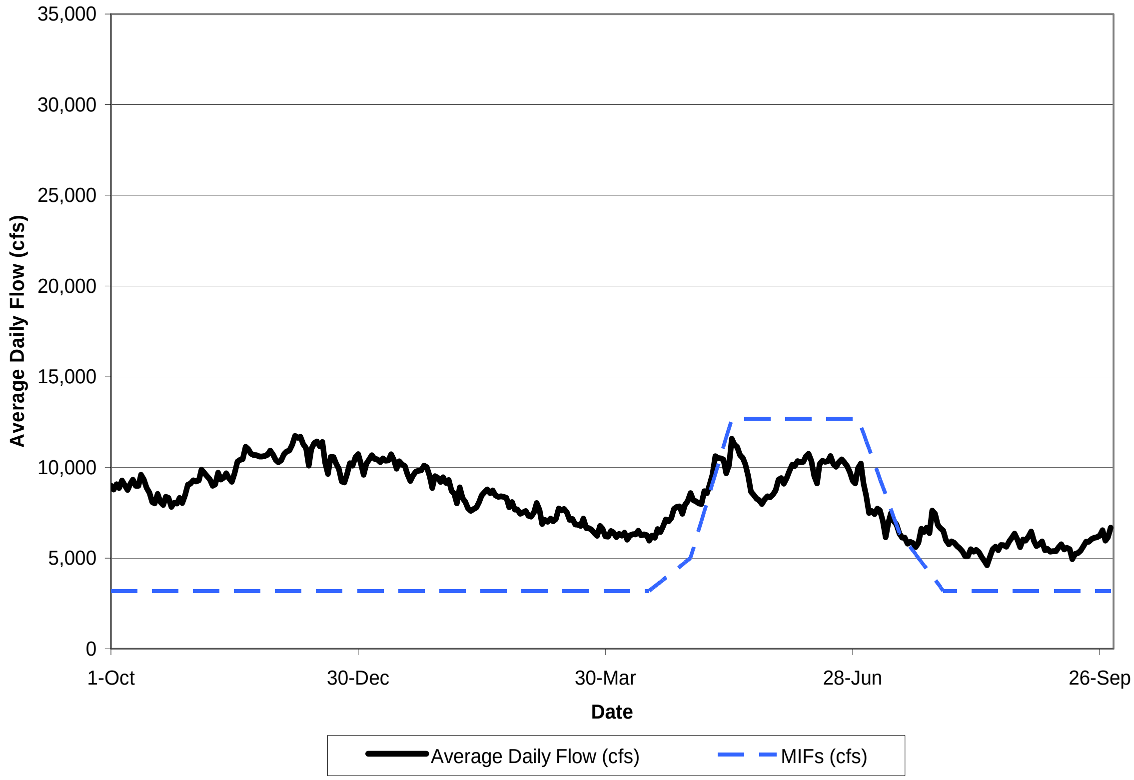
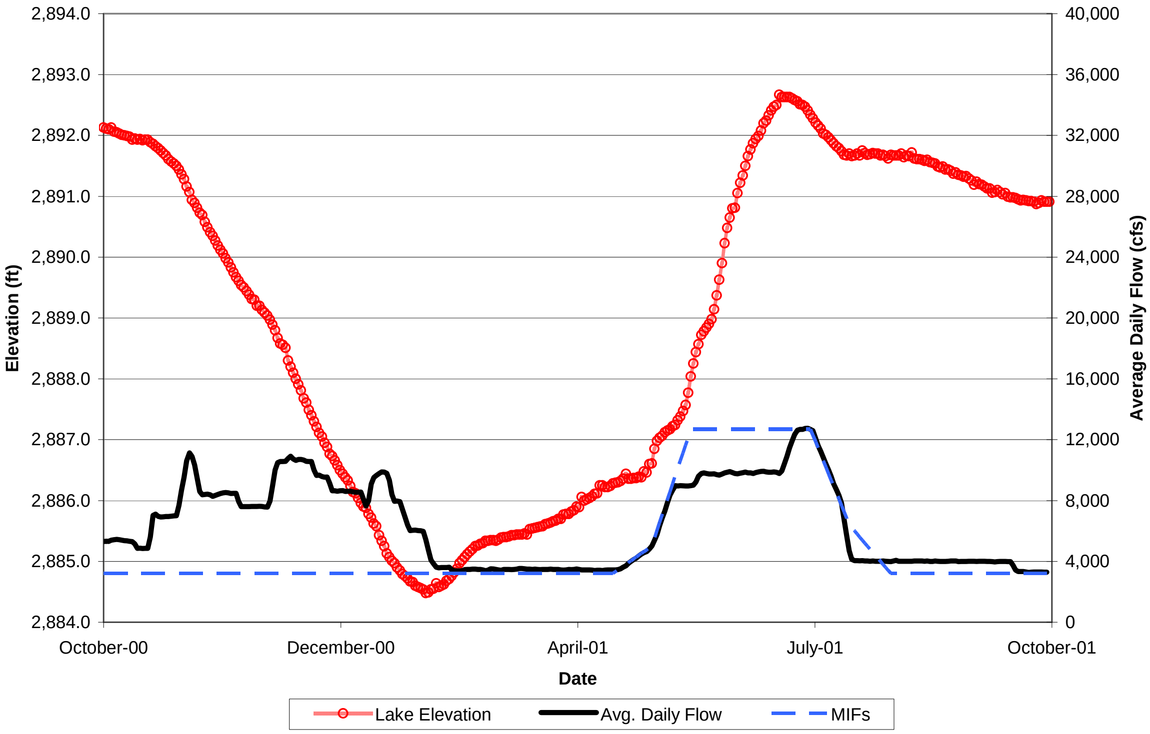


Figure 3-8 depicts average daily flows and minimum instream flows below the Kerr Project during drought. Impacts from these average daily flows include reduced aquatic habitat and detrimental changes in flow during critical spawning and hatching periods - affecting tribal trust and aquatic resources of the Lower Flathead River.

Figure 3-9 depicts flows and lake elevations in 2001 which is illustrative of the unresolved conflicts between Article 43 and Article 56. In 2001, lake levels were notably lower than normal and instream flows failed to meet minimum requirements in May, June, and at the end of July. As a result, there were impacts to tribal trust resources on the Lower Flathead River and to recreational users of the lake.

Figure 3-9: Lake Elevation and Kerr Releases – Water Year 2001



3.1.4 HUNGRY HORSE DAM AND RESERVOIR

Hungry Horse Dam is located approximately 19 miles north-northeast of the confluence of the Upper Flathead River and Flathead Lake, and roughly 47 river miles upstream from Flathead Lake. The project is operated by BOR. Built during the late 1940s and early 1950s, the project became operational in October 1952, although final construction was not completed until 1953. According to BOR, the original purpose for Hungry Horse Project was to regulate water releases to Grand Coulee and Bonneville Dams (downstream of Hungry Horse Dam and Flathead Lake on the Columbia River system) to increase their power production capabilities (Stene 1995). The Hungry Horse Project was also intended to provide electricity to residents living nearby, and to protect agricultural lands downstream against flooding.

Upon completion, Hungry Horse Dam created a reservoir approximately 34 miles in length that stores an estimated 3.47 million acre-feet of water. The reservoir is used for recreational purposes, including fishing, boating, water skiing, and swimming. Currently, the Hungry Horse Project has a nameplate capacity of 428 megawatts, and generates an average of one billion kilowatt hours annually (BOR 2004). However, the role of the Hungry Horse Project in maximizing power generation throughout the Columbia River system is of greater importance. The large volume of water storage available in Hungry Horse Reservoir allows spring runoff to be stored for later release. This optimization of water releases allows an estimated 4.6 billion kilowatt hours of additional power generation throughout the Columbia River system (BOR 2004 [2]).

Hungry Horse Reservoir has nearly 3 million acre-feet of its storage capacity assigned to flood control. According to BOR, the Hungry Horse Project helps minimize flooding in the Flathead Valley, reduces peak discharges on the Upper Columbia River system between the Flathead Valley and Grand Coulee Dam by as much as 25 percent, and reduces peak discharges at The Dalles (near Portland, Oregon) by roughly 5 percent (Ibid).

Given the large volume of storage dedicated to flood control, the elevation of Hungry Horse Reservoir fluctuates dramatically during the course of the water year. While Flathead Lake elevations vary by a maximum of 10 feet (2,883’ msl to 2,893’ msl), Hungry Horse Reservoir elevations vary by as much as 100 feet or more in a given year, although the average annual variation in elevation is generally closer to 50 to 60 feet. Full pool at Hungry Horse Reservoir is 3,560’ msl. Water releases from the Hungry Horse Dam generally range between 2,000 and 14,000 cfs, although instantaneous release rates may be higher, especially during April and May (Roache 2004).

The 2000 and 2004 Biological Opinions prepared by USFWS and NMFS, respectively, affected operations at Hungry Horse by requiring the release of flow augmentation water and the implementation of VARQ (for variable discharge; see section 1.5.3). From July 1 through August 31, the Hungry Horse Project releases additional water to benefit anadromous fish species (primarily Pacific salmon). This additional water is referred to as “flow augmentation.” The total amount of water released for flow augmentation is the maximum June storage in excess of elevation 3,540’ msl. Flow augmentation water must be passed through the Columbia River system so that benefits to anadromous fish are realized. This limits the potential for Hungry Horse flow augmentation water to be used to maintain Flathead Lake elevations in the event of a drought. The Hungry Horse Project has also adopted ramping rates and eliminated daily peaking in response to the requirements of the USFWS BiOp.

The 2008 Biological Opinion (BiOp) changes the volume and the timing of flow augmentation releases as compared to the 2000 and 2004 BiOps. As a result, during drought years under Hungry Horse experimental draft operations there may be slightly less water released to Flathead Lake in July and August, but potentially more in September. The exact impacts to lake levels on Flathead Lake due to changes in flow augmentation releases implied by the experimental draft are unknown, and will ultimately be determined by interagency coordination in any future drought year. The 2008 BiOp also calls for Hungry Horse to refill by about June 30 each year, with the exact date to be determined by in-season management. This may slightly change the timing of Hungry Horse refill, potentially moving it forward to slightly earlier in the month rather than under the operations modeled per the 2004 BiOp. Overall, the total flow augmentation volume during drought years should remain the same as that assumed for this EIS analysis, but the distribution of the flow may differ slightly over July through September in comparison to what was originally modeled for the purposes of this EIS. Therefore, the effects identified in this analysis are not expected to differ significantly between the 2004 BiOp operations assumed for the EIS and the new 2008 BiOp operations.

Hungry Horse reservoir is currently operating under VARQ, an alternative flood control strategy developed by the Corps of Engineers in collaboration with BOR, BPA, and the State of Montana. Under VARQ, the amount of flood control space to be provided in Hungry Horse Reservoir in a given year is determined based on runoff forecasts. Updated management strategies have been developed that allow Hungry Horse Reservoir to store more water during the winter months in low and moderate runoff years.

Under VARQ operations, spring water releases from Hungry Horse Dam are delayed; releases are reduced in April and increased in May and June. These changes in timing and magnitude affect Kerr Project operations. Specifically, during April, the Kerr Project is releasing water as it drafts Flathead Lake to its minimum elevation of 2,883' msl. Therefore, Hungry Horse Project releases during April are passed through the Kerr Project. During May and June, when Flathead Lake is refilling to its full pool elevation of 2,893' msl; releases from Hungry Horse Project can be stored in Flathead Lake. Analyses completed by BOR indicate that, during drought years, under VARQ, Flathead Lake has a slightly better likelihood of achieving full pool while meeting minimum instream flow requirements (Roache 2004).

3.2 LAND USE AND LAND OWNERSHIP

3.2.1 STUDY AREA

The land use study area is the same as the study area for the overall project and includes Flathead Lake, land adjacent to Flathead Lake, the Flathead River immediately upstream of Flathead Lake, and the Lower Flathead River between Kerr Dam and the confluence with Mission Creek (see Figure 3-1). The study area lies within Lake and Flathead counties. Population centers in the study area include the communities of Kalispell, Polson, Big Arm, Elmo, Dayton, Rollins, Lakeside, Woods Bay, Somers, and Bigfork.

This section describes land ownership and administration, land use plans, current land uses, and future land use plans and development trends. This discussion is limited to information that may be necessary to analyze land use as it pertains to the DMP for the Kerr Project. In general, land use regulations are driven by Lake and Flathead counties outside of the Flathead Indian Reservation. Reservation land use policies govern within Reservation boundaries.

3.2.2 OWNERSHIP AND ADMINISTRATION

The southern half of the study area is on the Flathead Indian Reservation, which is governed by the CSKT. Within the boundaries of the Reservation, ownership is fragmented. Much of the land is held in trust by the United States on behalf of the CSKT, portions of the land within the Reservation are owned by the State of Montana, and other land is privately held. The northern half of the study area (outside of the Flathead Reservation) includes lands owned by the State of Montana, U.S. Forest Service, and private interests including Plum Creek Timber and others. See Figure 3-10 for additional details regarding land ownership.

The CSKT has a Shoreline Protection Division established to provide technical assistance and review for the protection of shorelines, water quality, and property investments. The division administers Tribal Ordinances 64A (the Shoreline Protection Ordinance) and 87A (the Aquatic Lands Conservation Ordinance). The CSKT also have a Water Quality Program which oversees three major river drainages, more than 100 perennial streams, the southern half of Flathead Lake and numerous other lakes. The largest irrigation project in Montana also falls within the Reservation.

3.2.3 LAND USE PLANS AND REGULATIONS

Land use planning documents that apply within the Kerr Project study area were obtained and reviewed for relevance to the DMP EIS. A summary of potentially relevant information is provided below.

Some zoning regulations (including setbacks) are measured from the mean annual high water elevation. The County Lakeshore Protection Regulations define Mean Annual High Water Elevation as “the mean average of the highest elevation of a lake in each of at least five consecutive years, excluding any high levels caused by erratic or unusual weather or hydrologic conditions. The highest elevation caused by operation of a dam or other impoundment counts towards the establishment of the mean annual high water elevation.” Therefore the high water elevation for Flathead Lake is 2,893’ msl; this provides the demarcation point for development setbacks.

3.2.3.1 Lake County

The 2003 Lake County Growth Policy document provides a description of current conditions, anticipated trends, and goals. Lake County is not zoned as a whole; instead, staff planners facilitate groups intending to form zoning districts. Lake County maintains 16 zoning districts, six of which are on Flathead Lake. These are East Shore, Finley Point, Polson City Limit, Melita Island/LaBella Lane, Kings Point, and Upper West Shore District. The growth policy states that population and the need for infrastructure continue to increase (between 1993 and 2002 about 1,600 new lots were recorded) even though the historic agricultural and timber industries slowly move out of production. The policy includes nine goals and objectives, which aim to balance individual property rights and the good of the community. New zoning districts are added over time.

The 2005 Lake County Density Map and Regulations are designed to guide growth in a cost effective manner and to protect natural resources in each of the zoning districts. The Lake County Lakeshore Protection Regulations apply from the high water mark to 20 feet landward on any lake, lakebed, or lakeshore in Lake County, excluding portions of Flathead Lake within the City of Polson and Flathead Lake waters below 2,893.2’ msl elevation within CSKT Reservation lands. The regulations require permits prior to any work commencing in the lake protection zone. The development standards and criteria required for a permit were designed to minimize negative effects of development including sedimentation, pollution, flooding, erosion, and habitat damage.

3.2.3.2 Flathead County

Flathead County land use regulatory controls consist of the Flathead County Zoning and Subdivision Regulation and the Lake and Lakeshore Protection Regulations. The purpose of the Flathead County Zoning Regulations is to promote the general welfare of the community; to facilitate the provisions for public works requirements such as water, sewer, and environmental needs; and to ensure orderly development according to the Master Plan adopted for all or parts of Flathead County. The regulations restrict the height, number of stories, and size of buildings and other structures; the percentages of a lot that may be covered by impervious surfaces; the size of yards and other open spaces; the location and use of buildings, structures, and land for trade, industry, residences, and/or other uses; and the protection of the aesthetic resources of Flathead County. The subdivision regulations include design standards for developing near floodplains and water bodies, storm water runoff, temporary sediment and erosion control, and water and sewer. The Flathead County Lake and Lakeshore Protection Regulations are similar to those for Lake County.

3.2.3.3 CSKT Administered Programs

The CSKT has established several Divisions within the Natural Resources Department to govern land and water use on the Reservation. The Water Management Division was developed to preserve and enhance the Reservation's resources and ecosystems for future generations. The Division of Fish, Wildlife, Recreation, and Conservation works to protect and enhance the fish and wildlife resources of the CSKT. Among the restoration plans established by this division are the Wetland/Riparian Habitat and Bull Trout Restoration Plan, established in August, 2000. The Division of Environmental Protection, which protects human health and the environment for all Reservation residents, oversees several programs, including the Shoreline Protection Program, the Water Quality Program, and the Wetlands Conservation Program.

3.2.4 CURRENT LAND USES

Lakefront property in the study area, up to Stillwater, is primarily residential and commercial resort oriented, with a few parks and public access areas. These property values have risen faster than adjacent property, and this trend is likely to continue, based on review of real estate information for lakefront property. General land use information, as well as land cover types, is provided in Figure 3-11. Land north of the Flathead Lake is generally in agricultural use, and land downstream of the Lake along the Lower Flathead River is a mixture of riparian habitat and agricultural use.

3.2.5 FUTURE LAND USE AND DEVELOPMENT TRENDS

As discussed in the socioeconomic section, population in Lake and Flathead counties is growing quickly and steadily. Flathead County was the fourth fastest growing county in the state at a 26 percent population increase from 1990 to 2000. Between 1990 and 2000, cities and towns in the study area had growth rates as follows; Polson 22.79 percent, Charlo 22.63 percent, Pablo 39.75 percent, Kalispell 19.35 percent, and Whitefish 15.20 percent (U.S. Census Bureau, 2001). These trends are expected to continue; although available water and sewer infrastructure will be a constraint to development.

Figure 3-10: Land Ownership

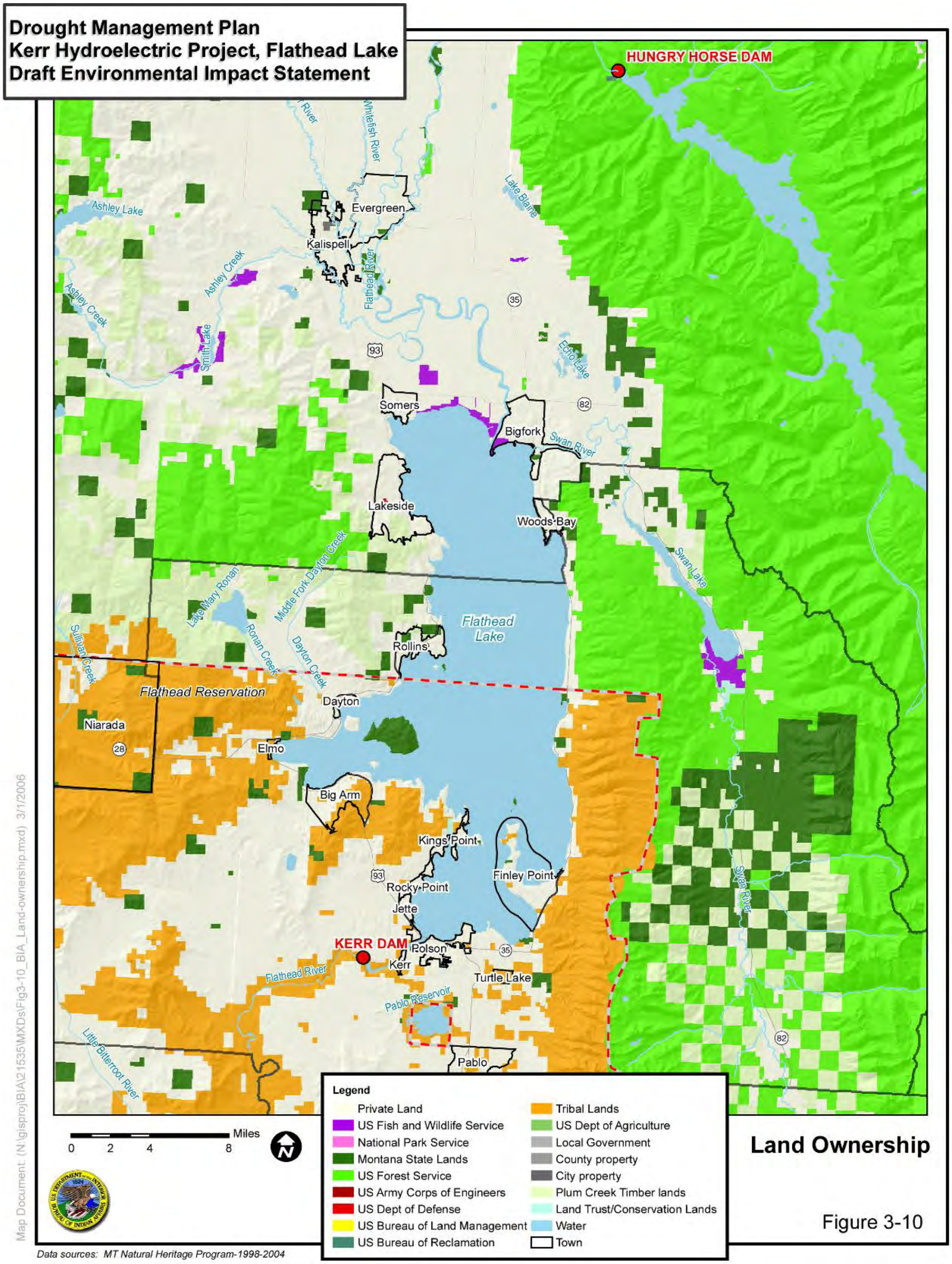
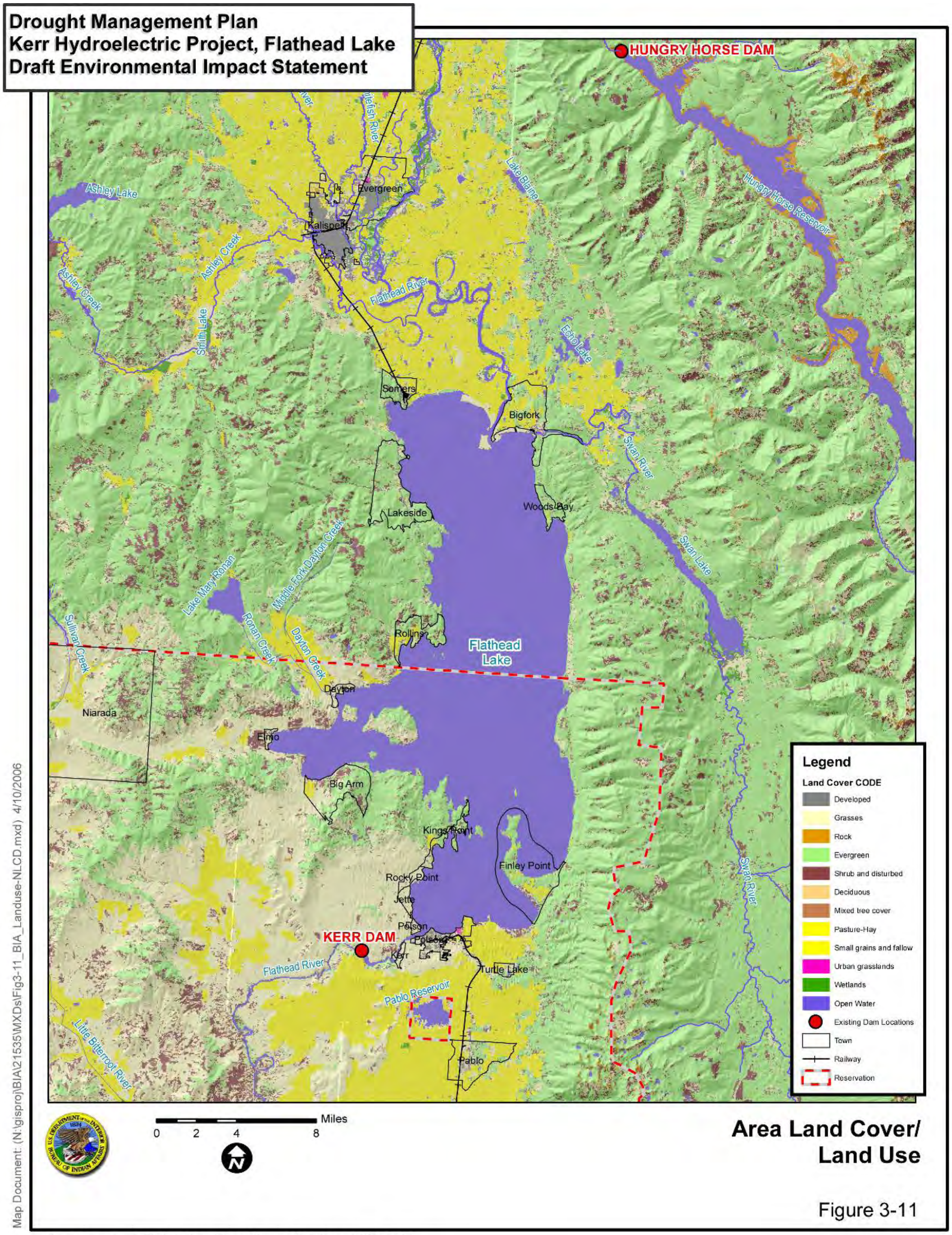


Figure 3-11: Area Land Cover / Land Use



Data source: USGS National Land Cover Database 1985-1995

3.3 WATER QUALITY

This section presents the existing water quality data and pollutant load allocations for Flathead Lake and water quality issues associated with the Flathead River below Kerr Dam. It also includes existing information on the erosion areas on Flathead Lake and the relationship of those areas to the operation of the Kerr Project. This information is presented for existing conditions in order to develop a baseline for assessing impacts of the alternatives. Impacts to be assessed include water quality issues identified during scoping and the public comment period, and effects of the alternatives on the findings and load allocations of the Total Maximum Daily Load Study (TMDL) for Flathead Lake. During scoping and the public comment period, commenters noted water quality concerns such as soil and bank erosion caused by high lake elevations, turbidity, and heavy nutrient loading causing weed growth in shallow bays.

Information describing existing conditions was obtained from the TMDL Study of Flathead Lake (MDEQ 2001), which describes the water quality condition of Flathead Lake. Additional information was obtained from the Flathead Lake Biological Station and the CSKT.

3.3.1 STUDY AREA AND OVERVIEW

The following water bodies are present in and adjacent to the study area: Flathead Lake, Flathead River, Swan River, and several tributaries and drainage ways that discharge into Flathead Lake.

MDEQ classifies surface water bodies in the state according to how the water is used, and each classification has associated standards for water quality. Flathead Lake is classified by the State of Montana and CSKT as an A-1 waterbody, meaning that it should be suitable for drinking and food processing purposes; bathing; swimming; recreation; the growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply.

3.3.2 APPLICABLE REGULATIONS

Water quality in the study area is regulated by the 1977 Clean Water Act (CWA)[11], Montana Water Quality Act Standards[12], and CSKT Water Quality Standards. Sections of the CWA that may be applicable to the DMP include sections 303(d), 305 (b), 401, and 402.

Section 305(b) requires states to prepare a comprehensive biennial water quality report, and section 303(d) requires states to produce a list of waters for which effluent limits are not sufficient to meet water quality standards. The section 303(d) list is prepared about every two years and identifies areas where water quality is impaired (does not fully meet standards) or threatened (is likely to violate standards in the

[11] The Clean Water Act is an amendment to the Federal Water Pollution Control Act of 1972. 33 U.S.C. 1251 *et.seq*.

[12] Montana water quality standards are found in the Administrative Rules of Montana (ARM), Subchapter 6, Title 17, Chapter 30, and the 1999 Montana Code Annotated, Title 75, Environmental Protection, Chapter 5 Water Quality.

near future). Once a water body is placed on the 303(d) list, the State is required to identify the sources of water quality problems and develop water quality improvement strategies, such as TMDL allocations.

A TMDL is the total amount of a pollutant that a water body may receive from all sources without exceeding water quality standards. Flathead Lake water quality must satisfy both State of Montana and CSKT water quality standards.

The State of Montana has established numerical and narrative water quality standards. In general, the numerical standards relate to:

- Chronic and acute factors affecting aquatic life.
- Human health.
- Fecal coliform levels.
- Changes in pH, turbidity, color, and temperature (MDEQ 2004).

These numerical standards have been established where data is available to develop an understanding of the effects of concentrations of various chemical parameters on aquatic life or human health. Where insufficient data is available to develop numerical standards, or where such standards would not be effective in addressing water quality issues, narrative standards are used. Narrative standards are often defined in terms of change from the status quo (i.e., “no increase above naturally occurring condition”). The two key concepts associated with narrative standards are:

- Activities which result in nuisance aquatic life are prohibited.
- No increases are allowed above naturally occurring conditions of sediment, settleable solids, oils or floating solids (which are harmful, detrimental, or injurious to public health), recreation, safety, welfare, livestock, wild animals, birds, fish, or other wildlife (Ibid).

The State of Montana considers conditions resulting from reasonable operation of dams in existence July 1, 1971, as naturally occurring conditions (Ibid).

CSKT water quality standards can be found in the 1990 Tribal Water Quality Management Ordinance 89B (sections 1-2-102, 1-2-201, 1-2-204, and 1-2-206), and the Surface Water Quality Standards and Antidegradation Policy (1995). These documents include water body classifications and standards including;

- The geometric mean number of organisms in the coliform group must not exceed 50 per 100 milliliters.
- Dissolved oxygen concentration must not be reduced below levels in the Tribal Criteria Chart.

- Induced variation of hydrogen ion concentration (pH) within the range of 6.5 to 8.5 must be less than 0.5 pH unit. Natural pH outside this range must be maintained without change. Natural pH above 7.0 must be maintained above 7.0.
- No increase above naturally occurring turbidity is allowed.
- Specific temperature range requirements must be met such as minimum and maximum temperature changes.
- No increases are allowed above naturally occurring concentrations of sediment, contaminated sediments, settleable solids, oils, or floating solids, which will or are likely to create a nuisance or render the waters harmful, detrimental, or injurious to public health, recreation, safety, welfare, livestock, fish, or wildlife.
- True color must not be increased more than two units above naturally occurring color.
- For waters classified A-I, concentrations of toxic or deleterious substances which would remain in the water after conventional water treatment may not exceed the maximum contaminant levels set forth in the U.S. Environmental Protection Agency (EPA) National Primary Drinking Water Regulations (40 CFR Part 141 and 143). Concentrations of toxic or deleterious substances also may not exceed Gold Book Levels and the Tribal Criteria Chart.

3.3.3 EXISTING WATER QUALITY DATA

Water quality data on Flathead Lake has been collected since 1899 by the Flathead Lake Biological Station of the University of Montana. Flathead Lake Biological Station (FLBS) has produced water quality reports since 1977. These reports show that the lake continues to support a cold water fishery; however, the studies indicate that water quality has been declining over the last 25 years. The water quality decline has been attributed to nutrient pollution in runoff from populated areas and deposition of wind-carried smoke and dust particles on the lake surface (FLBS 2005).

Therefore, Flathead Lake is listed on Montana's 303(d) list as impaired for increased algal growth, decreased water clarity, and high nutrient levels. The following description of water quality problems on Flathead Lake was taken from the 303(d) assessment record sheet;

> Long-term trends indicate that primary productivity (growth of algae) has increased over the past 20 years. This increase has been significantly correlated in Nitrogen and Phosphorus loads to the lake. Numerous point and nonpoint sources within the basin have been documented (see list of Causes and Sources). There is a documented dissolved oxygen decline in the hypolimnion during summer stratification, which is likely linked to algal blooms and overall increased productivity. Shoreline algal growth is linked to localized pollution sources, but data is not sufficient to link said growth to external nutrient loading. Shoreline erosion from Kerr Project operations and also Hungry Horse Reservoir releases impact the shoreline habitat. The salmonid fishery has changed greatly since arrival of Mysis shrimp, and changes have been to the detriment of kokanee and bull trout. Consequently,

there has been a decline in angler pressure. Fishery changes are related to trophic cascade and management decisions, and not currently related to poor water quality.

Studies by the FLBS have provided the technical background for developing a TMDL allocation to manage nutrient loads reaching Flathead Lake, particularly Water Quality Data Analysis to Aid in the Development of Revised Water Quality Targets for Flathead Lake, Montana (Stanford et al. 1997).

EPA approved the State of Montana’s Nutrient Management Plan and TMDL for Flathead Lake (filed pursuant to CWA requirements) in 2001 (MDEQ 2001).

Additional discussions with CSKT representatives indicate that additional data has been collected regarding water temperatures in the lower Flathead River. During the summer months, especially during low-flow conditions, temperatures rise to levels that do not favor cold water species. The lower Flathead River’s water quality is also influenced by non-point source pollution from its tributary watershed downstream of Kerr Dam. Water Quality of this watershed is very good high in the mountains, and gradually deteriorates as the tributary channels flow across the valley floor. Major pollutant sources include agriculture and irrigation return flows. Of increasing concern are pollutants from increasing development of the valley floor. It is anticipated that home development will range from 424 to 463 residences per year over the period 1994 to 2025. This would result in a doubling of the amount of development in the Flathead River valley. Pollutants of concern include; nutrients, oil/grease, sediment, dissolved salts and bacteria. (www.cskt.org)

3.4 ECOLOGICAL RESOURCES

Implementation of a DMP may affect aquatic species and plant and animal species that require lakeshore and/or riparian habitat. The following sections focus primarily on those species, however general discussion of the flora and fauna of the study area is also provided.

3.4.1 LAND COVER/HABITAT

To identify the types of habitat present within the study area, a review of U.S. Geological Survey (USGS) landcover data was conducted. Review of USGS mapping, aerial photography, and reconnaissance of portions of the study area confirmed these land cover types.

The area surrounding the upper Flathead River between the town of Kalispell and Flathead Lake is dominated by agriculture; however, much of the land immediately adjacent to the river is riparian wetland (see section 3.4.6 – Wetlands and Riparian Areas, for information on wetland types). Small pockets of grassland and mixed deciduous/coniferous woods are located in the area; the woodland pockets tend to be concentrated near the river.

Much of the lakeshore of Flathead Lake has been developed, primarily with low-density single family homes/cabins and resort facilities. The undeveloped areas around Flathead Lake consist primarily of coniferous forest and mixed deciduous/coniferous forest, especially along the east shore and the portion of the west shore north of Big Arm Bay. Much of the land surrounding Big Arm Bay on the west side of the lake is grassland and shrubland. Areas near the south shore of Flathead Lake (excluding Polson) are a mix of grassland, shrubland, and agricultural land, although wetland areas are present immediately adjacent to the lake east of Polson.

The land surrounding the lower Flathead River is a mix of grassland, shrubland, and agricultural land. The majority of the agricultural land is located east of the Flathead River (likely because of the presence of irrigation infrastructure associated with the Flathead Agency Irrigation Division). West of the Flathead River shrubland and grassland dominate.

3.4.2 FISHERIES

Fisheries resources in Flathead Lake and the lower Flathead River could be affected by the implementation of a DMP. At least 25 species of fish have been documented in the Flathead Lake/Flathead River system; 10 of which are native species. Table 3-5 summarizes the game fish species present in Flathead Lake and the lower Flathead River.

Table 3-5: Game Fish Species Present In Flathead Lake and the Lower Flathead River

Species (Scientific name)	Present In Flathead Lake	Present in the lower Flathead River
Westslope cutthroat trout (Salmo clarki lewisi)	Yes	Yes
Bull trout (Salvelinus confluentus)	Yes	Yes
Mountain whitefish (Prosopium williamsoni)	Yes	Yes
Lake trout (Salvelinus namaycush)	Yes	Yes
Lake whitefish (Coregonus clupeaformis)	Yes	Yes
Rainbow trout (Onchorhynchus mykiss)	Yes	Yes
Brown trout (Salmo trutta)	Limited or No	Yes
Brook trout (Salvelinus fontinalis)	Yes	No
Northern pike (Esox lucius)	Yes	Yes
Largemouth bass (Micropterus salmoides)	Yes	Yes
Smallmouth bass (Micropterus dolomieu)	Yes	Yes
Yellow perch (Perca flavenscens)	Yes	Yes
Kokanee (Onchorhynchus nerka)	Yes	No

Multiple studies conducted on the lower Flathead River concentrated on the effects of Kerr Project operations on the fishery. Prior to implementation of the section 4(e) conditions (primarily the minimum instream flows, between-day flow change limitations, and within-day ramping rate limitations), flow changes in the river below Kerr Dam significantly affected the physical composition of the environment of the lower Flathead River. According to one study, historical operations of the Kerr Project resulted in the river having the lowest populations of trout species in Montana for rivers of its size (Cross and DosSantos 1988). This has resulted in some shift in the focus of game species pursuits from cold water species (primarily salmonids) to cool- to warm- water species such as northern pike and bass. However, these species have also been negatively affected by Kerr Project operations.

The primary issues associated with the modifications of fish habitat include:

- Loss of suitable spawning habitat within the lower Flathead River.
- Reduced survival of fish eggs and young due to high winter flows.
- Higher velocities within the river creating stress in juvenile fish during critical growth periods.
- Low populations of invertebrates (a critical food source for juvenile fish) due to habitat modifications associated with flow volumes and variability.
- Stranding of fish in the varial zone during flow reductions.
- Fish mortality related to temperature fluctuations.

Kerr Project operations have also affected the fishery in Flathead Lake due to management of lake elevations. Several studies indicate that the effects have been both positive and negative, depending on the species (Hardy 2005). Kokanee populations have declined significantly; partially due to the arrival of the Mysis shrimp (see section 3.3), but also because of the dewatering of shallow spawning areas and sedimentation impacts to deep spawning zones. The effects on spawning habitat have also impacted native populations of bull trout and cutthroat trout in Flathead Lake.

Lake trout and whitefish populations have grown significantly. To address this issue, the CSKT and the MDFWP have developed a co-management plan. From 2001 to 2010, the goals of the plan are to:

- Increase and protect native trout populations (bull trout and westslope cutthroat trout).
- Balance tradeoffs between native species conservation and nonnative species reduction to maintain a viable recreational/subsistence fishery.
- Protect the high quality water and habitat characteristics of Flathead Lake and its watershed (MFWP and CSKT 2000).

3.4.3 TERRESTRIAL AND AMPHIBIOUS SPECIES

A variety of terrestrial and amphibious species exist within the study area. Mammals with ranges that intersect the study area include hoofed mammals (e.g. mule deer, white-tailed deer, elk, moose); black and grizzly bears; cats (e.g. lynx, mountain lion); canines (e.g. gray wolf, coyote, red fox); raccoon; skunk; members of the weasel family (e.g. long-tailed weasel, northern river otter, mink, fisher, wolverine); a variety of rabbits and hares; a variety of rodents (e.g. chipmunks, squirrels, beaver, gophers, mice, porcupines); and multiple species of bats (MTNHP 2004a).

Reptiles with ranges that intersect the study area include snakes (e.g. bullsnake, racer, common and western terrestrial garter snake, rubber boa, and western rattlesnake); painted turtle, and the northern alligator lizard. Amphibian species include several species of frogs, the western toad, and the long-toed salamander (Ibid).

In general, only those terrestrial and amphibious species that rely upon Flathead Lake, upper Flathead River or lower Flathead River habitats, which could potentially be affected by the implementation of a DMP, will be discussed further in this EIS.

3.4.4 AVIAN SPECIES

A number of migratory and non-migratory bird species are present within the Flathead basin and more specifically, the study area. However, the proposed DMP and alternatives are likely only to affect those species that nest or forage at or near the lake shore. Comments received during the scoping process indicated that analyses should therefore focus on osprey, eagles, and waterfowl species.

3.4.4.1 Osprey

The osprey (*Pandion haliaetus*) is a piscivorous (fish-eating) raptor characterized by a dark brown back and wings, with a white breast and barred tail. The head is white with a brown bar extending through the eye back to the shoulder. Mature birds are 21 to 24 inches long and have a wingspan of 54 to 72 inches. Ospreys are migratory, and winter in Central and South America. According to MDFWP data, ospreys arrive in Montana in late April, and leave by October. Ospreys nest near major water bodies, such as large lakes and reservoirs and major rivers. In general, nests are located in trees that are as tall as or taller than the surrounding forest. Ospreys may also nest on power poles and other man-made structures. Nests are commonly used for multiple years. The nesting period is generally between April and July (MFWP 2005a).

The State of Montana considers the osprey to be common, widespread, and abundant throughout its range in Montana. The osprey is not listed by the USFWS under the ESA (Ibid).

3.4.4.2 Bald Eagle

See section 3.4.5 – Species of Concern, for discussion of the bald eagle.

3.4.4.3 Waterfowl

Waterfowl are a popular segment of the bird population for hunting and bird-watching. As the term indicates, waterfowl include bird species that generally require significant water resources in which to live, breed, and forage. According to the Montana State University Extension Service (Mackie, et al. 2005):

> Montana waterfowl include a variety of species of migratory ducks, geese, and swans. Twenty-seven ducks or duck-like species, four species of geese, and two species of swan are included in Montana's waterfowl family. Of this list, 20 species of ducks, one goose, and one swan are considered as nesting species in the state.
>
> Montana's waterfowl distribution is a result of the condition of water levels and associated wetlands (habitat condition) and the season of the year. Breeding habitat should be of sufficient quality to supply needs from the time birds arrive in early spring through the time young are ready to fly in late summer. Important factors include not only the nest location but also stable water levels, good escape cover, and available food sources. Nesting habitat varies from upland, dry nesting sites located hundreds of yards from water for some puddle ducks, to nests built over the water as is the case for some diving ducks. Abundant food and good escape cover are two critical requirements of good brood rearing habitat.
>
> Habitat for both spring and fall migrations centers around the needs of rest areas and food supply. Larger bodies of water associated with agricultural crops are generally preferred by migrating birds. Montana's winter habitat is limited to river systems which maintain some open water. As expected, the extent of these wintering areas varies with the severity of the weather.
>
> Nearly all waterfowl are dependent upon the naturally occurring vegetation within the marsh ecosystem as their food source during the breeding and brood rearing season. Plants such as the sedges, bulrushes, and other marsh plants make up the birds' diet. With the advent of fall migration, pintails, mallards, and geese utilize grain crops as their main source of food. The diving ducks remain dependent upon the aquatic plant species found in the marsh[.]

3.4.4.4 Presence of Species and Associated Habitat in the Study Area

The majority of the study area provides potential habitat for ospreys. The entire shoreline of Flathead Lake within the Reservation as well as the Lower Flathead River below Kerr Dam provide potential osprey habitat; 38 osprey nests have been identified within this area, according to data provided by the CSKT. Detailed data regarding the number and location of osprey nests was not identified for the northern half of Flathead Lake or the Upper Flathead River. Given the consistency of habitat, however, it is expected that a similar density of nesting sites is present on the northern part of the lake. Inundation of shoreline and the corresponding loss of trees since the construction of the dam may have reduced the amount of nesting habitat on the Upper Flathead River and the extreme north shore of Flathead Lake.

The northern shore of Flathead Lake contains the Flathead Waterfowl Production Area, which covers approximately 2,730 acres. Waterfowl Production Areas (WPA) are set aside to preserve habitat for waterfowl nesting and foraging, and in many cases to provide hunting opportunities. The Flathead WPA has been subject to a number of changes associated with the management of lake levels through Kerr Project operations. Prior to the construction of the dam, the northern lakeshore area was most likely a mix of floodplain forest and emergent wetland. Once the dam was in place, lake levels were kept artificially high during the summer months. This extended period of high water appears to have caused much of the emergent wetlands to disappear; continued long durations of higher water have likely converted these to open water wetland types. These changes appear to have reduced the available waterfowl habitat along the north shore.

Waterfowl habitat is also present along other portions of the Flathead Lake shoreline, including the southeastern corner (east of Polson), other shallow bays, and in wetlands adjacent to the lake. The wetland complexes associated with the Upper Flathead River between Flathead Lake and Kalispell also provide waterfowl habitat.

3.4.5 SPECIES OF CONCERN

The State of Montana has established a list of species of concern. These include native plant and animal species reproducing in the state that are considered to be at risk because of declining populations, threats to habitat, and/or restricted distribution (MTNHP 2004b). In addition, the CSKT has compiled a list of species of concern that occur on the Reservation (Table 3-6) (CSKT CRP). Review of the Montana Natural Heritage Program (MTNHP) database identified 60 species of concern within the Flathead Lake watershed, and 46 species of concern within the Lower Flathead River watershed. Several of these species occur in both watersheds; there are a total of 89 unique Montana species of concern within the two watersheds. These include one amphibian species, 12 bird species, three fish species, three species of mammals, one reptile species, ten invertebrate species, 48 species of vascular plants (plants with water-conducting tissues), and 11 species of non-vascular plants (plants without water-conducting tissues). Of these 89 species, a few are listed by the USFWS as endangered, threatened, or candidate species. These include the species listed in Table 3-7.

Table 3-6: CSKT Species of Concern on the Flathead Indian Reservation

Common Name	Scientific Name
Threatened and Endangered Species	
Grizzly Bear	*Ursus arctos horribilis*
Northern Gray Wolf	*Canis lupus*
Peregrine Falcon	*Falco peregrinus*
Sensitive Species[1] - Mammals	
Lynx	*Lynx canadensis*
Wolverine	*Gulo gulo*
River Otter	*Lontra canadensis*
Fisher	*Martes pennanti*
Bobcat	*Lynx rufus*
Sensitive Species - Birds	
Barred Owl	*Strix varia*
Pileated Woodpecker	*Drycopus pileatus*
Clay-colored Sparrow	*Spizella pallida*
Merlin Falcon	*Falco columbarius*
Cooper’s Hawk	*Accipiter cooperii*
Northern Saw-whet Owl	*Aegolius acadicus*
Great Gray Owl	*Strix nebulosa*
Harlequin Duck	*Histrionicus histrionicus*
Bobolink	*Dolichonyx oryzivorus*
Long-eared Owl	*Asio otus*
Prairie Falcon	*Falco mexicanus*
Northern Goshawk	*Accipiter gentilis*
Golden Eagle	*Aquila chrysaetos*
Northern Pygmy Owl	*Glaucidium gnoma*
Olive-sided Flycatcher	*Contopus cooperi*
Long-billed Curlew	*Numenius americanus*
Brewer’s Sparrow	*Spizella breweri breweri*
Burrowing Owl	*Athene cunicularia*
Upland Sandpiper	*Bartramia longicauda*
Sharp-tailed Grouse	*Tympanuchus phasianellus*
Sensitive Species - Amphibians	
Rocky Mountain Tailed Frog	*Ascaphus montanus*
Van Dyke’s Salamander	*Plethodon vandykei*

[1] The CSKT defines Sensitive Species as those for which current viability is a concern, as evidenced by significant current or forecasted downward trends in their population status or habitat quality.

Table 3-7: Federally Listed Endangered, Threatened, or Candidate Species

Common Name	Scientific Name	Status
Fish		
Bull Trout	*Salvelinus confluentus*	Threatened
Montana Arctic Grayling	*Thymallus arcticus montanus*	Candidate
Mammals		
Gray Wolf	*Canis lupus*	Endangered
Lynx	*Lynx canadensis*	Threatened
Grizzly Bear	*Ursus arctos horribilis*	Threatened
Plants		
Linearleaf Moonwort	*Botrychium lineare*	Threatened
Spalding's Campion	*Silene spaldingii*	Threatened

The potential for drought management activities to negatively affect species' habitats is a concern. Of the federally listed species, bull trout and bald eagle habitats would most likely be affected by drought management. The mammal and plant species use or require upland habitat that would not likely be directly affected by drought management activities. The Montana arctic grayling is generally found in small, cold, clear lakes with tributaries suitable for spawning; Flathead Lake and the upper and lower Flathead Rivers are not generally considered grayling habitat.

Consideration was given to the twelve federally-listed salmonid species addressed in the NMFS BiOp (see section 1.5.3); these include five subspecies of chinook salmon (*Oncorhynchus tshawytscha*), five subspecies of steelhead (*O. mykiss*), the Columbia River chum salmon (*O. keta*), and the Snake River sockeye salmon (*O. nerka*). As discussed in section 1.5.3, the BiOp requires the release of flow augmentation water from the Hungry Horse Project to increase flows in the Columbia River to benefit migrating salmon and steelhead. The use of flow augmentation water for drought management purposes at the Kerr Project may not be possible under many situations.

3.4.5.1 Bull Trout

The bull trout is technically a char, and not a true trout. Char and trout are members of the salmonid family; char are of the genus *Salvelinus*, while trout are either of the genus *Salmo* or the genus *Oncorhynchus*. Body shape tends to be similar between char and trout, with the most distinctive differences being coloration. Trout have dark markings on a light background, while char have light markings on a dark background.

Bull trout are found in Flathead Lake and its tributaries. Two distinct populations exist; a stream-resident population and a migratory population. The migratory population lives in a manner similar to other migratory species such as salmon and steelhead, spending the majority of its life in a large water body (in the study area, Flathead Lake) and migrating into tributary rivers and streams to spawn. Bull trout spawn in the fall; migratory adults return to their lake of origin following spawning. Young trout may spend as many as three years in the stream prior to returning to a lake to mature (MTNHP 2005b).

Stream-resident fish generally do not exceed 12 inches, while migratory fish often exceed 24 inches, and can reach weights of up to 25 pounds in Flathead Lake (Ibid).

Bull trout populations are threatened by habitat modification/degradation, overfishing, and competition from and interbreeding with non-native species (Ibid).

Article 82 of the Kerr Project license requires the licensees to file a Threatened and Endangered Species Plan and annual report, that at a minimum must include any modifications to project facilities or operations proposed to minimize take of bull trout.

3.4.5.2 Bald Eagle

The bald eagle is a piscivorous raptor characterized by a white head with brown body and wings. Immature eagles (those less than five years old) tend to be dark brown on the head and body, and can be confused with the Golden eagle (Aquila chrysaetos). Mature bald eagles are 28 to 38 inches long, and have a wingspan ranging from 66 to 96 inches. Bald eagles have both resident and migratory populations in Montana. Resident eagles tend to stay in the general vicinity of the nesting sites, although some may move to lower elevations in the winter months. Migratory eagles generally spend the spring and summer months north of Montana, and either winter in Montana or pass through Montana in the fall on their way to wintering areas further south. Bald eagles tend to inhabit forested areas adjacent to lakes, reservoirs, and major rivers. Wintering habitat may include forested upland areas. Nests are generally built in the tallest and largest trees in a given area, and are commonly reused year after year. Breeding dates in Montana are generally between March and July (MFWP 2005b).

On June 28, 2007 the bald eagle was de-listed from threatened status of the ESA. The regulation of the bald eagle then transfers to the bald and golden eagle protection act. This act still provides protection to bald eagle nests from disturbance.

The majority of the study area provides potential habitat for eagles. The CSKT has identified the entire shoreline of Flathead Lake within the Flathead Indian Reservation as eagle habitat, as well as the Lower Flathead River below Kerr Dam. Within the Flathead Indian Reservation, 19 bald eagle nests have been identified. Specific data regarding the number and location of bald eagle nests was not available for the northern half of Flathead Lake or the Upper Flathead River.

3.4.6 WETLANDS AND RIPARIAN AREAS

USACE has jurisdiction under the CWA to regulate activities within waters of the United States, which include wetlands. Under the CWA, wetlands are defined as "Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas" (33 CFR 328.3b). The CSKT has wetlands jurisdiction over waters within the Reservation.

3.4.6.1 Methods and Identification

The USFWS National Wetlands Inventory (NWI) database was used to identify wetlands in the study area. NWI data and maps were primarily compiled by manual photo interpretation; therefore, the quality of the wetland data varies due to source photography, ease or difficulty of interpreting specific wetland types, and survey methods (e.g. level of field effort and state-of-the-art of wetland delineation).

3.4.6.2 Existing Wetlands

This EIS addresses wetlands that could be affected by modifications to lake level management and/or flows below Kerr Dam. These include wetlands with a direct hydrologic connection to the Upper Flathead River, Flathead Lake, and the Lower Flathead River. Smaller, isolated wetlands were observed in depressions near Flathead Lake at elevations greater than 2,893' msl; these wetlands are generally fed by runoff and groundwater infiltration, and would not likely be affected directly by lake level changes.

Potentially affected wetlands are primarily found on the north and south ends of the lake, and along the Upper and Lower Flathead River. The NWI shows scattered freshwater emergent wetlands, and some freshwater forested/shrub wetlands north of Flathead Lake. NWI classifies wetlands according to the Classification of Wetlands and Deepwater Habitats of the United States (Cowardin, et al., 1979). Table 3-8, Wetlands, and Figure 3-11, Area Land Cover/Land Use, show the wetland location and type. Wetland types found in the study area include lacustrine, palustrine, and riverine. These are further defined below and in Table 3-8.

- Lacustrine wetlands include wetlands with the following characteristics:
    - The wetland is situated in a topographic depression or a dammed river channel.
    - The wetland lacks trees, shrubs, persistent emergents, emergent mosses, or lichens with greater than 30 percent areal coverage.
    - Total wetland area generally exceeds 20 acres.
- Palustrine wetlands include wetlands dominated by trees, shrubs, emergents, mosses or lichens. Wetlands lacking such vegetation are also included if they exhibit all of the following characteristics:
    - Are less than 20 acres,

- o Do not have an active wave-formed or bedrock shoreline feature, and
- o Have at low water a depth less than 6-7 feet in the deepest part of the basin.

- Riverine wetlands include all wetlands contained in natural or artificial channels periodically or continuously containing flowing water or which forms a connecting link between two bodies of standing water. Upland islands or palustrine wetlands may occur in the channel, but they are not part of the riverine system.

It is important to note that wetland areas associated with the shore of Flathead Lake and the riparian environment of the lower Flathead River have been altered significantly by the construction and operation of the Kerr Project. Shore-oriented wetlands tend to be either inundated during the summer when the lake is at full pool, or mudflats when the lake is drawn down during the fall and winter. The riparian environment below Kerr Dam had generally been limited to muddy and rocky areas devoid of vegetation between high and low water marks; this has improved somewhat since the adoption of the section 4(e) conditions in the most recent version of the project license.

Table 3-8: Wetlands

Location	Type[1]
Upper Flathead River – Flathead Lake to Stillwater River	Lacustrine – L1UBH, L2ABG Palustrine – PABF, PABFx, PABG, PEMA, PEMAd, PEMC, PEMCd, PEMF, PFOA, PSSA, PSSC, PUBFx Riverine – R2UBG, R2UBH, R2USC, R4SBF
Flathead Lake – North End Adjacent to the Lake	Palustrine – PEMCh, PEMC, PFOAh, PEMFh
Flathead Lake – Shallow Area of the North End	Lacustrine – L2ABGh
Flathead Lake – Adjacent to East Bay	Lacustrine – L2ABFh, Palustrine – PABF, PABFh, PABG, PABGh, PEMA, PEMAd, PEMAh, PEMC, PEMCh, PEMF, PEMFh, PSSCh,
Flathead Lake – Channel Above Kerr Project west of Polson	Palustrine – PABGx, PEMC, PEMFh, PUSCx
Flathead Lake – West Side of South Bay	Lacustrine – L2ABG Palustrine – PABFx, PABG, PEMF, PEMFh
Flathead Lake – Big Arm Bay Area	Palustrine – PABF, PABFh, PEMC, PEMCh, PEMF, PEMFh, PSSA
Flathead Lake – West Side between Wildhorse Island and Somers	Lacustrine – L2ABFh, L2ABGh Palustrine – PABF, PABFx, PEMC, PEMCh, PEMF, PEMFh, PSSA
Lower Flathead River – Between Kerr Project and Clark Fork	Palustrine – PABF, PEMB, PEMC, PEMCh, PEMF, PSSA, PUBFx, Riverine – R3UBH, R3USC

[1] See Glossary for definitions of wetland types.

3.4.6.3 Flood Prone Areas

Both Flathead Lake and Flathead River have been studied by the Federal Emergency Management Agency (FEMA) as part of the National Flood Insurance Program (FEMA, 2007). FEMA used frequency analyses to determine maximum and minimum lake levels to provide upper and lower boundaries for the flood study. The frequency analysis used lake levels from 1966 on because of the 1965 amendment to the

MOU between MPC and USACE addressing flood control and lake levels. Lake levels from the frequency analyses were used as the downstream boundary condition for computation of upper Flathead River flood elevations. Water level elevations obtained from the two analyses are summarized in Table 3-9.

Table 3-9: Summary of Flathead Lake Flood Elevations (FEMA 2007)

Flooding Source and Location	Elevation (' msl)			
	10-year	50-year	100-year	500-year
Flathead Lake* Coincident with peak discharge in Flathead River	2,892.3	2,893.1	2,893.4	2,893.9
Flathead Lake* Annual Maximum Level	2,891.7	2,893.3	2,893.9	2,895.2

* Somers datum (Subtract one foot for consistency with USGS regional datum).

The datum used for the Flood Insurance Study is the Somers datum. As indicated in the Table 3-9 footnote, 1 foot needs to be subtracted to compare these data to the USGS Gauge at Polson, which is used to regulate Flathead Lake operations. Most of the flood elevations reported are below the maximum elevation of 2,893' msl (Polson datum) required by Article 43 of the project license given that the coincident peak discharge of Flathead River occurs during the April-June period when Flathead Lake is lowered for flood control operations. Details regarding the development of flood elevations for Flathead Lake and the upper Flathead River can be obtained by reviewing the 2007 Flood Insurance Study for Flathead County, Montana.

Peak discharges in the Flathead River were developed from data at USGS Gage No. 1236300 at Columbia Falls. Peak discharges in cubic feet per second for the 10-, 50-, 100-, and 500-year flow events were: 66,000; 79,000; 84,500; and 140,000; respectively.

3.5 TRIBAL RESOURCES

3.5.1 BACKGROUND

The Flathead Indian Reservation was reserved for tribal use as a permanent tribal homeland pursuant to the Treaty of Hellgate with the Flathead Nation, July 16, 1855, 12 Stat. 975 (1859).

The Reservation serves as homeland for Salish, Kootenai, and Pend d'Oreille people, descendants of members of a confederation of Tribes signatory to the Treaty of Hellgate. Tribal members today are referred to as the Confederated Salish and Kootenai Tribes of the Flathead Nation. The Reservation comprises approximately 1.3 million acres, over 62 percent of which is in Tribal and individual Indian ownership (other ownership includes private non-Indian owners, the Federal government, the State of Montana, and municipalities). Pursuant to Article III of the Treaty of Hellgate, the Tribes specifically retained the right to take approximately one half of available fish, in common with the citizens of the territory, at all "usual and accustomed places" and to hunt, gather, and pasture horses and cattle on "open and unclaimed lands" in ceded and aboriginal territory. This territory extends far beyond the boundaries of the Reservation property and includes, but is not limited to, the entire portion directly or indirectly affected by the Kerr Project. Specifically, this includes but is not limited to the project area itself, the lower river, the north half of Flathead Lake, the Waterfowl Production Area on the North Shore, and the 22 miles of the upper Flathead River backed up by the Kerr Project.

The Reservation occupies valleys and mountains in the lower quarter of the Flathead River basin. The east, south, and west boundaries of the Reservation are generally defined by drainage divides, the most prominent being the glaciated Mission Range to the east. Much of the Flathead Basin to the north and east of the Reservation is drained by the Swan and upper Flathead Rivers; numerous smaller streams drain into the lake directly from adjacent mountains. Most of these smaller basins and the southern half of Flathead Lake lie within the boundaries of the Flathead Reservation and are used for domestic and municipal water supplies and irrigation.

Every natural resource and person on the Reservation affects or is affected by water. Surface waters not only provide water for irrigation, business, industrial, hydroelectric, recreation, and domestic and livestock use, but also support aquatic and riparian habitats essential for the survival of numerous wildlife and fish species. The CSKT have always highly valued water for its many uses and life-giving properties. Cultural and recreational uses are enriched by the purity and beauty of these waters and the resources they nourish. The waterways have always been an important resource to the Tribes, both for subsistence and culture. Tribal water uses are dependent upon water quality, which is directly affected by the management of hydropower development and irrigation diversions, as well as forestry, agriculture, residential, and recreational practices.

Flathead Lake provides subsistence and recreational opportunities and receives the largest recreational use of any area within the Reservation boundaries; such uses include boating, fishing, camping, swimming, and sightseeing. Many summer homes and permanent residences owned by tribal members use the lake water for domestic and irrigation purposes.

In addition to Flathead Lake, there are over 500 miles of fishable streams on the Reservation. These include 67 miles of the lower Flathead River between Kerr Dam and the Reservation boundary, as well as a number of tributaries. These tributaries provide important fish and wildlife habitat, and provide critical spawning habitat for Flathead River trout populations.

The lower Flathead River is a major historical and cultural water resource for the CSKT. The Flathead River corridor has been extremely important for the Salish and Kootenai people. Proximity to water and an abundant food supply were primary factors in choosing these areas as the regular stopping points along their migration routes. The river remains vital to the CSKT today as an important food source for subsistence and for reaffirming cultural traditions. Along with fishing and hunting in the riparian zones, plants are gathered as a food source and for medicinal purposes. The seclusion of the river provides solitude for personal reflection. Preservation of the river water quality, environment, and its natural processes is vital to the health of the Salish and Kootenai people.

The Reservation portion of the Flathead River has become an attraction for numerous types of recreational activities. Its seclusion and scenic value draw visitors from both the immediate area and outside the region. Main pursuits include floating, rafting, kayaking, canoeing, fishing, hunting, bird watching, and camping.

In the 1970s, the CSKT decided to work toward assuming management responsibilities for their natural resources, and over the past 30 years have developed the expertise and infrastructure necessary to do so. During the 1990s, the CSKT assumed management of all Federal programs under the Bureau of Indian Affairs and the Indian Health Service. CSKT management efforts have focused largely on restoring natural resources affected by the Kerr Project.

3.5.2 KERR PROJECT IMPACTS ON TRIBAL RESOURCES

Construction and operation of the Kerr Project has had a significant impact on tribal resources in the Flathead Reservation. In Flathead Lake, the artificial, seasonal lake level fluctuations induced by Kerr Project operations have negatively affected shoreline and near-shore fisheries habitat. Shoreline spawning areas are dewatered in the fall and winter, and deep water spawning habitat has been degraded by prolonged shoreline erosion and resulting sedimentation during the summer months. In addition, the extended period of full pool elevation during the summer months results in reduced wave cleaning action, which negatively affects varial zone habitat (that area between the high and low elevations of a water body).These impacts limit shoreline invertebrate and juvenile fish production, which in turn impacts fish species that prey on aquatic insects and immature fish (CSKT 2000). Wildlife habitat has experienced similar changes since the beginning of Kerr Project operations. Shallow bays that harbored diverse wetland complexes, including emergent wetlands before the dam was constructed, have been converted to areas of inundated shallows or dry mudflats (Ibid). These water level changes since Kerr was constructed are directly related to flow regulations which have had an impact on the ecosystem of the lower Flathead River.

Tribal resources of the lower Flathead River have also been impacted by Kerr Project operations. Prior to construction of the Kerr Project, the lower Flathead River annual hydrograph supported rich floodplains and a diverse aquatic environment. Once project operations began, especially operations as a peaking facility, hourly and daily flow fluctuations severely reduced the productivity of aquatic and riparian habitats. Artificial flows below Kerr Dam degraded the lower Flathead River varial zone, reducing invertebrate production and impacting many resident fish species (as documented in 16 studies referenced in the March 3, 1995 comment letter from the CSKT to DOI on the section 4[e] conditions). Riparian zone vegetation was also impacted, modifying deciduous and deciduous/coniferous flood plain communities to upland coniferous communities (Ibid).

3.5.3 TRIBAL RESOURCE RESTORATION

As discussed previously, a key component of the Kerr Project relicensing was implementation of DOI's section 4(e) conditions, which provide for the protection and utilization of the Flathead Indian Reservation. These section 4(e) conditions were first adopted by the Commission in its June 25, 1997 licensing order, and later amended by the Commission on December 14, 2000, pursuant to a settlement among PPL Montana, CSKT, and DOI. The operational conditions are discussed in Chapter 1.0, Section 0. Consistent with the Tribes assuming management of their own natural resources and their role as a co-licensee of the Kerr Project, the CSKT have significant responsibility for implementing certain non-operational section 4(e) conditions that are relevant to drought management. These non-operational measures include Articles 63 through 65 and 67:

- Article 63 requires the CSKT, in consultation with PPL Montana, the MDFWP, and the USFWS, to develop and implement a Fish and Wildlife Implementation Strategy (FWIS). The purpose of the FWIS is to provide a process by which the protection and utilization of fish and wildlife resources of the Flathead Indian Reservation can be achieved.
- Article 64 requires the CSKT, in consultation with the MDFWP and the USFWS, to develop a fish stocking, supplementation, and reintroduction plan for selected fish species in Flathead Lake and the lower Flathead River. The plan shall provide for the avoiding, minimizing, restoring, and/or replacing the loss of approximately 131,000 pounds of salmonids or other target species annually in Flathead Lake, and 26,640 pounds of salmonids or other target species annually in the lower Flathead River and its tributaries.
- Article 65 requires the CSKT, in consultation with PPL Montana, to develop a fish and wildlife habitat acquisition and restoration plan. The plan is to include the protection and restoration of aquatic and riparian habitat for the south half of Flathead Lake and the lower Flathead River.
- Article 67 requires the CSKT to acquire 985 acres of varial zone habitat and 312 acres of riparian habitat along or closely associated with the lower Flathead River; and 1,792 acres of varial zone habitat along or closely associated with the southern half of Flathead Lake.

The CSKT, as a co-licensee of the Kerr Project, is coordinating with the USFWS regarding erosion mitigation and habitat restoration activities at and adjacent to the Flathead Waterfowl Production Area.

3.5.4 CSKT APPROACH TO RESTORATION OF TRIBAL RESOURCES

The FWIS, required by Article 63, provides understanding of the CSKT's approach for restoring and managing tribal fish and wildlife resources impacted by the Kerr Project. The FWIS is organized into a series of categories, with goals and objectives established for each category. A summary of the categories and goals include:

Fisheries Mitigation – Flathead Lake and Tributaries

- Improve capability to predict responses of fish community to physical and biological changes.
- Improve productivity and stability of the Flathead Lake fish community by restoring quality habitat.
- Offset fisheries losses in Flathead Lake and tributaries through habitat protection/acquisition, non-native species control, and by reintroduction.

Fisheries Mitigation – Lower Flathead River and Tributaries

- Improve ability to predict responses of the fish community to operational, physical, and biological changes.
- Restore ecological processes in the Flathead River and tributaries by improving and restoring habitat quality.
- Offset fisheries losses in the lower Flathead River and tributaries through habitat protection/ acquisition, non-native species control, and by reintroduction.

Wildlife Mitigation

- Acquire 3,089 acres of habitat mitigation credits.
- Enhance acquired habitat to the greatest extent.
- Enhance lake and river habitat to the greatest extent.
- Enhance/restore habitat on existing tribal, allotment, and private lands.
- Restore depleted or locally extirpated wildlife species.
- Maintain long-term wildlife population monitoring.
- Evaluate wildlife/habitat relationships.
- Implement monitoring to assess ongoing effects of the Kerr Project.
- Prepare FWIS report/annual work plan.

Information and Education, Conservation, Recreation, and Monitoring

- Increase public awareness.
- Enforce tribal hunting fishing and recreation laws, and increase compliance through education and other measures.
- Increase opportunities for recreationists through education and monitoring, and site enhancement, development, and monitoring.
- Develop and implement a monitoring program to assess Kerr Project compliance with required project operations.
- Complete a DMP.

Tribal Lands Department

- Implement acquisition portion of habitat acquisition and restoration plan.
- Prepare properties for restoration activities.

Tribal Preservation Office

- Research, document, and synthesize information about the Tribes' historical and cultural use sites, place-names, and traditional approaches to natural resource management to provide a historical context for Kerr Project mitigation.

3.6 SOCIOECONOMIC RESOURCES

3.6.1 POPULATION

U.S. Census data was reviewed to obtain an understanding of the demographic characteristics of the study area. While population estimates are available at the county level for July 1, 2006, data regarding demographic characteristic at the census tract level are only available through the 2000 Census. Therefore, population estimates from 2006 are used to present county data, but 2000 census data is used to review the characteristics of census tracts and block groups. Table 3-10 presents an overview of the key characteristics of Flathead and Lake counties.

Table 3-10: Population Characteristics of Flathead and Lake Counties, Montana

Demographic Category	Flathead County			Lake County		
	1990	2000	2006[2]	1990	2000	2006[2]
Total Population	59,218	74,471	84,370	21,041	26,507	28,343
Population Growth	---	25.7%	13.3%	---	25.8%	6.9%
Urban Population	39.7%	47.4%	N/A	15.5%	15.5%	N/A
Rural Population	60.3%	52.6%	N/A	84.5%	84.5%	N/A
Minority (non-white)[1]	2.2%	3.7%	N/A	22%	28.6%	N/A

N/A = not available
Data obtained from the 1990 Census, 2000 Census, and 2006 Census Population Estimates
[1]Minority (non-white) populations constituted 7.3 percent of the total population of Montana in 1990, and 9.4 percent in 2000.
[2]Estimates of urban population, rural population, and minority population are not available.

In addition to the county level demographic data pertaining to population (i.e., total, urban, rural, and minority), block group data was compiled for census tracts adjacent to Flathead Lake. Within Flathead County, data was compiled for census tract 13, block groups 1, 5, and 6, and census tract 14, block groups 1-3. In Lake County, data was compiled for census tract 2, block groups 1-2, census tract 9402, block groups 1-3, and census tract 9403, block groups 1-7, and 9. Figure 3-12 identifies the location of each census tract and block group.

Table 3-11 shows the 2000 total, urban, rural, and minority populations in Flathead and Lake counties by census tract and associated block groups. In addition, the table compares the total block group populations and block group minority populations to the county and state total and minority populations. Also, urban and rural populations at the block group level are compared to the urban and rural populations at the county level.

3.6.2 INCOME AND EMPLOYMENT

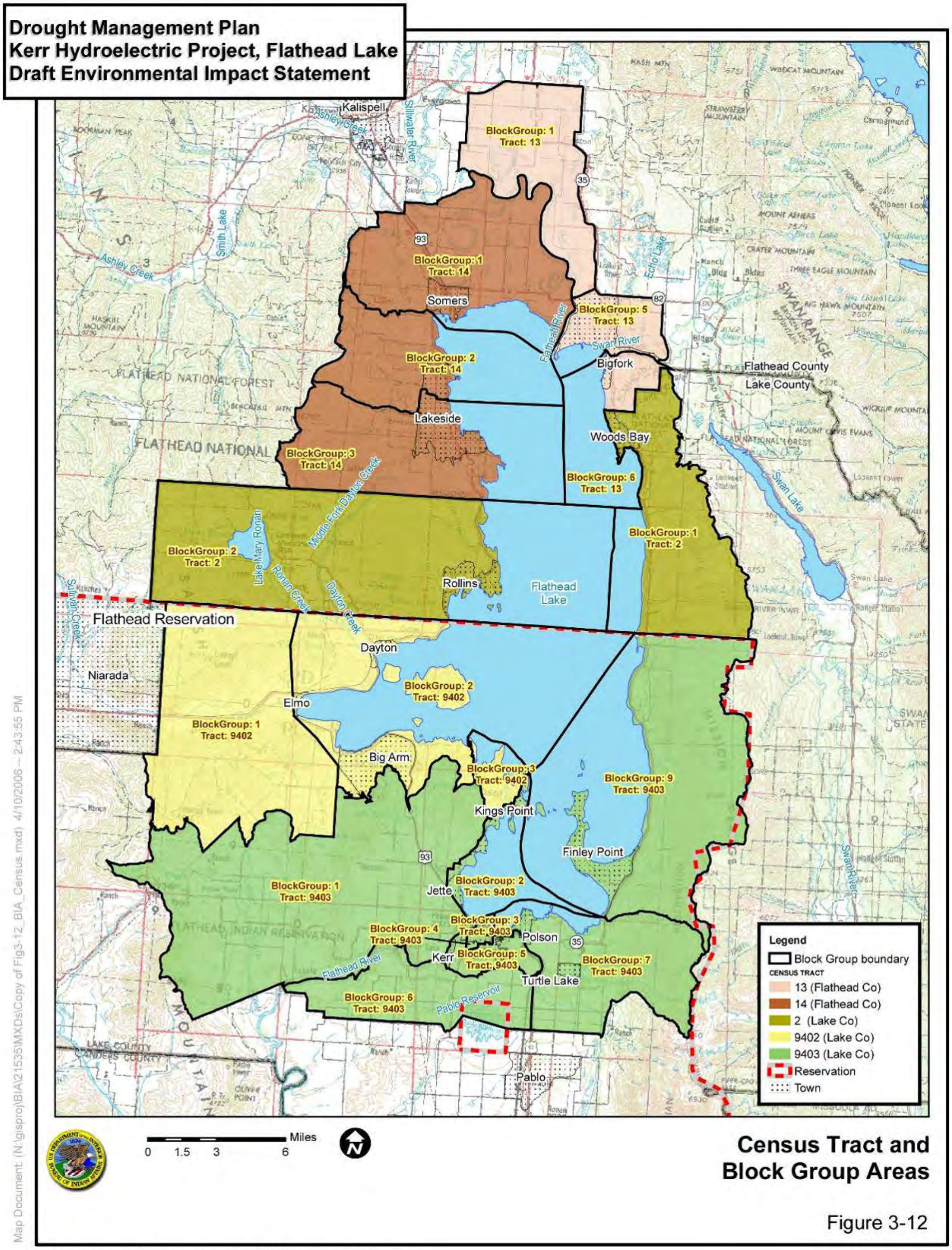
In 2006, per capita personal income for Flathead and Lake counties was $32,463 and $23,344 respectively (U.S. Bureau of Economic Analysis CA04). These were 105.4 percent and 75.8 percent, respectively, of the state per capita income ($30,790) and 88.4 percent and 63.6 percent, respectively, of the United States per capita income ($36,714). Between 1990 and 2000 the Flathead and Lake counties experienced a growth in per capita income of 52.7 percent and 37.7 percent, respectively. Between 2000 and 2006, the growth rate of per capita income for Flathead and Lake counties was 35.2 percent and 27.6 percent, respectively. Growth in per capita income for the state and United States was 23 percent and 34.3 percent between 2000 and 2006, and 53.2 percent and 48.5 percent between 1990 and 2000, respectively.

In addition to the county level data pertaining to 1999 per capita income, block group data was compiled for tracts adjacent to Flathead Lake. Within Flathead County, data was compiled for census tract 13, block groups 1, 5, and 6, and census tract 14, block groups 1-3, whereas in Lake County, data was compiled for census tract 2, block groups 1-2, census tract 9402, block groups 1-3, and census tract 9403, block groups 1-7, and 9 (see Figure 3-12).

Table 3-12 shows 1999 per capita income in Flathead and Lake counties by census tract and associated block group compared to the county and state per capita incomes.

Table 3-13 shows the number of employees, annual payroll, and total number of establishments by industry for Flathead and Lake counties in 2006 (Bureau of Labor Statistics QCEW). Based on number of employees and annual payroll for 2006, retail trade, accommodation and food services, and health care and social assistance were the three largest industries in both Flathead and Lake counties.

Figure 3-12: Census Tract and Block Group Areas



Data sources: US Census Bureau 2000 American FactFinder

Table 3-11: Total, Urban Rural, and Minority Populations by Census Tract and Associated Block Groups in Flathead and Lake Counties, Montana (2000)

County	Census Tract	Block Group	Total Pop.	Percent of County	Percent of State	Urban Pop.	Percent of County	Rural Pop.	Percent of County	Minority Pop.	Percent of County	Percent of State
Flathead	13	1	932	1.25	0.10	0	0.00	932	2.38	9	0.32	0.01
Flathead	13	5	1707	2.29	0.19	0	0.00	1707	4.36	67	2.41	0.08
Flathead	13	6	266	0.36	0.03	0	0.00	266	0.68	0	0.00	0.00
Flathead	14	1	1599	2.15	0.18	0	0.00	1599	4.08	27	0.97	0.03
Flathead	14	2	1055	1.42	0.12	0	0.00	1055	2.69	15	0.54	0.02
Flathead	14	3	1275	1.71	0.14	0	0.00	1275	3.25	54	1.94	0.06
Lake	2	1	1260	4.75	0.14	0	0.00	1260	5.63	14	0.18	0.02
Lake	2	2	472	1.78	0.05	0	0.00	472	2.11	10	0.13	0.01
Lake	9402	1	97	0.37	0.01	0	0.00	97	0.43	52	0.69	0.06
Lake	9402	2	855	3.23	0.09	0	0.00	855	3.82	232	3.06	0.27
Lake	9402	3	107	0.40	0.01	0	0.00	107	0.48	9	0.12	0.01
Lake	9403	1	912	3.44	0.10	0	0.00	912	4.07	134	1.77	0.16
Lake	9403	2	648	2.44	0.07	143	3.47	505	2.26	102	1.34	0.12
Lake	9403	3	977	3.69	0.11	977	23.74	0	0.00	338	4.46	0.40
Lake	9403	4	804	3.03	0.09	804	19.53	0	0.00	129	1.70	0.15
Lake	9403	5	2113	7.97	0.23	1514	36.78	599	2.68	327	4.31	0.38
Lake	9403	6	298	1.12	0.03	0	0.00	298	1.33	45	0.59	0.05
Lake	9403	7	1990	7.51	0.22	678	16.47	1312	5.86	420	5.54	0.49
Lake	9403	9	712	2.69	0.08	0	0.00	712	3.18	129	1.70	0.15

Source: U.S. Census Bureau, Census 2000 American FactFinder

Table 3-12: Per Capita Income by Block Group (2000)

County	Census Tract	Block Group	Per Capita Income	Percent Compared to County	Percent Compared to State
Flathead	13	1	$17,979	99.27	104.83
Flathead	13	5	$19,596	108.19	114.26
Flathead	13	6	$28,792	158.97	167.87
Flathead	14	1	$21,625	119.40	126.09
Flathead	14	2	$22,056	121.78	128.60
Flathead	14	3	$18,513	102.21	107.94
Lake	2	1	$18,428	121.45	107.45
Lake	2	2	$23,924	157.67	139.49
Lake	9402	1	$13,124	86.50	76.52
Lake	9402	2	$17,233	113.58	100.48
Lake	9402	3	$18,133	119.51	105.73
Lake	9403	1	$14,599	96.22	85.12
Lake	9403	2	$22,920	151.06	133.64
Lake	9403	3	$10,271	67.69	59.89
Lake	9403	4	$9,546	62.91	55.66
Lake	9403	5	$14,717	96.99	85.81
Lake	9403	6	$19,874	130.98	115.88
Lake	9403	7	$19,115	125.98	111.45
Lake	9403	9	$19,782	130.38	115.34

Source: U.S. Census Bureau, Census 2000 American FactFinder

Table 3-13: 2006 Total Number of Employees, Annual Payroll, and Total Number of Establishments by Industry for Flathead and Lake Counties, Montana

Industry	Flathead County			Lake County		
	No. of Employees	Annual Payroll ($1000)	Total No. of Establishments	No. of Employees	Annual Payroll ($1000)	Total No. of Establishments
Forestry, fishing, hunting, and agriculture support	387	16,663	88	47	943	28
Mining	253	12,169	18	19	432	4
Utilities	188	10,554	10	(D)	(D)	7
Construction	4,086	138,742	916	575	15,029	175
Manufacturing	3,470	141,239	190	798	23,032	45
Wholesale trade	1,019	38,717	119	102	2,223	25
Retail trade	5,679	139,074	486	1,177	25,699	130
Transportation and warehousing	688	20,394	122	(D)	(D)	23
Information	646	24,758	63	132	6,556	14
Finance and insurance	1,568	71,466	198	235	7,471	37
Real estate and rental and leasing	748	21,997	249	79	1,737	48
Professional, scientific and technical services	1,299	48,064	392	229	7,053	66
Management of companies and enterprises	119	6,173	14	(D)	(D)	2
Admin, support, waste mgt, remediation services	2,582	59,673	213	(D)	(D)	31
Educational services	407	10,035	32	27	668	8
Health care and social assistance	4,475	155,892	299	1,020	28,427	72
Arts, entertainment and recreation	1,314	18,991	123	79	1103	18
Accommodation and food services	4,773	64,438	324	858	9,047	75
Other services (except public admin)	1,462	27,617	310	240	3,929	75

(D) Denotes figures withheld to avoid disclosing data for individual companies; the data are included in broader industry totals.
Source: U.S. Department of Commerce, Bureau of Economic Analysis, 2006 Economic Census

3.6.3 PROPERTY VALUES

Anecdotal evidence suggests that property values have increased significantly in the study area, especially for high demand property (lakeshore, mountain view, etc.). This appears to be driven by an increase in development on rural land that was formerly used for farming, ranching, and timber production. Twenty-two percent of the agricultural land in Flathead County was converted to other uses between 1997 and 2002 (Lakes 2004). According to a regional timber company, agricultural and timber land sold for $300 to $500 per acre in 2003; when converted to residential use, the price can rise to $10,000 acre (Jamison 2003).

An important additional consideration for property on Flathead Lake is the value of lake-related improvements such as docks and boathouses. Review of permit files from the CSKT Shoreline Protection Office indicate that many docks on the lake are constructed with heavy timbers and rock or concrete, and have construction costs well in excess of $10,000. Review of 1999 low-level aerial photography of the lake shore indicates that there are over 2,200 of these docks present on Flathead Lake.

3.6.4 TOURISM AND RECREATION

Tourism and recreation resources and practices are critical to the study area's economy, which includes Flathead and Lake counties and more specifically the Kalispell Metropolitan Statistical Area (MSA)[13], and the city of Polson. Of the 19 types of industries providing employment opportunities within these areas (as designated in the Economic Census), the following industry types have been determined to have the most significant impact on tourism and recreation within the study area: retail trade; real estate and rental and leasing; arts, entertainment, and recreation; and accommodation and food services. Specific recreational activities in the study area include fishing, sailing/boating (including personal watercraft use), whitewater rafting (below Kerr Dam), hiking, and camping. Information regarding the economic value of these tourism and recreation related activities was obtained by reviewing Economic Census data.

In 2002, the retail trade industry in Flathead and Lake counties, the Kalispell MSA, and the city of Polson was comprised of motor vehicle and parts dealers; furniture and home furnishing stores; electronics and appliance stores; building material and garden equipment and supplies dealers; food and beverage stores; health and personal care stores; gasoline stations; clothing and clothing accessories stores; sporting goods, hobby, book, and music stores; general merchandise stores (excluded from the summary statistics for Polson); miscellaneous store retailers; and non-store retailers (U.S. Census Bureau 2002).

In 2002, the arts, entertainment, and recreation industry in Flathead County and the Kalispell MSA was comprised of performing arts, spectator sports, and related industries; and amusement, gambling, and recreation industries whereas Lake County and the city of Polson exclude performing arts, spectator sports, and related industries (U.S. Census Bureau 2002).

[13] Metropolitan Statistical Areas are defined as having at least one urban cluster of at least 10,000, but less than 50,000, population, plus adjacent territory that has a high degree of social and economic integration with the core as measured by commuting ties (U.S. Census Bureau 2002).

As stated above, and shown in Table 3-14, retail trade, accommodation, and food services were among the top three largest employers, based on number of employees, in Flathead County. Arts, entertainment, recreation, and real estate and rental and leasing ranked 12th and 13th respectively (U.S. Census Bureau 2002). Retail trade was among the top three largest employers, based on number of employees, in Lake County, whereas accommodation and food services; arts, entertainment, and recreation; and real estate, and rental and leasing ranked 8th, 16th, and 17th respectively (Department of Commerce 2002).

Table 3-14: Value of Tourism and Recreation Related Economic Activity Output – 2002

Revenue Category	Flathead County/Kalispell MSA	Lake County	Polson	Montana
Retail trade sales	$1,025,123,000	$194,425,000	$39,873,000	$10,122,625,000
Real Estate/ Rental/Leasing	$65,456,000	$7,395,000	$6,009,000	$520,932,000
Arts, Entertainment, and Recreation	$60,695,000	Information withheld to protect anonymity of individual companies/ organizations	Information withheld to protect anonymity of individual companies/ organizations	$486,116,000
Accommodation and Food Services	$159,629,000	$26,839,000	$13,599,000	$1,537,986,000

Source: U.S. Department of Commerce, Bureau of Economic Analysis, 2002 Economic Census

3.6.4.1 Retail Trade Sales

In 2002, retail trade sales in Flathead County/Kalispell MSA[14] accounted for 10.1 percent of the retail trade sales in Montana. Motor vehicles and parts dealers accounted for the largest percentage of retail trade sales at 25.8 percent ($264,974,000) in Flathead County/ Kalispell MSA (U.S. Census Bureau 2002). Retail trade sales in Lake County and the city of Polson accounted for 1.9 percent and 0.4 percent respectively of the retail trade sales in Montana. Motor vehicles and parts dealers accounted for the largest percentage of retail trade sales at 31.8 percent ($61,737,000) in Lake County whereas food and beverage stores accounted for the largest percentage of retail trade sales at 36 percent ($14,341,000) in the city of Polson (U.S. Census Bureau 2002).

3.6.4.2 Real Estate/Rental/Leasing

In 2002, the value of economic output from real estate/rental/leasing in Flathead County/Kalispell MSA accounted for 12.6 percent of the total revenue for Montana. Real estate accounted for the largest percentage of real estate/ rental/leasing output at 64.3 percent ($42,119,000) in Flathead County/Kalispell MSA (U.S. Census Bureau 2002). Real estate/rental/leasing output in Lake County and the city of Polson

[14] The 2002 summary of statistics for Flathead County and the Kalispell MSA are identical because the Kalispell MSA incorporates all of the territories that contribute to social and economic integration within Flathead County through commuting ties.

accounted for 1.4 percent and 1.2 percent respectively of the economic activity in Montana. Real estate accounted for the largest percentage of real estate/rental/ leasing output at 91 percent and 90 percent respectively in Lake County and within the city of Polson ($6,731,000 and $5,345,000) (U.S. Census Bureau 2002).

3.6.4.3 Arts, Entertainment, and Recreation

In 2002, the value of economic output from arts, entertainment, and recreation in Flathead County/Kalispell MSA accounted for 12.5 percent of the total arts, entertainment, and recreation economic activity in Montana. The amusement, gambling, and recreation industries accounted for the largest percentage of arts, entertainment, and recreation output at 88.5 percent ($53,686,000) in Flathead County/ Kalispell MSA (U.S. Census Bureau 2002). Arts, entertainment, and recreation output in Lake County and for the city of Polson were withheld from the 2002 summary statistics to avoid disclosing data of individual companies; data was included in higher level totals. Based on the information provided, the amusement, gambling, and recreation industries accounted for $2,640,000 in activity in Lake County. This information was withheld for the city of Polson (U.S. Census Bureau 2002).

3.6.4.4 Accommodation and Food Service

In 2002, accommodation and food services sales in Flathead County/Kalispell MSA accounted for 10.4 percent of the total accommodation and food services sales in Montana. Food services and drinking places accounted for the largest percentage of accommodation and food services sales at 71 percent ($113,223,000) in Flathead County/Kalispell MSA (U.S. Census Bureau 2002). Accommodation and food services sales in Lake County and for the city of Polson accounted for 1.7 percent and 0.9 percent respectively of the accommodation and food services sales in Montana. Food services and drinking places accounted for the largest percentage of accommodation and food services sales at 86 percent and 91.3 percent, respectively ($23,049,000 and $12,419,000) in Lake County and within the city of Polson (U.S. Census Bureau 2002).

3.6.4.5 Lake Access

A critical component of the tourism and recreation industry is access to Flathead Lake. Table 3-15 – Public and Commercial Access Locations, summarizes information obtained regarding public and private boat and fishing access points on Flathead Lake.

Table 3-15: Public and Commercial Access Locations

Flathead Lake State Parks			
Name	**Open**	**Boat Ramp**	**Minimum Lake Elevation/Notes**
Big Arm	Year Round	Yes	Good at all depths; deep draft access
Finley Point	Year Round	Yes	2,890’ msl
Wayfarers	Year Round	Yes	Good at all depths
West Shore	Year Round	Yes	Good at all depths
Wild Horse Island	Year Round	No	Day use only; dock only; no boat ramp
Yellow Bay	Year Round	Yes	Good at all depths; deep water access
Flathead Lake Fishing Access Sites (FAS)			
Name	**Open**	**Boat Ramp**	**Minimum Lake Elevation/Notes**
Somers	Year Round	Yes	Good at all depths; deep water access
Walstad	Year Round	Yes	Ramp ends at 2,885’ msl
Woods Bay	Not usable below 2,885’ msl	Yes	Ramp ends at 2,884’ msl
Elmo	Year Round	No	---
Bigfork	Closed 12-1 to 5-12	Yes	2,890’ msl
Ducharme	Closed 12-1 to 5-12	Unimproved	Good only at full pool (hand launch)
Flathead Lake Access – Other			
Name	**Open**	**Boat Ramp**	**Minimum Lake Elevation/Notes**
Bluebay/CSKT	NP	Yes	Good at all depths
Dayton/ Lake County	NP	Yes	Not usable at low pool (2,883’ msl); sailboats only
Lakeside North and South/ Flathead County	NP	Yes	Not usable at low pool
Flathead Lake Access – Commercial			
Name	**Open**	**Boat Ramp**	**Minimum Lake Elevation/Notes**
Woods Bay Marina	Memorial Day to Labor Day	Yes	2,890’ msl
Bigfork Marina	NP	Yes	2,890’ msl
Marina Cay	May through October	Yes	2,890’ msl; no deep draft access
Lakeside Marina	May through October	Yes	No deep draft access
Bayview Marina	May through September	Yes	NP
Salish and Kootenai Marina	NP	NP	NP
Eagle Bend Marina	NP	NP	NP
Koss Landing/ KwaTaqNuk	Year Round	Yes	Deep draft launching; 80 spots for large boats

NP – Information not provided as of the writing of this EIS.

Information obtained from the Montana Department of Fish, Wildlife, and Parks (MDFWP 2005c); and multiple personal communications.

The 2004 Visitation Report for Montana state parks and fishing access sites (MFWP 2005d) provided information regarding the number of visitors to the six Flathead Lake state parks. Over the 1998-2004 period, visitation rates ranged from a low of approximately 122,400 visitors in 2001 to a high of just under 175,000 in 2004. Statewide, park visitation numbers for the same period also ranged from a low in 2001 (1.34 million visitors) to a high in 2004 (1.65 million visitors). Fishing access site visitation data was available only at the state and regional levels. Region 1 (in which Flathead Lake is located) fishing access sites received approximately 431,000 visitors in 2004.

As noted in section 3.6.3, there are over 2,200 docks on Flathead Lake; Table 3-15 summarizes only major public and private facilities. Many owners of lakefront property or property with lake access also have docks and other boat mooring and launching facilities of varying size and configuration. Review of bathymetric mapping and a near shore bathymetric model of Flathead Lake indicate that docks and access points constructed in the following locations would be most susceptible to lake level fluctuations due to generally shallow conditions.

- Somers
- Bigfork
- The point near Woods Bay
- The southern end of Skidoo Bay
- The southeastern portion of East Bay
- The western end of Big Arm Bay
- The Dayton area, especially near Cromwell Island
- The inlet off of Shelter Bay near Rollins
- Hughes Bay
- Peaceful Bay near Conrad Point, south of Lakeside

Not all docks and access points in these areas would necessarily be affected by lower summer lake levels; the bathymetric data only identifies areas that generally are shallower.

3.6.5 Power Generation

As noted in section 3.1.3.4, the Kerr Project has a maximum power generating capacity of approximately 210 MW. Based on discussions with PPL Montana personnel, the Kerr Project generates roughly 40 MW at the lowest minimum instream flows of 3,200 cfs; maximum power generation is achieved at 14,000 cfs which is the hydraulic capacity of the tunnels.

CHAPTER 4.0 ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

This chapter evaluates the potential direct, indirect, and cumulative impacts on each affected resource described below associated with implementing PPL Montana's Proposed Action and the alternatives. Analysis of the potential impacts on each resource was based on the existing conditions described in Chapter 3.0., Affected Environment, for that resource and the pertinent evaluation methods. Suggested measures to mitigate unavoidable adverse effects are presented where appropriate. Where analyses are extensive, this chapter presents only a summary of the evaluation and findings. Technical reports on climate analyses and Kerr Project operational modeling are included in Appendix B.

This chapter assesses the differences in potential impacts to social, economic, and environmental resources from implementing each of the drought management alternatives. In many cases, the absence of any drought management strategy would result in greater impacts to the full spectrum of the social, economic, and environmental resources of the study area as discussed in the following sections.

4.2 KERR OPERATIONAL IMPACTS

This section describes the potential impacts to Kerr Project operations under the Proposed Action and alternatives and the methods used to determine those impacts.

4.2.1 METHODS

Hydrologic modeling and review of actual Kerr Project operations was used to assess the operational effects of the alternatives. The hydrologic model considered actual water level and flow data in conjunction with defined decision making parameters (where available) to predict Flathead Lake water levels and Lower Flathead River flows under the various alternatives. Modeling was conducted on Alternatives 1 and 2 using the DMP-defined decision making parameters presented in the discussion of alternatives (See sections 2.2.3, 2.3.2 and 2.3.3 and Appendix B). However, hydrologic modeling was not conducted on the No-Action and Proposed Action alternatives due to the lack of defined decision-making parameters (e.g., set lake elevations on specific dates, specific instream flow requirements, and certain criteria triggering specific actions). Historical data review and qualitative analyses were therefore used to help determine operational impacts of adopting either the No-Action or Proposed Action alternatives. Both the No-Action and Proposed Action alternatives used a monthly decision-making process that required creation of new runoff curves and coordination with multiple agencies. In the No-Action Alternative, there is no formal decision-making process or criteria from which to determine whether a DMP is activated or not. Under the Proposed Action, an end-of-December elevation of 2,888' msl is achieved every year, but there are no definable decision points for how each subsequent monthly forecast will influence Kerr operations. Therefore, Kerr Project operations under the Proposed Action and the No-Action Alternative cannot be readily modeled.

The operational discussion in section 3.1.3.5 focused on the water years since the inception of the MOU regarding lake elevations (i.e., since 1965). To develop a better understanding of the impacts of implementing DMP alternatives, modeling was also conducted for the drought years of 1940, 1941, and 1944, since these are three of the driest years during the period of record. It should be noted that for water years 1940, 1941, and 1944, the MEI and FPRI indicators were not available. The MEI and FPRI for 1940, 1941, and 1944 used in the hydrologic model are estimates based upon data available for these years.

4.2.2 ALTERNATIVES

This section describes the potential impacts to Kerr Project operations under each of the alternatives.

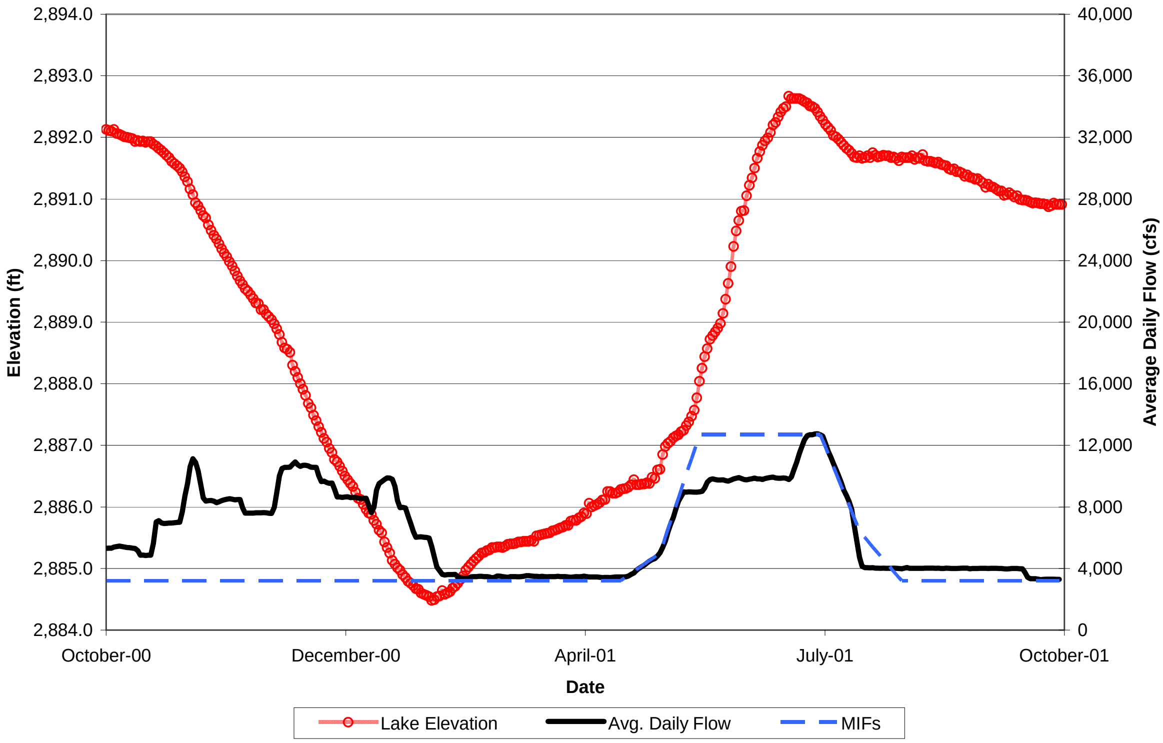
4.2.2.1 No-Action Alternative

As discussed in section 2.3.1, the No-Action Alternative addresses drought conditions as they occur. Under the No-Action Alternative, there would be no DMP and the Kerr Project would operate under the requirements of license Article s 43 (lake elevations) and 56 (minimum instream flows). In other words, the lake would be managed to meet lake elevations as set forth in Article 43 as well as the minimum instream flows in Article 56. Any conflict between these requirements in a low-water year is managed without the use of any fixed decision-making criteria. The principal lake management decision-making agencies are BIA, USACE, CSKT, BOR, and PPL Montana.

Data regarding precipitation, runoff, and other pertinent water management concerns is periodically updated during monthly Kerr Project operations conference calls. In addition, during these calls the relevant agencies seek to agree on decisions regarding lake levels and instream flows below the Kerr Project during drought conditions. For example, such decisions may relate to timing of lake refill or timing and volume of spring water releases. The No-Action Alternative does not allow for reliable modeling, as most of its decision-making parameters are loosely defined or undefined.

Actual lake elevation and release data for water year 2001 was reviewed to better understand the operational impacts of the No-Action Alternative. Water year 2001 was selected because it was the only drought year in the historic period of record after the section 4(e) conditions were added to the Kerr Project license (precipitation was roughly 56 percent of normal in 2001). Water year 2001 data reveals that the April 15 and June 15 target lake elevations of Article 43 were not met. The lake reached its lowest elevation for 2001 of 2,884.4’ msl on February 4, 2001, and subsequently reached a maximum elevation of 2,892.6’ msl by June 20, 2001, as shown in Figure 4-1.

Figure 4-1: Lake Elevation and Kerr Releases Water Year 2001



As noted in section 3.1.3.5, the Kerr Project has historically been operated to maintain lake levels as near full pool (2,893' msl) as possible during the summer recreation season. In the spring and summer of 2001, DOI granted a series of deviations from the minimum instream flow requirements of Article 56 to help augment lake levels. As a result, Flathead Lake levels increased in June and nearly reached full pool on June 19, 2001. Lake levels then gradually decreased, however and the lake never reached 2,893' msl during the recreation season. DOI's deviations allowed the lake to reach a higher pool elevation in the early part of the summer than would have been possible under the license, but because of severe drought conditions and lack of drought preparedness earlier in the water year, that elevation was not sustainable throughout the summer.

Figure 4-1 also shows the relationship between lake levels and stream flows for WY 2001. From October of 2000 to February of 2001 flow releases from Kerr were in the 8000 cfs to 11,000 cfs range. Since inflows were substantially below those values, water levels dropped significantly in Flathead Lake. Beginning in February of 2001, Kerr releases were at or near the required minimum instream flow release. As flows were increased in compliance with Article 56, it became apparent that the lack of snow pack was going to result in a very low spring runoff such that both lake levels and minimum instream flows would not be met. Therefore, DOI granted a temporary deviation from the 12,700 cfs instream flow requirement. This deviation prevented flood plain recharge, which is important to sustaining the flood plain environment. DOI determined that temporary deviations could not extend beyond three weeks, at which time the minimum instream flows were increased to 12,700 cfs. During this same time frame, BOR released flow augmentation water, in compliance with the approved BiOps, in order to assist Flathead

Lake in meeting both minimum instream flows and lake levels, however, it was stipulated that this flow release had to be passed through Kerr by the end of August. Hence, as Figure 4-1 indicates, flows released from Kerr in July were slightly above 4,000 cfs and in excess of the minimum instream flows. This was done to pass the Hungry Horse flow through Kerr in compliance with the BiOps.

The No-Action Alternative would not be effective at meeting the requirements of Article s 43 and 56 during severe drought years because there are no early drought indicators that would support in-season operational modifications – such as a higher winter-early spring lake elevation or a shift in the timing of lake refill.

4.2.2.2 PPL Montana's Proposed Action

The PPL Montana proposed DMP uses a tiered approach consisting of changes to Kerr Project operations over an annual period as follows:

- Achieve an annual end-of-December lake elevation of 2,888' msl in all years (regardless of drought status).
- Analyze runoff predictions and prepare monthly operating curves in consultation with various agencies.
- Revise the target lake elevation from 2,893' msl to 2,892' msl for the recreation season from June 15 to September 1 when the system is declared to be in a drought. If it is not possible to achieve this elevation during this period, then implement the next feature.
- Achieve and maintain a reduced summer pool elevation of 2,892' msl by doing the following:
    - Increase flow from the Hungry Horse Project to help attain a Flathead Lake elevation of 2,892' msl; and
    - Modify Article 56 minimum instream flows to maintain a Flathead Lake elevation of 2,892' msl between June 15 and September 1 by matching outflows to inflows.

The Proposed Action cannot be accurately modeled since most of its decision-making logic is adaptive in nature, and cannot be clearly defined. However, a qualitative discussion of the components of the Proposed Action yields useful insights into the impacts of this alternative. Modeling for Alternatives 1 and 2 is possible because the effects can be bracketed and the adaptive management component can be contained. The modeling effort for the two alternatives can thus describe a broad range of effects.

End-of-December Lake Elevation and Monthly Operating Curves

The Proposed Action calls for an end of December lake elevation of 2,888' msl every year regardless of whether or not the system is in a drought condition. In the case of a drought prediction, it is possible that the lake would be held 2,888' msl through April 15 to reserve water to help achieve a lake elevation closer to full pool in the summer months. The decision to modify the operating curves and keep the lake at a higher elevation would take place on a month-by-month basis. Depending on the monthly runoff forecasts between January and April, lake drawdown and refill would be modified. The decision-making process would involve input from the key stakeholder agencies: USACE, BOR, BIA, CSKT, State of Montana, and PPL Montana.

Revised Target Lake Elevations

If a drought has been declared, the summer lake elevation target would be dropped from full pool (2,893’ msl) to 2,892’ msl. This action recognizes that despite efforts to save water earlier in the year by not drawing the lake down to 2,883’ msl, sufficient water may still not be available in the system to allow a full refill. While the Proposed Action cannot be modeled as discussed above, modeling results for Alternatives 1 and 2 confirm that in several drought years (see sections 4.2.2.3 and 4.2.2.4), full pool cannot be achieved without additional water management measures even when the lake is held at 2,888’ msl throughout the winter and early spring months.

Modification of Minimum Instream Flow Requirements

The Proposed Action calls for a potential modification of minimum instream flows should the lake fail to achieve or maintain the modified summer target elevation of 2,892’ msl. The Proposed Action also calls for matching outflows to inflows in an attempt to maintain 2,892’ msl. This would only be effective if the lake achieved an elevation of 2,892’ msl on or around June 15, but was not likely to maintain this elevation because minimum instream flow requirements were higher than existing or anticipated inflows to the lake. Where it would not appear possible to reach 2,892’ msl initially, matching outflows and inflows would only maintain a lake elevation below the revised target. In this situation, the Proposed Action calls for requesting additional water from Hungry Horse Reservoir.

Increasing Hungry Horse Flows

The Hungry Horse Project is operated by BOR for specific purposes including power generation, flood control, and support for environmental protection measures in both the Flathead and Columbia River basins. Because the Proposed Action is based on a progressive decision-making process, any request for additional water from Hungry Horse would require a cooperative decision from BOR, BIA, CSKT, PPL Montana, and USACE, and approval by BOR. BOR’s obligations under the ESA require it to address the effect of Hungry Horse operations on ESA listed species and designated critical habitat. The existing flood control operation at Hungry Horse, VARQ, also has its own procedures and considerations that BOR follows to provide a more normative hydrograph. The impact to power generation at Hungry Horse would also have to be analyzed and potentially compensated. Given these constraints, water may not be available from Hungry Horse when needed at the Kerr Project. In addition, the time required for this decision-making and approval process to occur, and the time it would take water released from Hungry Horse to reach Flathead Lake, would make this a time-consuming and inefficient approach during drought conditions even under the best of circumstances (e.g., when additional water was actually available). For these reasons, depending on water releases from Hungry Horse as the principle component of a DMP is not a reliable approach for achieving lake elevations or meeting other license requirements at the Kerr Project under drought conditions.

4.2.2.3 Alternative 1 and Alternative 2 (Use of Climate Indicators on Flood Control Operations)

As discussed in Chapter 2.0, Section 2.3.2, the operational procedures for Alternative 1 are the same for Alternative 2, except for management of minimum instream flows. Therefore, this section deals with the consequences of using climate indicators in management of Kerr Operations.

Both Alternative 1 and Alternative 2 use climate indicators to obtain an early prediction of drought conditions. Should such conditions be identified, lake elevations during the January to April period would be managed to preserve water to help achieve lake refill. Specifically, the end of December target lake elevation would be 2,888' msl if drought conditions were forecasted, and the lake would be held at or near 2,888' msl through April 15 should drought conditions persist (and prediction of late precipitation does not trigger immediate flood control operations). In addition, target lake levels for the June 15 to September 15 period would be reduced to 2,892.2' msl.

None of the analyses conducted for Alternatives 1 and 2 resulted in the maximum Flathead Lake Elevation of 2,893' msl being exceeded. The analyses show that climate indicators can assist in detecting increasing snow pack and can therefore be used efficiently to deactivate the DMP in time to effectively implement flood control operations. USGS notes that even without big snow packs or exceeding 2,893' msl in the lake in general, large rain events do occasionally cause flood impacts near the lake's inlet. USACE will continue to take action it deems reasonable to reduce this risk.

Effect of Drought Prediction in Non-drought Years for Alternatives 1 and 2

(The following discussion is taken from a paper entitled (Floods of June 1964 in Northwestern Montana, by F.C. Boner and Frank Stermitz, U.S.G.S. Water Supply Paper 1840-B)

The record-breaking flood of 1964 and most previous Montana floods occur in June, when seasonal large-scale meteorological conditions may have been similar. Heavy rainstorms along and near the eastern side of the Continental Divide in late May and early June are clearly associated with floods of 1894, 1906, 1908, 1927, 1938, 1948 and 1953. In these years, mountain snowmelt has filled stream channels to near capacity in the same period as the rain events have occurred. The flood of 1964 is a clear demonstration of rain induced flooding within the Flathead basin and Northwestern Montana. The 1964 event was a high volume rain that fell between June 7 and 8, 1964. The precipitation during January to April 1964 was slightly below normal for the 4-month period; however, the precipitation in May was nearly double the normal. Also typical of the flood events is below-normal temperatures of March to May delaying the usual mountain snowmelt pattern. As a result, many streams were at a high level and there was still a significant amount of high altitude snow when the intense rains began.

The Flathead River basin upstream from Flathead Lake underwent the most severe flooding in recorded times. Nearly all roadway bridges upstream of Columbia Falls were

> washed out or rendered unusable. Nearly 70 percent of the $55,000,000 in damages reported in North Western Montana was damages to roads and bridges. Between Columbia Falls and Flathead Lake, the Flathead River flooded extensive lowland areas totaling approximately 25,000 acres. More than 350 homes were flooded east of Kalispell, by both the Flathead River and by smaller tributaries which backed up and left their banks.

Water year 1964 illustrates the flood risk of late season snows, a delayed spring runoff, and basin wide late spring rain events. The climate indicators used in Alternatives 1 and 2 would have called for the DMP to be activated in WY 1964 (drought would have been forecasted by December 1963 and persisted until March 10). By March 10, the snow pack had reached sufficient volumes to call for deactivating the DMP. The Kerr Project would then have been operated for flood control where modeling demonstrates that Flathead Lake could have been reduced to 2,883.8' msl right around the April 15 target date.

It is likely that a flood event equal to or greater than the 1964 event will occur within the Flathead River basin at some point in the future (water levels that occurred on Flathead Lake during 1964 were at or above a 500 year event). If the DMP were activated, as would have been the case in 1964, the climate indicators would be used to monitor snowpack, and if necessary, to deactivate the plan with sufficient time (in most cases) to avoid major flooding. However, under certain comparatively infrequent circumstances, flooding could still occur.

Examination of modeled and historic Kerr Project releases during water year 1964 provides information regarding the effects of DMP activation on water releases when the system reverts from drought operations to flood control operations. (Figure 4-2, Figure 4-3, and Figure 4-4). When the DMP is activated, more water is stored in Flathead Lake, reducing seasonal January through March flow releases to near the 5,000 cfs minimum (typical releases are between 10,000 and 14,000 cfs for these months). In 1964, more water would have been released during April, to restore the flood pool.

Figure 4-2: Model Results – Water Year 1964

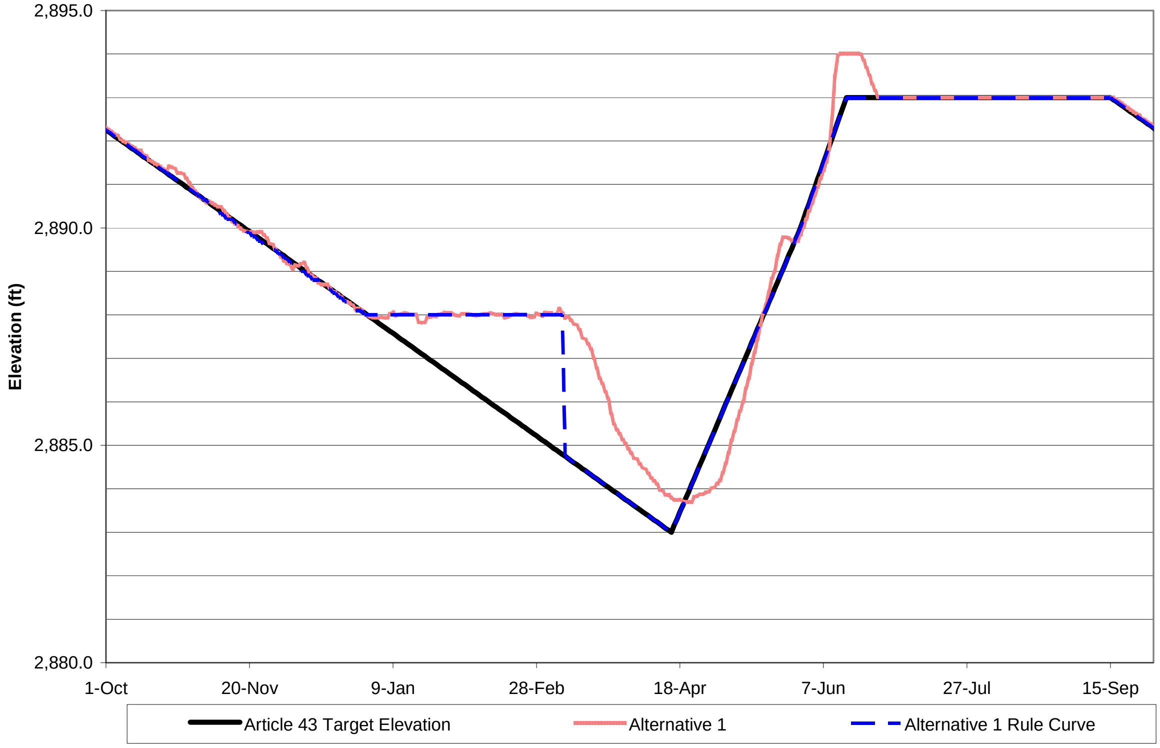


Figure 4-3: Historic Kerr Project Releases for Water Year 1964

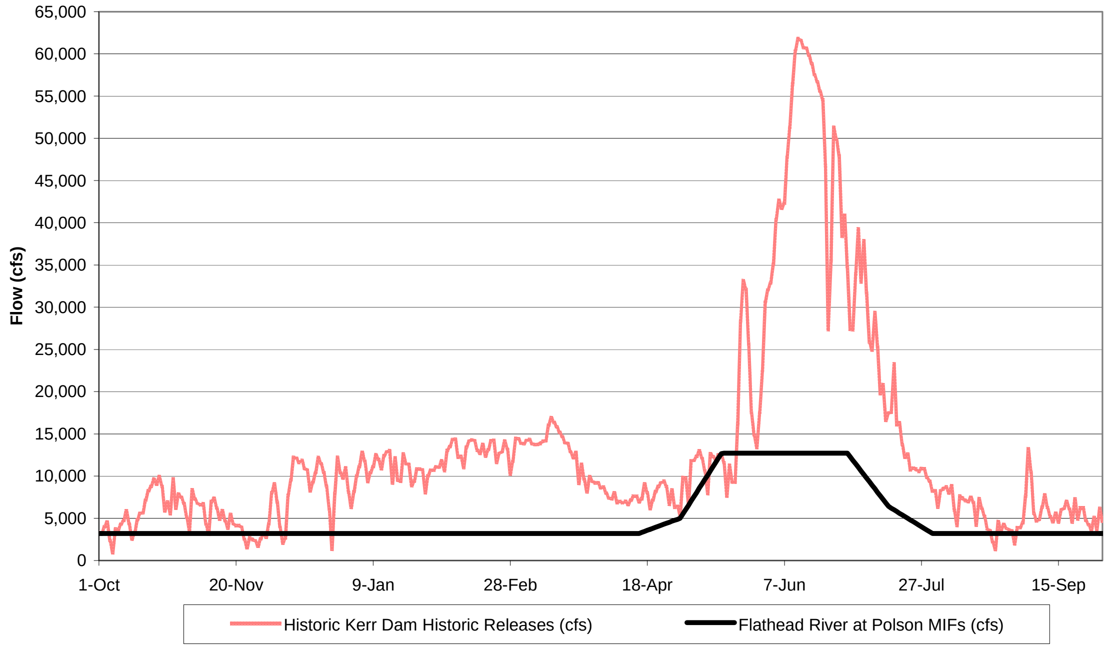
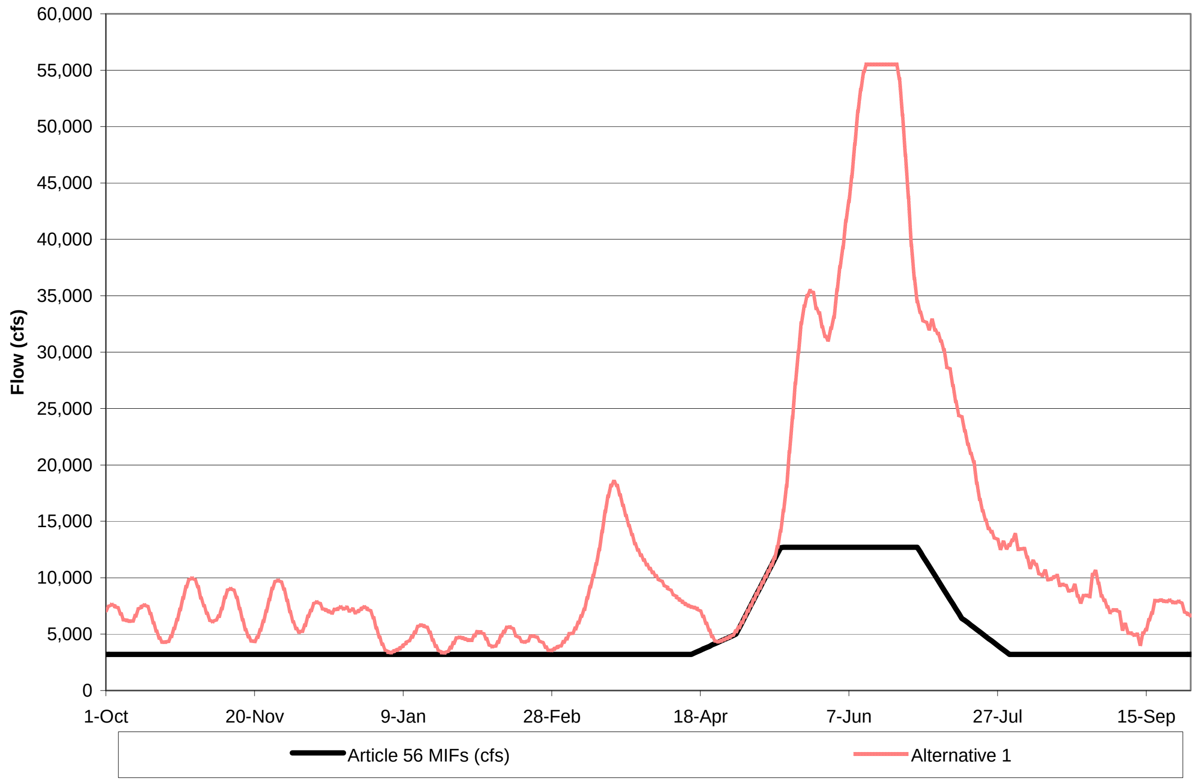


Figure 4-4: Modeled Kerr Project Releases for Water Year 1964



Alternative 1 Discussion

As indicated in Section 2.3.2, January through April flow releases are identical under Alternatives 1 and 2. However, Alternative 1 requires the licensee to make every reasonable effort to achieve a June 15 lake elevation no lower than 2,892.2' msl (higher if possible)[15] and would make every reasonable effort to maintain this minimum lake elevation from June 16 to September 15 – without impacting required minimum stream flows downstream of Kerr Dam.

Modeling

Three variations in the timing of lake refill were modeled, beginning refill one, two, or three weeks early (see section 2.2.3 and Appendix B for information regarding model development and assumptions). The model used water level and flow information from the 1940 through 2004 period of record. As discussed in section 4.2.1, MEI indicator values for DMP activation were estimated for the years 1940 through 1951, and actual values were used from 1951 to 2004. If at anytime during the January through April period the climate indicators resulted in the deactivation of the DMP, the model would revert to the provisions of Article 43.

Lake Elevation Model Results

Modeling results for the ten worst drought years in terms total runoff volume (1940, 1941, 1944, 1973, 1977, 1987, 1988, 1992, 1994 and 2001) were evaluated to determine if implementing Alternative 1 would have met the revised target average lake elevation of 2892.2' msl for the June 15 to September 15 period. The model results indicate that in 1973, 1987, 1988, 1992, and 1994, the average lake elevation would have met or exceeded this target; the average summer lake elevation for these five drought years was just over 2,892.7' msl. However, for the drought years of 1940, 1941, 1944, 1977, and 2001, the June 15 to September 15 average lake elevation was slightly less than 2,890.1' msl. Therefore, giving priority to the minimum instream flows for these drought years results in a failure to meet lake elevations during the summer recreational season.

Figure 4-5 presents the lake elevation results from the model run of Alternative 1 for 1973, a year where Alternative 1 would have been successful in achieving full pool through the summer months. As a comparison, Figure 4-6 shows the results from the model run for 1977, a more severe drought year where Alternative 1 would not have been effective in achieving summer lake elevations.

15 During the summer recreation period, elevation 2892.2 would have been achieved or exceeded under the Drought Management Plan in six of the seven drought years that occurred between 1965 and 2004. The 1965 through 2004 time frame was chosen because it includes the affect of Kerr Project operations under Article 43 conditions.

Figure 4-5: Alternative 1 Model Results – Water Year 1973 Lake Elevations

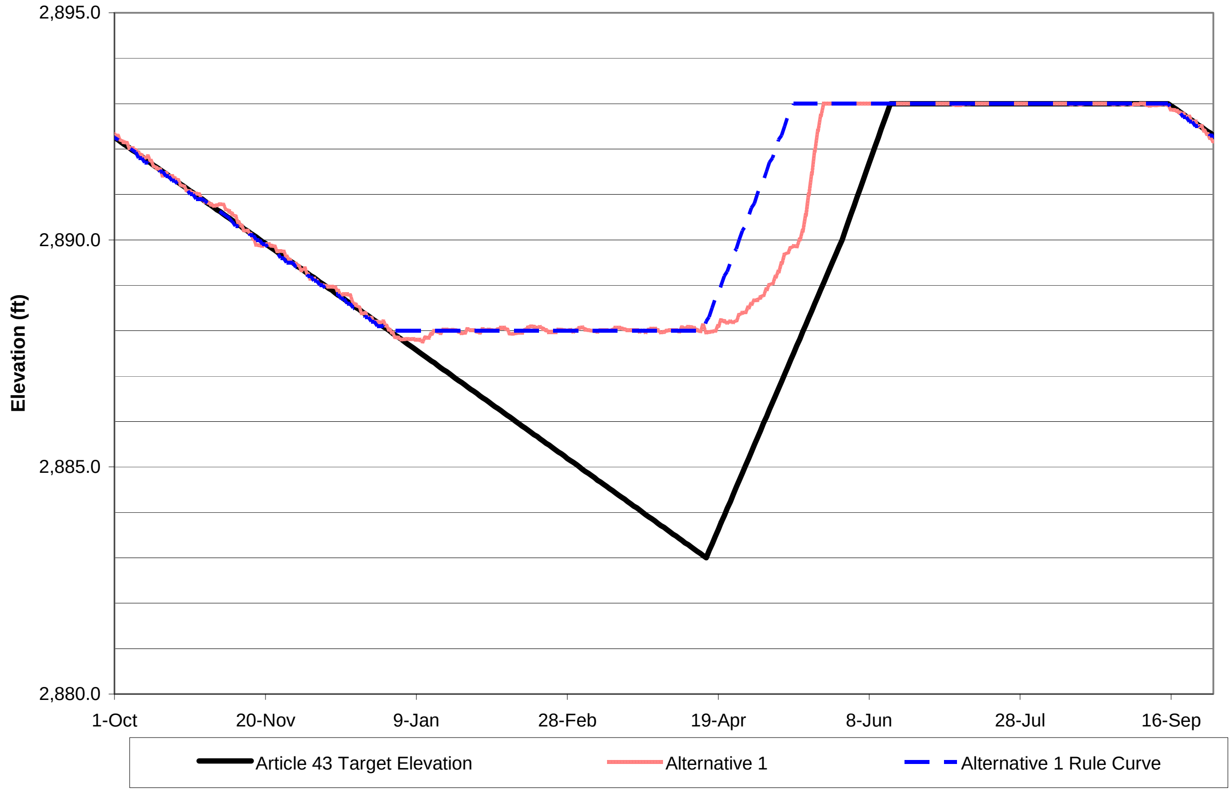
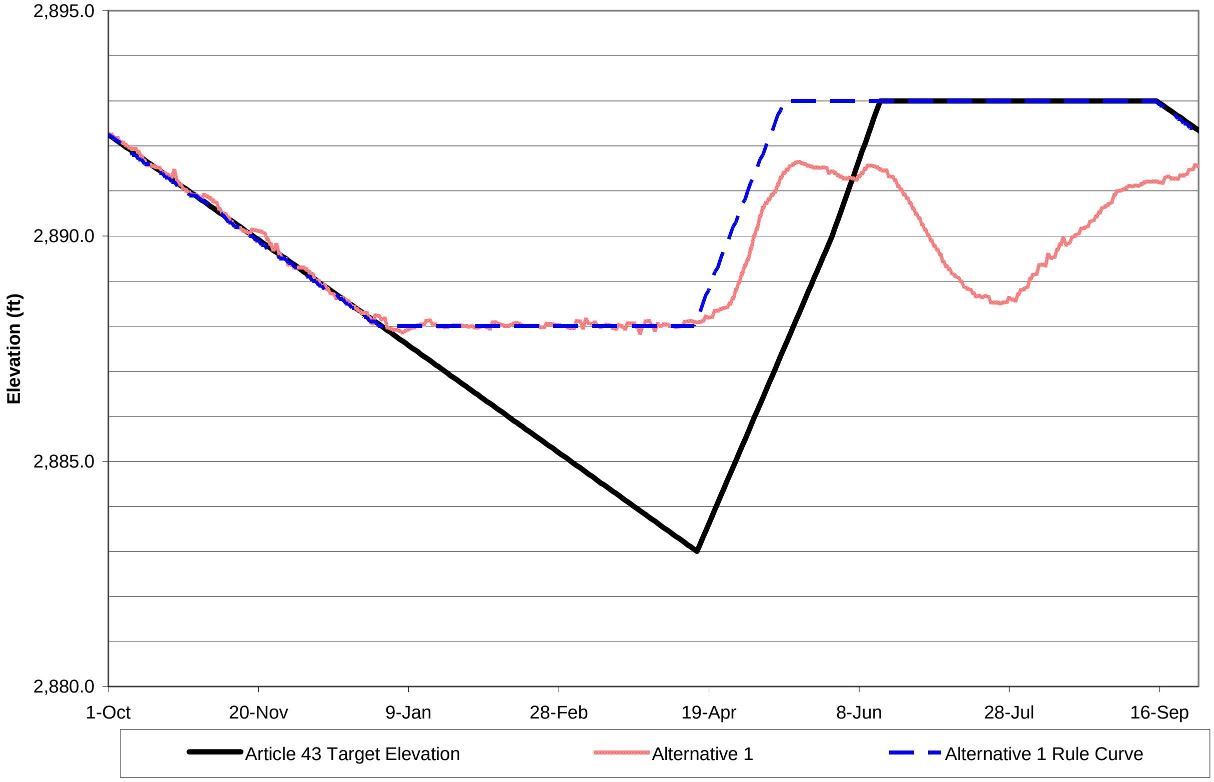


Figure 4-6: Alternative 1 Model Results – Water Year 1977 Lake Evaluations



Before 1965, lake elevations were not managed in accordance with USACE MOU; the MOU was amended in 1965 to address lake elevations and is incorporated by reference in Article 43. Using pre-1965 historical lake elevation data could introduce unnecessary variability in the analysis. Therefore, to allow a viable comparison of historical data and modeled results, the frequency analysis for Alternative 1 used the seven drought years that occurred since 1965.

Figure 4-7 presents the lake elevation frequency curve for simulated lake elevations on June 15. Figure 4-8 presents the lake elevation frequency curve for simulated lake elevations from June 16 to September 15. Figure 4-7 indicates that the lake would meet the June 15 target elevation of 2,893’ msl 50 percent of the time, and would meet the Alternative 1 revised target lake elevation of 2,892.2’ msl approximately 75 percent of the time. The revised target average lake elevation would be met approximately 70 percent of the time for the June 16 to September 15 period. Therefore, Alternative 1 improves upon the historic record for meeting the June 15 target (compare Figure 4-7 with Figure 3-4), but is worse than the historic record for the June 16 through September 15 period (compare Figure 4-8 with Figure 3-5).

Figure 4-7: Modeled Alternative 1 June 15 Elevation Duration Analysis Curve for Seven Drought Years ('73, '77, '87, '88, '92, '94, '01)

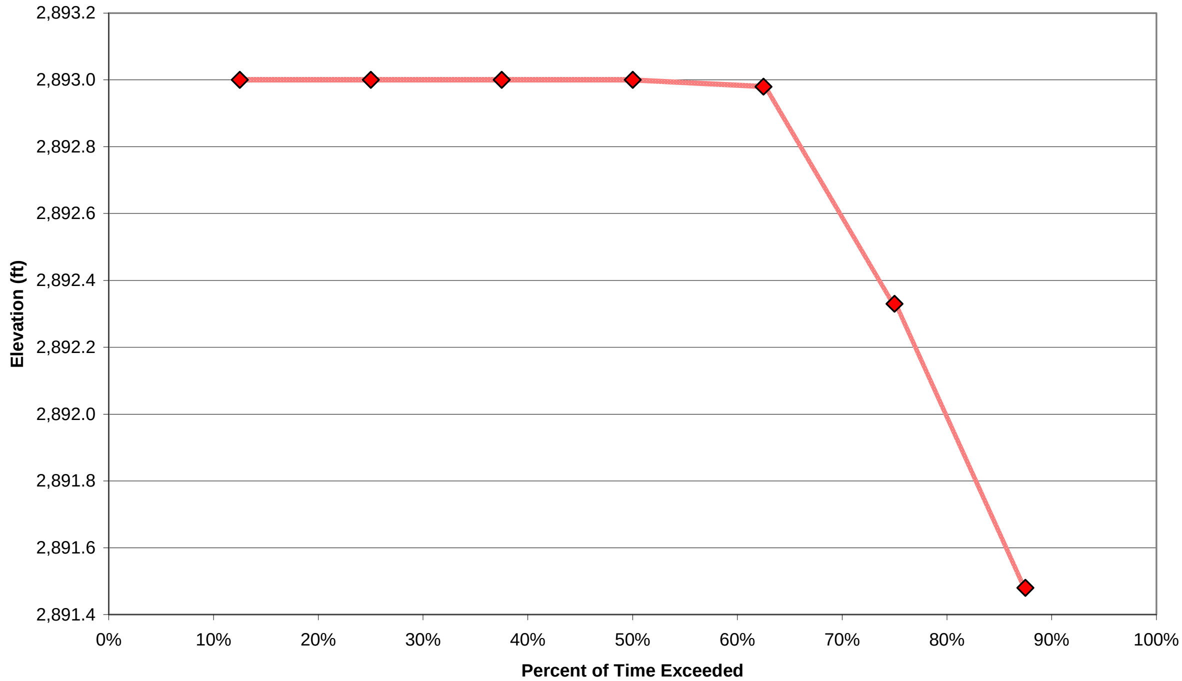
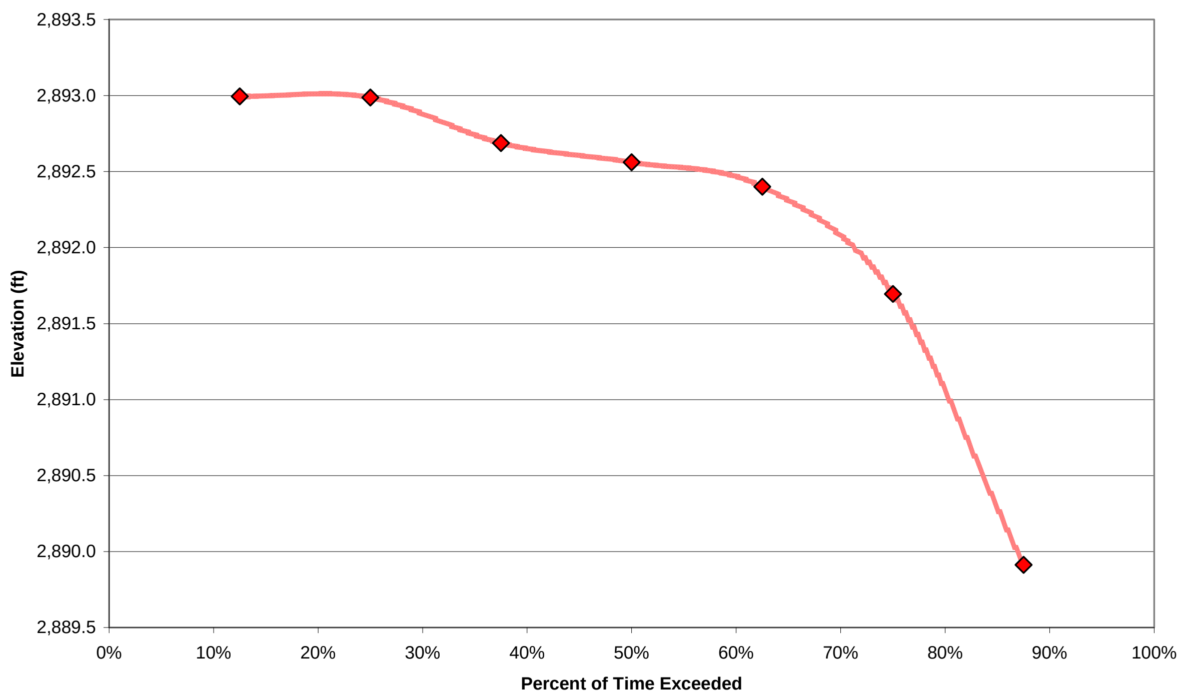


Figure 4-8: Modeled Alternative 1 June 16 to September 15 Average Elevation Duration Analysis Curve for Seven Drought Years ('73, '77, '87, '88, '92, '94, '01)



Kerr Release Model Results

The modeled Kerr Project releases under Alternative 1 were compared with the Article 56 minimum instream flow requirements to note the flow release pattern in the fall, winter, and early spring months. In general, it was noted that in the less severe drought years (1973, 1987, 1988, 1992, and 1994), releases were above minimum flow requirements, while in the more severe drought years (1940, 1941, 1944, 1977, 2001), releases were held to the minimum flow requirements. Two representative graphs of modeling results demonstrate these differences. Figure 4-9 depicts the modeled Kerr Project releases for 1987 and Figure 4-10 depicts the 1977 modeled releases.

Figure 4-9: Modeled Kerr Project Releases for Water Year 1987 – Alternative 1

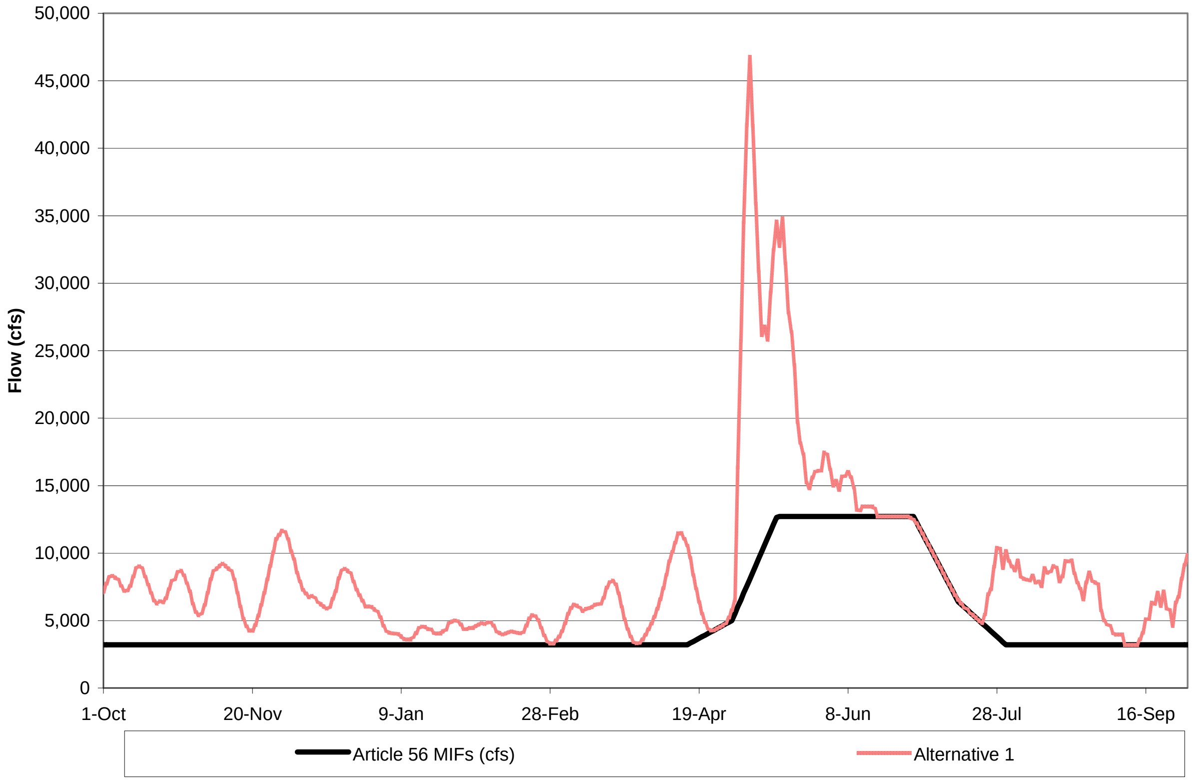
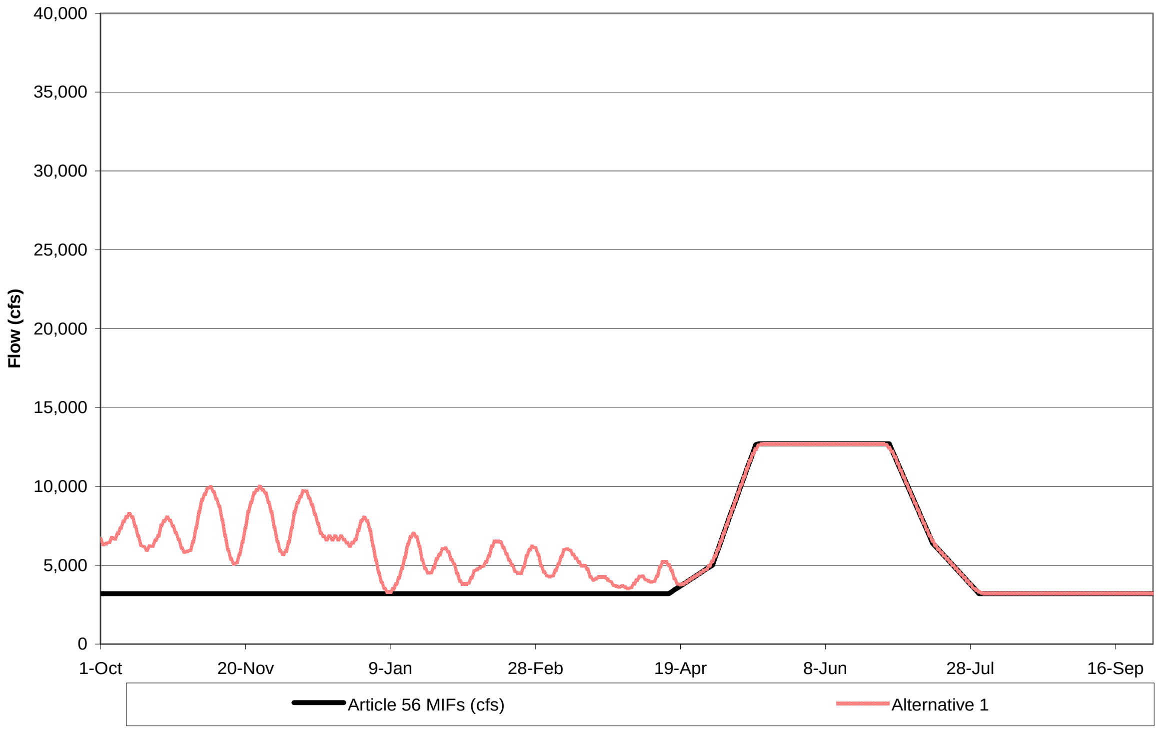


Figure 4-10: Modeled Kerr Project Releases for Water Year 1977 – Alternative 1



4.2.2.4 Alternative 2 (Minimum Instream Flow Variance Allowed)

Alternative 2 is essentially identical to Alternative 1, with one significant exception. In early April, if the lesser of the FRPI or the Official April Final runoff forecast from the NWS – Northwest River Forecast Center is less than or equal to 65 percent of normal, a deviation from the minimum instream flow requirements would be allowed, subject to approval by the Secretary and USACE. Review of historic runoff forecasts and calculations of the FPRI based on historic precipitation data indicates that this would only have occurred during three years in the 1940 to 2004 period of record (1944, 1977, and 2001). However, the accuracy of precipitation data earlier in the period of record is uncertain, and the FRPI for years prior to 1951 years is based on estimates. Because of the minimum instream flow deviation option, Alternative 2 provides an opportunity to meet revised summer lake level targets for drought years that are missed by Alternative 1.

Upon approval, the licensee would be allowed to deviate to a minimum instream flow as low as 8,000 cfs. Under the deviation plan, the licensee would make every reasonable effort to achieve a June 15 through September 15 lake elevation of 2,892.2' msl, higher if possible.

Modeling

The modeling approach for Alternative 2 was essentially the same as for Alternative 1 (see section 4.2.2.3). Alternative 2 allowed the deviation from minimum instream flows from a maximum of 8,000 cfs under certain drought conditions. As noted above, minimum instream flows deviations were only called for in 1944, 1977, and 2001 model runs; therefore the Alternative 2 modeling results for all other years were identical to Alternative 1. See Appendix B for additional information regarding model development and assumptions.

Lake Elevation Model Results

Model results were analyzed for those years where minimum instream flow deviations were implemented. Modeling indicates that the revised June 15 to September 15 lake elevation targets would have been met in 1944, 1977, and 2001 under Alternative 2. Furthermore, modeling indicates that a deviation to 8,000 cfs would have been required in 1944 and 1977, while in 2001, a deviation to 10,500 cfs would have been sufficient to meet revised lake level targets. Figure 4-11 depicts the Alternative 2 lake elevation modeling results for water year 1977. As shown in the figure, the lake dips below 2,892' msl during a portion of July, but the average elevation is above 2,892.2' msl. The effectiveness of the minimum instream flow deviations can be seen by comparing Figure 4-11 with Figure 4-6 (the 1977 model results for Alternative 1).

As discussed in section 4.2.1, the estimated MEI and FPRI values indicated that no minimum instream flow deviation would have been called for in 1940 or 1941 and the lake would not have achieved summer target elevations. However, this is attributed to the inability to accurately estimate MEI and FPRI values for those years. If called for, a deviation in minimum instream flows to 8,000 cfs would have allowed Flathead Lake to achieve refill even in these years.

The frequency analysis of Alternative 2 was conducted using the same assumptions as for Alternative 1 (Section 4.2.2.3) and as discussed in Chapter 3.0, Section 3.1.3.5.
Figure 4-12 shows the results of the frequency analysis for modeled lake elevations on June 15; Figure 4-13 shows the frequency analysis results for the average modeled lake elevations for the June 16 through September 15 period.

The frequency analysis demonstrates that in all drought years since 1965, under Alternative 2, the revised lake level target of 2,892.2' msl would have been exceeded from June 15 through September 15. Furthermore, under Alternative 2, the lake elevation would have exceeded 2,892.5' msl approximately 80 percent of the time, which improves upon the historic record.

Figure 4-11: Alternative 2 Model Results – Water Year 1977 Lake Elevations

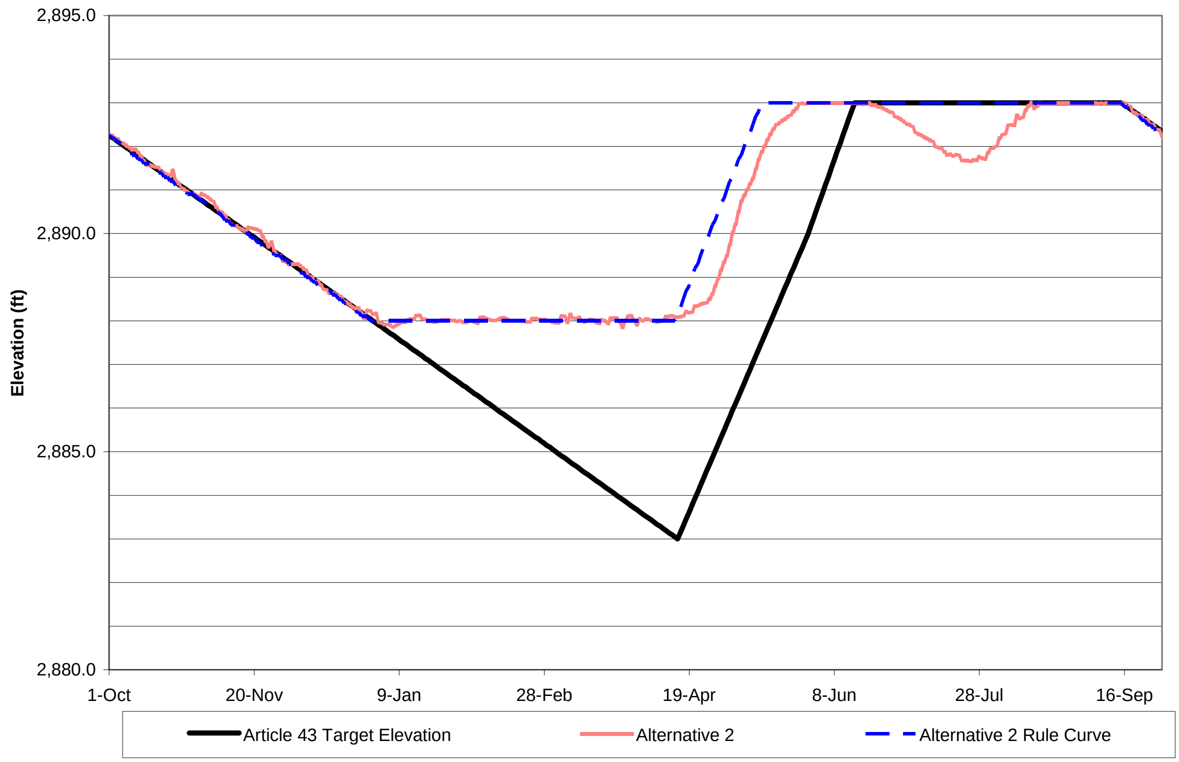


Figure 4-12: Modeled Alternative 2 June 15 Elevation Duration Analysis Curve for Seven Drought Years ('73, '77, '87, '88, '92, '94, '01)

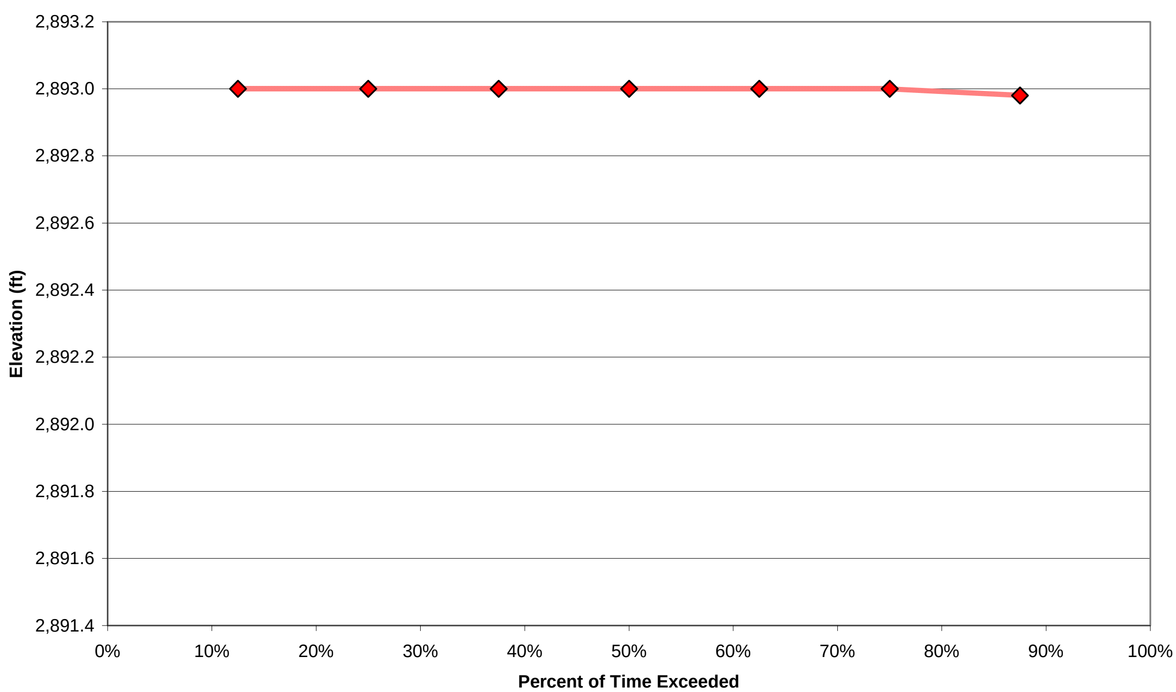
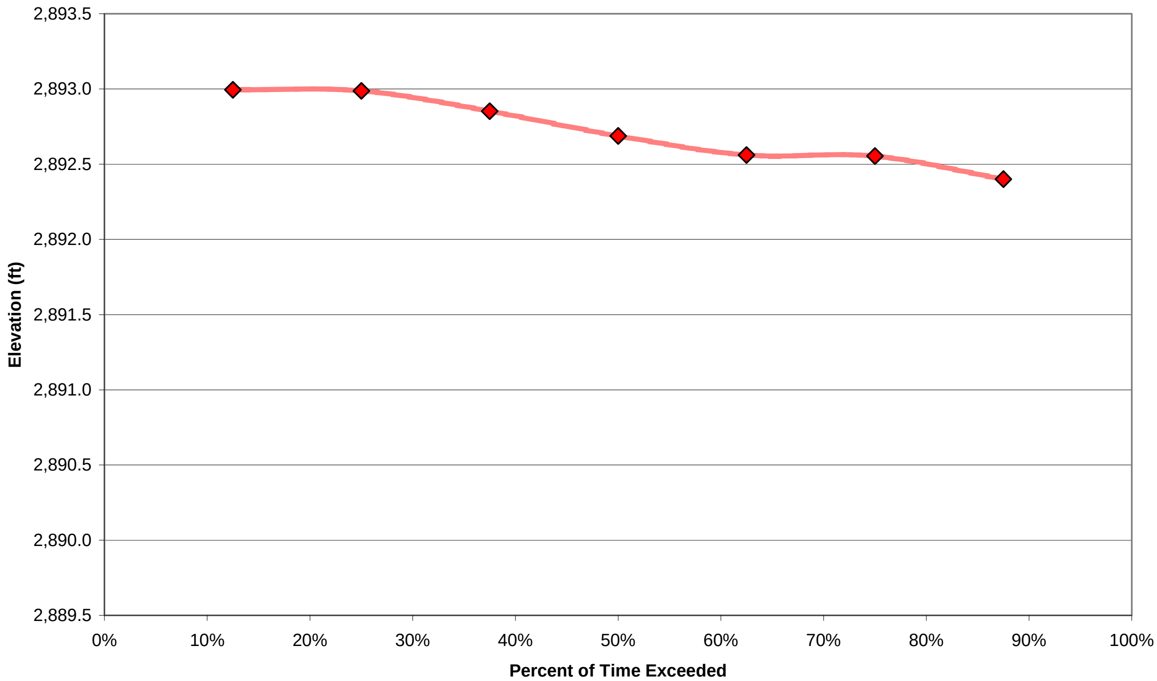


Figure 4-13: Modeled Alternative 2 June 16 to September 15 Average Elevation Duration Analysis Curve for Seven Drought Years ('73, '77, '87, '88, '92, '94, '01)



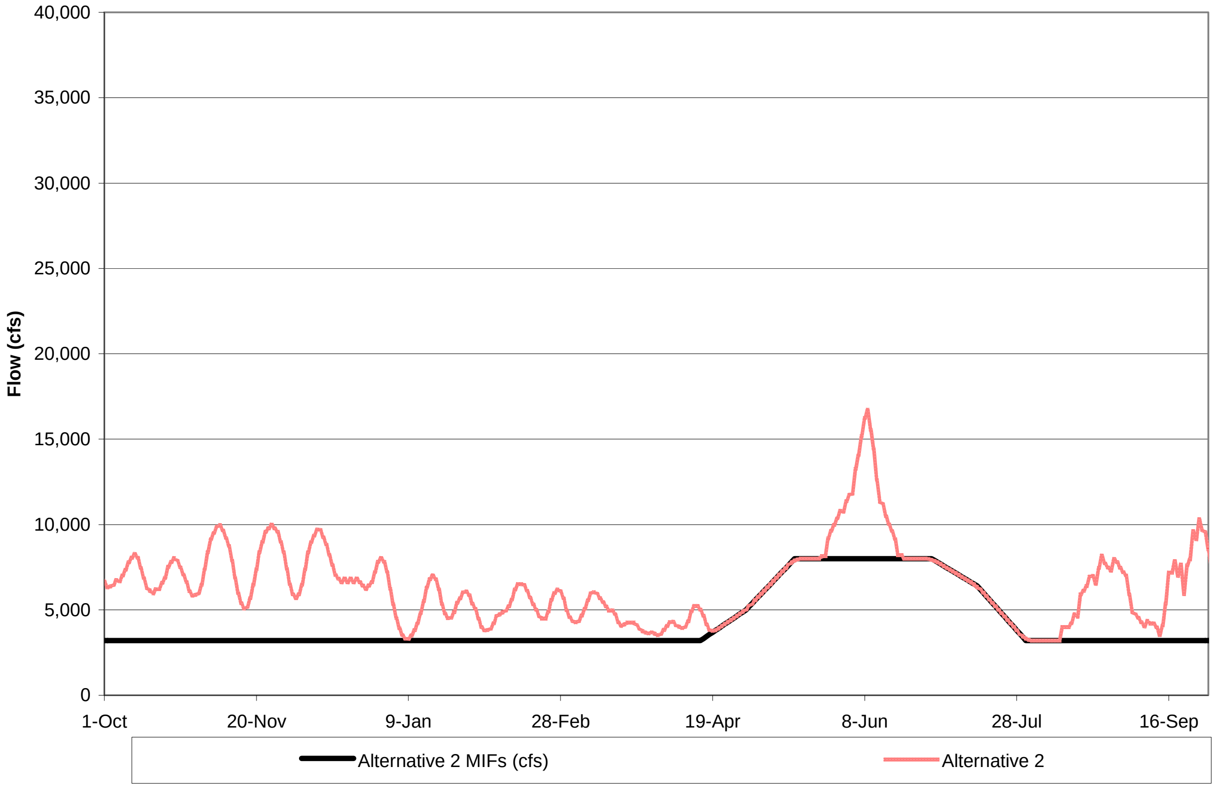
Kerr Release Model Results

The modeled Kerr Project releases under Alternative 2 were compared with the Article 56 minimum instream flow requirements to note the flow release pattern in the fall, winter, and early spring months. As noted above, Alternative 2 model results only differ from Alternative 1 in 1944, 1977, and 2001. Figure 4-14 shows the modeled Kerr releases for water year 1977. Comparing Figure 4-14 with Figure 4-10 illustrates the differences in releases between Alternative 1 and Alternative 2 in a more severe drought year.

Effect of Drought Prediction in Non-drought Years

Under Alternative 2, the effect of drought prediction in non-drought years would be identical to Alternative 1. In addition, no minimum instream flow deviations were ever called for in a non-drought year.

Figure 4-14: Modeled Kerr Project Releases for Water Year 1977 – Alternative 2



4.3 PHYSICAL ENVIRONMENT

This section describes potential impacts to the physical environment under the Proposed Action and alternatives and the methods used to determine those impacts.

4.3.1 METHODS

This section describes the methods used to determine potential impacts to geology and soils, including the potential for erosion on Flathead Lake and the lower Flathead River.

4.3.1.1 Geology and Soils

Publicly available studies regarding erosion and beach-forming activities were reviewed. General elevations and locations of erosion-prone shorelines were identified based upon these reports and available topographic information. General evaluations were conducted to determine if erosion-prone areas or elevations would experience more frequent or longer durations of high flows or lake elevations for the Proposed Action and each alternative.

For lake impacts specifically, erosion-prone areas were compared to lake level duration and frequency graphs for each alternative. A seasonal analysis of wind speed and direction was conducted to create a graph commonly referred to as a wind rose. The wind rose was used to develop a qualitative understanding of predominant wind directions and how they relate to potential erosion prone areas on Flathead Lake.

4.3.1.2 No-Action Alternative

Geology

No effects on unique or special geologic resources would be anticipated under the No-Action alternative.

Soils/Erosion

As noted in the operational impacts discussion above, the No-Action Alternative would maintain the existing undefined decision-making approach to drought management. Thus, an accurate model cannot be developed due to the inherent uncertainties in both the timing and nature of operational decisions. The actual lake levels and releases in 2001 (the only drought year in the 1939-2001 period of record where Kerr Project operations were subject to current license requirements, specifically the section 4(e) conditions) can be used to develop an understanding of potential erosion concerns under the No- Action Alternative. In 2001, lake elevations varied throughout the water year, and the summer target elevation of 2,893’ msl was not met. Lake elevations declined from approximately 2,892.5’ msl to just under 2,891’ msl during the summer recreation period; wave energy would not have been concentrated at any specific elevation.

In 2001, water discharged from Kerr Dam was reduced below minimum instream flow requirements for much of the spring runoff period, and generally stayed near the post-runoff minimum of 3,200 cfs later in the summer. In this situation, there would have been few if any erosion concerns along the Flathead River below Kerr Dam.

The primary issue with the no-action alternative is the lack of a defined decision making process. Historic Kerr operations have resulted in water level regimes that have been detrimental to the shorelines and aquatic habitats of Flathead Lake and the lower Flathead River. Without a plan, mitigation and management is increasingly difficult, complicating efforts to reduce and repair environmental impacts associated with erosion.

4.3.1.3 PPL Montana’s Proposed Action

Geology

The Proposed Action would result in modifications to Flathead Lake elevations and potentially to flows below Kerr Dam during drought years. These modifications would not affect any unique or special geologic resources in the study area.

Soils/Erosion

For each water year (regardless of drought status), Flathead Lake would be held to an end of December elevation of 2,888’ msl under the Proposed Action. This would result in higher fall and early winter lake elevations that may, depending on spring forecasts, continue through April 15 (rather than drafting to 2,883’ msl as would typically occur). As noted in the discussion above, the Proposed Action cannot be accurately modeled; therefore the duration that the lake would be held at 2,888’ msl cannot be determined for any particular water year.

Under the Proposed Action, there would be higher concentrations of wave energy at elevation 2,888' msl every year and possibly at 2,892' msl during drought years (the proposed summer lake elevation from June 15 to September 1). As noted in Chapter 3.0, Section 3.1.1, winds in the study area generally blow from the north and south. A more detailed review of wind rose data for Polson and Kalispell was conducted, the results of which are presented in Table 4-1.

Table 4-1: Wind Direction

Location	January-April Wind Orientation (Blowing From)	June-September Wind Orientation (Blowing From)
Polson	Southwest, Northeast, South	Northeast, Southwest, South
Kalispell	North, Southeast, Northeast, South	North, Southeast

During the winter and spring months when the lake is being held at an elevation of 2,888' msl, northern and southern shorelines would experience a greater level of wave energy. Under the proposed action, this would occur annually, regardless of drought status. Eastern and western shorelines would receive less direct wave energy although oblique wave impacts could potentially increase the lateral transport of shore sediments. In addition, the end of December 2,888' msl target elevation would concentrate ice build-up at this level, affecting shoreline erosion and dock structures along Flathead Lake.

During summer months, if implementation of the Proposed Action was able to maintain a lake elevation of 2,892' msl, wave energy would be concentrated approximately one foot lower than in non-drought years, increasing erosion on the newly exposed shoreline. These effects would decrease if lake elevations dropped throughout the summer, although sedimentation would likely increase as wave action eroded the newly exposed substrates.

Erosion below the dam on the lower Flathead River is not expected to change substantively due to drought. Of greater concern are high spills released from Flathead Lake to avoid exceeding 2,893' msl in the summer, or to keep lake elevations lower in the winter and spring during wet years. In addition, erosion may be increased in the spring if the DMP is deactivated and large volumes of water are discharged over a short period of time for flood control purposes. As discussed above, however, it is difficult to model this possibility given the lack of firm decision making criteria.

4.3.1.4 Alternative 1 (Minimum Instream Flows Precedence)

Geology

No effects on unique or special geologic resources would be anticipated as a result of implementing Alternative 1.

Soils/Erosion

Similar to the Proposed Action, the implementation of Alternative 1 could result in Flathead Lake being held at certain elevations for extended periods of time that differ from standard operations. In Alternative 1, climate indicators would be used to determine whether or not the January through April lake elevation should be held at 2,888' msl. Evaluation of historic climate data (1940 – 2004) indicates that the lake would have been held at 2,888' msl for at least one month during the January-April period in 19 of the 62 years (1940, 1941, 1944, 1945, 1953, 1958, 1964, 1966, 1970, 1973, 1977, 1980, 1992, 1993, 1994, 1998, and 2001). Based on the information provided in Table 4-1, during these years shorelines with a northern or southern exposure would experience higher wave energy and a greater potential for wave erosion and deposition at 2,888' msl. This represents approximately 30 percent of the water years, whereas under the proposed action, this elevation would be achieved annually.

Modeling indicates that during the June 15 through September 15 period, lake levels would fluctuate more when drought conditions were more severe (years with conditions similar to 1944, 1977, and 2001). Steadier and higher lake levels (generally between 2,892 and 2,893' msl) were seen in the model runs for drought years 1973, 1987, 1988, 1992, and 1994; during these milder droughts, wave erosion would be similar to non-drought years. The more severe drought years would see lake levels below 2,892' msl and wave-related erosion could take place at shore elevations that generally do not experience much wave energy. However, the variability in lake elevations in these years would tend to spread out the wave energy over a range of lake elevations, greatly reducing potential impacts at any one location.

As discussed under the Proposed Action alternative, erosion below the dam on the lower Flathead River is not expected to change substantively due to drought. However, erosion may be increased in the spring if the DMP is deactivated and large volumes of water are discharged over a short period of time for flood control purposes. Modeling results for Alternatives 1 and 2 allow for qualitative analysis of the potential for increased erosion impacts due to the incorrect prediction of drought. As noted above, Flathead Lake would have been kept at an elevation of 2,888' msl for one or more months during the January-April period for 19 of the 62 years modeled. Nine of these years were not drought years (1945, 1953, 1958, 1964, 1966, 1970, 1980, 1993, and 1998). Comparison of the model results with the historic release data for these years indicates that the volume of water released is similar after April. However, Alternative 1 results in the need to discharge water at a greater rate during April than would typically occur, indicating a possible increase in erosion downstream of the Kerr Dam.

4.3.1.5 Alternative 2 (Minimum Instream Flows Variance Allowed)

Geology

No effects on unique or special geologic resources would be anticipated as a result of implementing Alternative 2.

Soils/Erosion

Lake level management strategies under Alternatives 1 and 2 are essentially the same. Therefore, the effects of implementing these alternatives would be similar. Application of Alternative 2 would result in closer to currently managed summer lake levels for more severe drought years (such as 1944, 1977, and 2001). Therefore the effects of wave-based erosion under Alternative 2 would be similar to non-drought years.

Erosion concerns below Kerr Dam along the Flathead River would be generally the same for Alternative 2 as for Alternative 1, since the operations would be similar for these two alternatives. However, in severe drought years a deviation from the minimum instream flow requirements could be allowed under Alternative 2. This could reduce erosion in portions of the main channel and associated deposition in floodplain areas.

4.4 LAND USE IMPACTS

This section describes potential land use impacts that could occur under the Proposed Action and alternatives and the methods used to determine those impacts.

4.4.1 METHODS

This section evaluates land resource impacts based on differing lake elevations and discharge levels resulting from the Proposed Action or alternatives – although land use effects were primarily limited to lakeshore property. The analysis therefore, focuses on whether the lake level changes caused by implementation of the Proposed Action or alternatives would temporarily or permanently cause lakeshore property to become less or more amenable to its current use, or if there would be no significant effect on the property use.

4.4.2 ALTERNATIVES

This section describes potential land use impacts that could occur under each of the alternatives.

4.4.2.1 No-Action Alternative

Under the No-Action Alternative, the current decision-making approach for Kerr Project operations would continue. As noted above, water year 2001 provides one example of the results of the undefined decision-making approach during a drought year when the section 4(e) conditions were in place. Over the June 15, 2001, to September 15, 2001, period, lake levels ranged from 2,891.0 to 2,892.7' msl, averaged 2,891.7' msl, and generally declined throughout the summer. While this would not necessarily be the case in every drought year, it may be representative of more severe drought years.

Under the No-Action Alternative there would not be sufficient water to meet the requirements of Article s 43 and 56 in drought years. As such, lake levels would drop affecting lake access, docks, and mooring points. The vast majority of the over 3,000 docking structures on Flathead Lake are built as fixed elevation structures designed to accommodate a 2,893' msl summer lake level. During the scoping process, several comments were received which described the negative impact of these lower lake levels on the elderly and disabled who were attempting to access watercraft from these fixed elevation structures. The degree of the effect will depend upon water level at that time and the particular docking structure. Depending on lake elevation and topography, private docks, shore stations, and public facilities would be unusable for part or all of the recreation season. Under the No-Action alternative, impacts to recreation and use of docking structures would occur every drought year.

For areas upstream of the lake on the Flathead River, the No-Action alternative would generally maintain the status quo with uncertain operations. The primarily agricultural land use would continue to experience similar impacts as those experienced historically by the No-Action alternative. Lower river land use impacts would be uncertain as well, with little change from current conditions.

4.4.2.2 PPL Montana's Proposed Action

As noted previously, PPL Montana's Proposed Action could not be modeled; therefore the likelihood of the Proposed Action achieving its modified summer target lake level of 2,892' msl during a drought could not be determined. It is understood, however, that additional water from the Hungry Horse Project is not guaranteed, particularly during drought years. Therefore, it is reasonable to assume that the Proposed Action would not consistently achieve summer lake level target elevations and that effects on land use under drought conditions would be similar to the No-Action Alternative.

A number of private docks have been constructed in portions of the lake that are more susceptible to lake elevation changes. Many of these docks rely on the historic summer lake level of 2,893' msl. Under the Proposed Action, the revised target lake level of 2,892' msl would have negative effects on these docks – in some cases making them unusable for mooring deeper draft vessels (e.g. large deep v-hull powerboats and larger sailboats with rigid keels). Docks constructed in deeper water would not be affected to the same degree although stepping into boats from fixed docks (regardless of location) could become more difficult if the lake elevation was 2,892' msl (or less) especially for children, the elderly, and the disabled. There would be an increase in water hazards for all water craft.

Under the Proposed Action, the duration of impact would be dependent upon the precipitation patterns and runoff. However, the impact could be as long as the entire recreational season. Areas of potential concern include:

- Somers,
- Bigfork,
- The point near Woods Bay,
- The southern end of Skidoo Bay,
- The southeastern portion of East Bay,
- The western end of Big Arm Bay,
- The Dayton area, especially near Cromwell Island,
- The inlet off of Shelter Bay near Rollins,
- Hughes Bay, and
- Peaceful Bay near Conrad Point, south of Lakeside.

Under the Proposed Action, agricultural land uses upstream of the lake along the Flathead River would experience elevated water levels in each water year which may produce negative impacts to agricultural production. Lower river land use would be impacted in drought conditions as minimum flows may not be met.

4.4.2.3 Alternative 1 (Minimum Instream Flows Precedence)

Model results for Alternative 1 indicate that over the 1940 to 2004 period of record, the revised summer average lake elevation target of 2,892.2’ msl would have been met or exceeded in five of the ten drought years. Specifically, modeling indicates that the average summer lake elevation for the years 1973, 1987, 1988, 1992, and 1994 was approximately 2,892.7’ msl. For the years 1940, 1941, 1944, 1977, and 2001, the model showed an average summer lake elevation of just less than 2,890.1’ msl.

Based on these results, implementation of Alternative 1 would likely result in better lake access conditions than the Proposed Action in 5 of the 10 drought years but would result in measurable lake access impacts for the other 5 drought years. Similar to the previously discussed alternatives, these lake level changes would result in temporary and seasonal impacts to boat launching and mooring facilities. In general, however, the temporary nature of these impacts would not cause a permanent change in land use. For 5 of the 10 drought years, a summer lake elevation of 2890.1’ msl or below would render many private and public docks, shore stations, and launching sites unusable for deep draft boats and those with large keels. There would be an increase in water hazards for all water craft during those years. Alternative 1 would improve water level issues along the upper Flathead River since elevated levels would only occur with drought conditions. No impacts to lower river land uses are anticipated.

4.4.2.4 Alternative 2 (Minimum Instream Flows Variance Allowed)

Model results for Alternative 2 indicate that over the 1940 to 2004 period of record, the revised summer average lake elevation target of 2,892.2’ msl would have been met or exceeded in eight of the ten drought years. Specifically, modeling indicates that the average summer lake elevation for the years 1944, 1973, 1977, 1987, 1988, 1992, 1994, and 2001 was approximately 2,892.7’ msl. For the years 1940 and 1941, the model showed an average summer lake elevation of just less than 2,889.8’ msl. As noted in the operation effects discussion (see section 4.2), the climate indicators for 1940 and 1941 were estimates; precipitation data was not robust enough to develop a high level of confidence in the FPRI for those years. Therefore, it is uncertain whether or not a minimum instream flow deviation would have been called for in 1940 and 1941. Models developed during the scoping process indicate that target lake levels would have been achieved in 1940 and 1941 if conditions called for a minimum instream flow deviation to 8,000 cfs. In any case, the droughts of 1940 and 1941 could be considered the worse case for summer lake elevations using the recorded historical record.

Based on these results, implementation of Alternative 2 would likely result in better lake access in all drought years than the Proposed Action or Alternative 1. The average summer lake elevation of 2,892.7’ msl shown by the model would be essentially identical to the normal operating level of Flathead Lake during non-drought years. Alternative 2 is not expected to have land use impacts as the result of its implementation. Alternative 2 would improve water level issues along the upper Flathead River since elevated levels would only occur with drought conditions. No impacts to lower river land uses are anticipated.

4.5 WATER QUALITY IMPACTS

This section describes the potential water quality impacts under the Proposed Action and alternatives and the methods used to determine those impacts.

4.5.1 METHODS

During drought years, Kerr Project operational changes will occur regardless of the alternative selected; these changes would affect water flow and lake levels as discussed previously. The Proposed Action and alternatives were evaluated to determine if they would potentially increase or decrease the mass loading of organic and inorganic pollutants in Flathead Lake or the lower Flathead River. For Flathead Lake, potential mass loading changes were qualitatively compared to the established TMDL for the lake to determine if implementing any of the alternatives would cause Flathead Lake to be out of compliance with CWA requirements or additional water quality impacts on the lower Flathead River.

As noted in Chapter 3.0, Section 3.3, Flathead Lake is listed by the EPA under section 303d of the CWA as impaired due to increased algal growth, decreased water clarity, and elevated nutrient levels. The focus of achieving a 15 percent reduction in phosphorus loading (required by the TMDL) is on reducing urban and agricultural runoff in areas north of the lake near Kalispell. Additional reductions are being achieved by allocating allowable phosphorus discharges for the rest of the watershed using surface water modeling techniques (MDEQ 2002).

The water quality issues in the lower Flathead River are water temperature issues during low flow periods and non-point source pollution derived from watershed runoff and irrigation return flows.

4.5.2 ALTERNATIVES

This section describes potential impacts to water quality that could occur under each alternative.

4.5.2.1 No-Action Alternative

The undefined decision-making approach to modifying operations in drought years would result in varying lake levels and Flathead River flows. In the more severe drought years, the lake could be two or more feet below full pool at various times during the summer months due to the combination of drought and compliance with minimum instream flows. As indicated in Chapter 3.0, Section 3.3, the higher summer through late fall lake levels on Flathead Lake have caused erosion of the shoreline and deposited sediment in the near shore areas. Lower summer and fall lake levels would actually improve water quality and near shore habitats by reducing erosion and washing fines from spawning sites now covered with eroded sediments.

Limited data is available regarding trends in visitors to Flathead Lake (see Chapter 3.0, Section 3.6.4). Available data indicates that drought plays a role in the number of visitors to the lake, region, and the state. However, other socioeconomic factors affect visitation rates, ranging from age to ethnicity to fuel prices. Reduced lake visitation, which could be partially attributable to drought conditions, would potentially reduce wastewater generation, and therefore result in some reduction in nutrient loading. Such a reduction is not quantifiable. However, given that the point and non-point loading from wastewater related sources (i.e. wastewater treatment plants and shoreline septic systems) constitutes five percent or less of the phosphorus and nitrate/nitrite load for the lake (MDEQ 2002), it is unlikely that any significant reduction in nutrient loading would occur from a reduced number of visitors or conversely, would any significant increase occur during periods of heavy tourism to the region.

Modeling has shown that the No-Action Alternative will fail to meet both instream flow requirements and lake elevation targets during drought conditions. Lower flows in the Flathead River would result in warmer water, stressing cold and cool water fisheries. In addition, reduced flows would exacerbate pollution effects from irrigation return flows. Presumably, irrigation needs would increase during drought conditions increasing return flows to the lower Flathead River. Lower discharges from the Kerr Dam would reduce the diluting effects of Flathead River flows, increasing the negative effects of pollutants contained in the irrigation return flows.

4.5.2.2 PPL Montana’s Proposed Action

Water quality impacts would generally be similar under PPL Montana’s Proposed Action as under the No-Action Alternative. As discussed previously, it is unlikely that lake levels or minimum instream flow targets would be met and maintained under the Proposed Action – resulting in a warmer, more polluted Flathead River.

4.5.2.3 Alternative 1 (Minimum Instream Flows Precedence)

Modeling Alternative 1 indicates that for five of the 10 worst drought years, Kerr operations would meet both minimum instream flows and summer recreational lake level targets. Therefore, for these water years, water quality impacts to both Flathead Lake and the lower Flathead River would be similar to non-drought years. In the five worst drought years (in terms of total runoff volume), minimum instream flows would be met, although summer recreational lake level targets would not. As discussed above, water quality is not expected to be significantly affected by lower lake levels. However, by meeting the minimum instream flows, lower Flathead River water quality would be similar to non-drought years.

4.5.2.4 Alternative 2 (Minimum Instream Flows Variance Allowed)

Water quality under Alternative 2 would be nearly identical to non-drought water years based on lake levels and lower Flathead River flows. Implementation of Alternative 2 achieves, for all practical purposes, the summer recreational season lake elevation of 2892.2’ msl (or above) and meets (in most cases) minimum instream flow requirements. In those few years when minimum instream flows are reduced, the 8,000 cfs minimum should continue to provide a sufficient temperature regime and mixing to maintain the river ecosystem through the drought conditions.

4.6 ECOLOGICAL RESOURCES IMPACTS

This section describes potential impacts to ecological resources under the Proposed Action and alternatives and the methods used to determine those impacts.

4.6.1 METHODS

This section describes the methods used to determine potential impacts to land cover and habitat, fisheries, terrestrial and amphibious species, avian species, species of concern (threatened or endangered species), and wetlands and riparian areas.

4.6.1.1 Land Cover/Habitat

Evaluation of impacts to land cover and habitat were based on a qualitative assessment of lake elevations and flows below Kerr Dam for the Proposed Action and the No-Action Alternative. Lake elevations and Flathead River flows obtained from modeling results were used for Alternatives 1 and 2. The relative magnitude and duration of river flow and lake elevation changes due to the proposed drought management strategies were reviewed to determine short term and long term impacts to land cover and habitat. In general, a long term change to lake elevations or river flows would be necessary to modify land cover, although short term changes to lake elevations and river flows could temporarily modify the availability of habitat. Habitat impacts would largely occur in the river environment below Kerr Dam, and the lakeshore environment on Flathead Lake.

4.6.1.2 Fisheries

The fisheries impact analysis focused on the riparian environment along the Flathead River below Kerr Dam. An assessment of the Proposed Action and Alternatives was conducted based on an evaluation of available physical habitat for selected species and life stages. These assessments were conducted for three study sites within the Lower Flathead River below Kerr Dam. Quantitative assessments were developed for Alternative 1 and Alternative 2 based on historic flow data and modeling results. For the Proposed Action and the No-Action Alternative, a qualitative assessment was developed since these alternatives could not be accurately modeled.

The quantitative assessment for Alternatives 1 and 2 was based on work conducted by Addley and Ludlow (2001). In their work, two-dimensional hydrodynamic models were used in conjunction with Habitat Suitability Curves for key species important to tribal resource management objectives within the lower Flathead River to simulate the relationships between available habitat and discharge. The availability and suitability of habitat can vary greatly with changes in flow, and varies significantly by species type and life stage. Therefore, the available suitable habitat at a given flow rate may be high for one species and low for another species. Adult, juvenile, fry, and spawning life stage relationships were developed at three study sites (Buffalo, Sloan, and Dixon – see Figure 4-15) within the main stem Flathead River below Kerr Dam.

Historic and modeled Kerr releases for the water year 1939-2001 period of record (which was the largest data set available when the assessment was conducted – see Chapter 2.0, Section 2.2.1) were used to develop the average percent of available habitat results for each month. These results were then combined to find the average yearly available habitats for each selected species and life stage. The average yearly available habitats were then used to compare the alternatives.

4.6.1.3 Terrestrial and Amphibious Species

Modifying lakeshore and riparian environments through lake elevation changes and flow volume/rate changes could affect amphibious species' habitats. Evaluation of impacts considered the magnitude and duration of such modifications for each alternative compared to the behavior of the Flathead Lake system in a drought condition with no drought management activity.

4.6.1.4 Avian Species

Impacts to birds may result from other impacts to wetlands, erosion, water quality, or vegetation. In addition, nesting, foraging, and migratory patterns may be altered by changes in water elevations and flow patterns. Lake operational information for the Proposed Action and alternatives was compared against known life cycle patterns of avian species using nesting and foraging areas in the near shore and riparian environments of Flathead Lake and the lower Flathead River, especially during the breeding season. As discussed in Chapter 3.0, Section 3.4.4, the construction of the Kerr Project and the corresponding control of lake levels has caused some reduction in waterfowl habitat, especially on the north shore of Flathead Lake; these impacts are part of the baseline and are not addressed by this EIS.

4.6.1.5 Species of Concern

Impacts to wetlands, erosion, water quality, or vegetation may affect threatened and endangered species. In addition, nesting, spawning, foraging, and migratory patterns may be altered by changes in water elevations and flow rates. Lake operational information for the Proposed Action and alternatives was compared to known life cycle patterns of wildlife using nesting, spawning, and foraging habitat in the near shore and riparian environments of Flathead Lake and the lower Flathead River.

As discussed in Chapter 1.0, Section 1.5.3 and Chapter 3.0, Section, 3.1.4 and 3.4.5, Kerr Project operations under the Proposed Action or Alternatives would not affect measures required by the NMFS and USFWS BiOps for listed salmon and steelhead.

Figure 4-15: Habitat Study Site Locations

4.6.1.6 Wetlands/Riparian Areas

In accordance with Executive Order 11990 – Protection of Wetlands (Section 4.12.3.2), BIA evaluated the potential for impacts to wetlands associated with the implementation of the Proposed Action or alternatives. Lake operational information for the Proposed Action and alternatives was used to evaluate potential hydrologic impacts on wetland and riparian areas adjacent to Flathead Lake and the Flathead River. Changes to water regimes based on observed conditions were evaluated and potential changes to wetland environments were estimated based on published information for identified wetland types.

Operation of the Kerr Project subjects wetlands adjacent to Flathead Lake and the lower Flathead River to changes in water levels and flows. Wetlands are therefore at different saturation levels at different times of the year. The focus of the discussion in this section is on the impacts to wetlands as a result of the modification of lake level and minimum instream flow management. In general, such impacts occur to lake-related wetlands during the summer months and to lower Flathead River wetlands during spring and early summer months. However, it is important to note that current wetland and riparian systems have been significantly altered from their natural state as a result of the construction and operation of the Kerr Project. Chapter 3.0, Section 3.4.6, provides information about the wetlands present in the study area.

4.6.2 ALTERNATIVES

This section describes potential impacts to ecological resources that could occur under each of the alternatives.

4.6.2.1 No-Action Alternative

The potential variability of lake levels and water releases into the Flathead River below Kerr Dam under the No-Action Alternative would result in reducing water to lakeshore and downstream wetland and riparian areas during drought. Failure to proactively plan for and manage lake levels and minimum instream flows under the No-Action Alternative leads to conflicts in water management. As noted in Chapter 2.0, Section 2.4, strictly complying with lake level requirements results in failure to meet minimum instream flows below Kerr Dam during drought events. Conversely, strictly complying with minimum instream flows results in failure to meet lake levels during drought events.

Land Cover/Habitat

In the long term, no land cover changes would be anticipated under the No-Action Alternative. In general, long-term or permanent changes in water availability below Kerr Dam or at the lakeshore would be required to change land cover types.

However, temporary changes to habitat would occur during drought years. Lower average summer lake levels that could occur during drought years would reduce the availability of water in shoreline wetland complexes, most notably at the southeastern and northern shores of the lake (see wetland discussion below). Failure to meet minimum instream flows would impact the riparian and aquatic habitat below Kerr Dam during the spawning season for a number of species; more detail regarding this issue is presented in the fisheries discussion below.

Fisheries

Fisheries habitat modeling demonstrates the effects of flow management during and up through water year 2001 (see Table 4-2 for historic habitat availability/suitability). Historic habitat availability/suitability is a measure of the long-term average fisheries habitat prior to implementing minimum instream flows. The percent available habitat is a total habitat value that takes into account seasonal water releases, life stage, and habitat parameters at specific study reaches. For each fish species and life stage, there are specific habitat requirements that can be measured as percent available habitat under a given flow. Assuming that historic operations are a general indicator of the No-Action Alternative, modeling demonstrates that habitat values in general are reduced under historic operations when compared with either Alternative 1 or Alternative 2.

Table 4-2: Modeled Percent of Total Available Habitat

Species and Life Stage	Buffalo Study Site			Sloan Study Site			Dixon Study Site		
	Historic Percent Available Habitat	Change Under Alt. 1	Change Under Alt. 2	Historic Percent Available Habitat	Change Under Alt. 1	Chang e Under Alt. 2	Historic Percent Available Habitat	Change Under Alt. 1	Change Under Alt. 2
Brown Trout Adult	91.25	**-0.36**	-0.69	76.81	+1.75	+2.20	92.91	+1.10	+1.37
Brown Trout Juvenile	82.51	+0.82	+1.27	65.91	+0.61	+0.68	84.31	+1.48	+1.91
Brown Trout Fry	74.24	+1.92	+2.75	74.36	**-1.95**	**-1.35**	64.50	+0.28	+1.31
Brown Trout Spawn	95.35	+2.84	+3.00	59.13	+7.69	+7.63	90.41	+4.75	+4.91
Bull Trout Juvenile	77.84	+3.13	+4.48	71.52	+0.38	+0.33	75.40	+1.67	+1.92
Bull Trout Spawn	69.91	+3.54	+3.21	54.13	**-2.65**	**-3.24**	80.25	+2.35	+2.57
Cutthroat Trout Adult	97.22	+0.86	+1.01	81.78	+0.84	+0.99	93.24	+1.03	+1.22
Cutthroat Trout Juvenile	87.80	+0.79	+1.02	76.22	+0.35	+0.30	75.37	+0.50	+0.46
Cutthroat Trout Fry	89.11	+3.32	+3.16	76.55	+5.02	+3.98	87.45	+3.62	+3.61
Cutthroat Trout Spawn	75.43	**-1.90**	+0.97	63.50	**-4.74**	**-3.73**	68.30	**-7.78**	**-4.97**
Rainbow Trout Adult	96.31	+0.78	+0.89	59.56	+0.41	+0.46	73.18	+1.31	+1.59
Rainbow Trout Juvenile	87.06	+2.08	+2.74	59.96	+0.44	+0.41	79.04	+1.48	+1.85
Rainbow Trout Fry	93.12	+0.64	+0.95	80.25	+3.67	+2.81	87.21	+1.65	+2.23
Rainbow Trout Spawn	45.53	+0.12	**-0.61**	70.13	**-0.74**	**-0.91**	66.08	**-4.31**	**-3.29**
Whitefish Adult	95.31	+1.17	+1.37	61.86	+0.73	+0.88	77.44	**-0.69**	**-1.34**
Whitefish Juvenile	95.31	+1.17	+1.37	61.86	+0.73	+0.88	77.64	+1.31	+1.60
Whitefish Fry	51.34	**-11.43**	**-11.28**	51.53	**-9.58**	**-8.97**	55.92	**-5.92**	**-5.97**
Whitefish Spawn	91.87	+4.24	+4.50	54.71	**-0.36**	**-0.76**	75.91	+4.85	+4.92
Pike Juvenile	89.21	+0.96	+1.20	80.75	+0.73	+0.91	82.32	+0.58	+0.78
Pike Fry	64.63	**-1.07**	**-1.65**	74.25	**-2.94**	**-2.54**	73.83	**-5.99**	**-2.01**
Pike Spawn	91.27	+0.67	+1.53	76.52	**-0.32**	**-0.93**	82.25	+0.10	**-0.29**
Smallmouth Adult	83.43	+0.70	+0.90	77.24	+0.25	+0.21	74.96	**-0.77**	**-1.19**
Smallmouth Juvenile	88.34	+0.83	+1.05	67.79	+0.28	+0.27	72.88	+0.47	+0.50
Smallmouth Fry	83.13	+6.99	+4.51	82.15	+8.34	+5.21	84.19	+7.87	+5.17
Smallmouth Spawn	94.34	+1.58	+0.69	63.39	**-2.95**	**-2.78**	60.69	**-5.91**	**-4.83**

Note: Bold numbers indicate a relative reduction in habitat.

Terrestrial and Amphibious Species

Impacts to terrestrial species are anticipated as a result of continued implementation of the No-Action Alternative during drought conditions.

Aquatic reptilian and amphibian species that use shoreline habitat could be affected as lower lake levels during drought periods reduce the area of wetland habitats. These species would primarily include frogs and turtles, which could be stressed from the reduction of suitable habitat in the near shore environment. Should drought conditions result in a decision to deviate from minimum instream flow requirements, backwater areas of the lower Flathead River would not receive as much, or in extreme cases, any water; this could also affect frog and turtle species inhabiting the riparian habitat below Kerr Dam. The reduction in suitable lakeshore and riparian habitat for these species would likely increase intra-species and inter-species competition, and potentially increase mortality rates.

Avian Species

Continued implementation of the No-Action Alternative may affect some avian species, particularly waterfowl that use wetland areas for nesting and foraging. As noted previously, the lower summer lake elevations during drought conditions would potentially temporarily reduce the saturated area of wetland habitat. If the minimum instream flow requirements were reduced because of drought conditions, similar temporary losses of saturated wetland habitat in the lower Flathead River could also occur. The reduction in habitat would potentially increase intra-species and inter-species competition for nesting sites, foraging areas, and could reduce reproductive success during a drought year.

No impacts to nesting sites or foraging habits of ospreys or bald eagles (see Species of Concern discussion below) are anticipated.

Species of Concern

Of all the species of concern, only bull trout are expected to be affected by the No-Action Alternative. Modeling indicates that bull trout habitat below Kerr Dam ranges from 54 to 80 percent available over the three study locations identified in Table 4-2. The table also shows that historic flows (which are a general indicator of the No-Action Alternative) generally provide less habitat for bull trout when compared to Alternatives 1 and 2.

Wetlands/Riparian Areas

As mentioned in the sections above, temporary impacts to wetland complexes on the shore of Flathead Lake and in the riparian environment below Kerr Dam could occur. Lower lake elevations during drought years would reduce the saturation of wetland complexes hydrologically connected to Flathead Lake. These are:

- Palustrine and lacustrine complexes located on the north shore of Flathead Lake;
- Palustrine and lacustrine complexes located in the East Bay area;
- Palustrine wetlands located in the channel above Kerr Dam west of Polson;

- Palustrine and lacustrine complexes located on the west side of South Bay;
- Palustrine wetlands located in the Big Arm Bay area; and
- Various palustrine and lacustrine wetland areas interspersed along the shore/near shore area between Wildhorse Island and Somers.

Should a decision be made to deviate from minimum instream flows, the spring and early summer saturation of palustrine and riverine wetland complexes in the lower Flathead River would also be reduced.

An estimate of wetland acres that may be affected by reduced saturation during the summer months is difficult to develop, given the potential variation in lake elevation and duration of drought conditions in any given year. Furthermore, the relationship between wetland saturation and lake elevation likely varies by location due to varying soil types and hydraulic connectivity between the lake and wetland areas.

Flooding

The No-Action Alternative is not likely to increase or decrease the risk of flooding due to Flathead Lake operations. USACE would continue to provide local and regional flood control by reducing Flathead Lake elevation in the spring, as discussed previously.

4.6.2.2 PPL Montana's Proposed Action

As mentioned previously, the Proposed Action cannot be directly modeled or analyzed due to the lack of defined target elevations or specific minimum instream flow requirements. However, it is possible to qualitatively discuss notable differences in this plan versus the No-Action alternative and Alternatives 1 and 2.

Land Cover/Habitat

There are two primary aspects of the Proposed Action that would cause negative effects to land cover and habitats: (1) The end of December 2,888' msl elevation every year (regardless of drought status) and (2) the concept of matching Flathead Lake outflows with Kerr Project inflows (when lowering the target lake elevation to 2,892' msl for the recreation season is not sufficient to resolve conflicts).

A 2,888' msl end of December lake elevation exposes the shoreline and dock structures to additional erosion. This erosion has a negative effect on the near shore and shoreline habitats of Flathead Lake. Altering flow regimes to match outflows with inflows would create a more unstable hydrograph, creating variable habitat conditions in the Lower Flathead River.

Fisheries

The end of December lake elevation of 2,888' msl has the potential to increase erosion in the near shore area which can reduce water quality and silt in near shore aquatic habitats. Also, the Proposed Action does not propose to follow the minimum instream flows, but requires the license to match outflows with inflows. This unspecified flow regime could result in severely reduced flows for the lower Flathead River, increasing water temperature (and impacting other water quality parameters) and reducing fisheries habitat.

Terrestrial and Amphibious Species

Impacts to terrestrial and amphibious species would be similar to those discussed for the No-Action Alternative. There would be a potential for greater impacts to turtles and frogs inhabiting the lakeshore environment because the Proposed Action calls for a reduced summer lake elevation target of 2,892’ msl. Amphibious and aquatic reptilian species that live in or near the lower Flathead River would potentially experience a reduction in habitat caused by lower river flows during drought years.

Many terrestrial species depend upon the flood plain environment of the lower Flathead River. Lower flows that result from matching outflows to inflows would reduce flood plain habitats, thereby impacting wildlife and plants in this environment.

Avian Species

Impacts to avian species would be similar to those discussed for the No-Action Alternative. There would be a potential for greater impacts to waterfowl using lakeshore wetland habitat because the Proposed Action calls for a reduced summer lake elevation target of 2,892’ msl. Waterfowl using lower Flathead River habitat would potentially experience a reduction in habitat caused by reduced flows in drought years. The reduction in habitat would potentially increase intra-species and inter-species competition for nesting sites, foraging areas, and could reduce reproductive success during a drought year.

Species of Concern

Because the Proposed Action cannot be modeled, impacts to bull trout habitat can not be quantified. However, matching of outflows with inflows has the potential to create an unsteady and uncertain flow regime in the lower Flathead River, potentially impacting bull trout habitat.

Wetlands/Riparian Areas

Impacts to wetland and riparian areas would be similar to those discussed for the No-Action Alternative.

Flooding

The Proposed Action has the potential to reduce flood control by increasing the end of December lake elevation to 2,888’ msl. During non-drought years particularly, winter and early spring inflows to Flathead Lake may be sufficiently large to overwhelm available storage.

4.6.2.3 Alternative 1 (Minimum Instream Flows Precedence)

Alternative 1 is the only alternative that does not allow for a deviation from the minimum instream flow requirements of Article 56. Therefore, implementation of this alternative would have the least impact on the ecological environment below Kerr Dam. As noted in Section 4.2.2.3, modeling indicated that Alternative 1 would not have met target lake levels in 1940, 1941, 1944, 1977, and 2001. According to the model, the average June 15 to September 15 lake elevation in those years was slightly less than 2,890.1’ msl. For the drought years of 1973, 1987, 1988, 1992, and 1994, the average June 15 to September 15 lake elevation was just over 2892.7’ msl. During all of these drought years, minimum instream flows were met or exceeded.

Land Cover/Habitat

Impacts to lakeshore land cover and habitat would generally be similar to those discussed for the No-Action Alternative. While no two drought years are the same, drought years similar to 1940, 1941, 1944, 1977, and 2001 would result in temporary changes to land cover and habitat. No impacts to the riparian environment below Kerr Dam would be anticipated.

Fisheries

Fisheries impacts from Alternative 1 were quantified through the modeling approach discussed in the methods section above. Kerr Project releases were used to identify habitat availability/suitability for seven key fish species and 25 distinct life stages. Flow differences under Alternative 1 are associated with modifications to lake drafting and refill. As discussed in section 4.2.2.3, maintaining the lake at an elevation of 2,888' msl reduces flows during the winter and early spring months, and in situations where drought is incorrectly forecasted, can increase late spring and early summer flows.

Table 4-2 shows the percent of total habitat available using historic flow data and the model runs for Alternative 1 and Alternative 2 (it is important to note that these habitat percentages are averages over the water year 1940-2001 period of record; there is significant variability from year to year and on any given day within a year). As the table illustrates, 21 of the 25 distinct life stages have an increase in habitat at the Buffalo measurement site, 16 of the 25 at the Sloan site, and 18 of 25 at the Dixon site. Specifically, spawning and fry life stages are more likely to see habitat reductions; while juvenile and adult life stages are more likely to see increases in available habitat under Alternative 1.

Terrestrial and Amphibious Species

Impacts to terrestrial and amphibious species inhabiting lakeshore environments would occur during water years similar to 1940, 1941, 1944, 1977, and 2001. The lower summer pool elevations forecasted in these water years would impact near shore aquatic habitats although not to the same degree as the No-Action Alternatives (i.e., a higher pool elevation on December 31, as called for in the Proposed Action and Alternatives 1 and 2 during drought years, would help to reduce these effects to some degree). No impacts to species inhabiting the riparian environment of the lower Flathead River would be anticipated.

Avian Species

Impacts to avian species inhabiting lakeshore environments would occur during water years similar to 1940, 1941, 1944, 1977, and 2001. The lower summer pool elevation forecasted in these water years would impact near shore aquatic habitats, specifically wetland areas – although not to the same degree as the No-Action Alternative (as discussed above). No impacts to species inhabiting the riparian environment of the lower Flathead River would be anticipated.

Species of Concern

The primary species of concern that would be affected by drought management activities is the bull trout, as discussed above. Table 4-2 shows that Alternative 1, by maintaining downstream river flows, would result in a small increase in habitat availability for juvenile bull trout at all three fisheries study sites, and would result in a small increase in spawning habitat at two of the three study sites, with a small reduction in spawning habitat at the third study site when compared to the observed long term habitat at these study sites.

Wetlands/Riparian Areas

Impacts to lakeshore wetland areas would generally be similar to those discussed for the No-Action Alternative, and would tend to occur only during the drought years similar to 1940, 1941, 1944, 1977 and 2001. No impacts to the riparian habitat below Kerr Dam would be anticipated because the minimum instream flows would be met or exceeded.

As noted in Section 4.2.2.3, the implementation of Alternative 1 would result in maintaining a lake elevation of 2,888' msl during some or all of the January-April period if the climate indicators forecasted a drought. During drought years, this would preserve water to aid in lake refill later in the year. However, there are nine water years in which the climate indicators reverse and the DMP is discontinued. These years included 1945, 1953, 1958, 1964, 1966, 1970, 1980, 1993, and 1998. The higher pool elevation would require higher discharges in order to comply with the Article 43 flood control rule curves. Comparison of the model results with the historic release data for these years indicates that the volume of water discharged after April is similar, but the average daily flows would be higher under Alternative 1.

Flood Control

Alternative 1 alters flood-control operations identified in part under Article 43, but remains subject to USACE flood control authority. If drought conditions persist, Alternative 1 calls for a minimum lake elevation of 2,888' msl and for refill as soon as flood conditions allow, potentially exceeding 2,890' msl by May 31. Flathead Lake has a total storage capacity of 1.2 million acre-feet. In moderate to heavy flood years, Article 43 instructs the operator that upon the lake reaching an elevation of 2,886' msl, they are to gradually open the floodgates until such time as the danger of exceeding 2,893' msl has passed. This presumes that the lake has been drawn down prior to the peak of the flow reaching Flathead Lake. In most normal to wet years, Flathead Lake cannot be drafted to 2,883' msl because of a naturally occurring hydraulic restriction just upstream of Kerr Dam.

The effect of the restriction is demonstrated by the fact that the average minimum elevation between 1965 and 2004 for Flathead Lake was 2,884.5' msl. However, for the seven drought years, the average minimum elevation was 2,884' msl. In general, it is only during low baseflow/runoff conditions or a drought that Flathead Lake can be fully drafted to maximize its storage capacity for flood control.

Of particular concern to maintaining Flathead Lake at or above 2,888' msl is a water year that experiences a low snow pack, but short-term weather patterns resulting in above-average rain in late April and May. Alternative 1 does provide a means to anticipate this event.

USACE maintains operational responsibility for Flathead Lake's flood control pool throughout the year. Alternative 1 does not provide for forecasts beyond the April FPRI and the Official Runoff Forecasts and relies upon the flood control authority and expertise of USACE to guide flood-control operations throughout the year. The instructions relative to refilling provided for in Alternative 1 presume continued drought conditions and may be relaxed or abandoned should precipitation patterns change.

4.6.2.4 Alternative 2 (Minimum Instream Flows Variance Allowed)

Alternative 2 is essentially a modification of Alternative 1 that allows for a deviation from the minimum instream flow requirements of Article 56 when runoff predictions are less than 65 percent of normal as discussed in Chapter 2.0. The historical record from 1939 to 2001 indicates that a deviation would only have been called for in 1944, 1977, and 2001. As noted in section 4.2.2.4, modeling indicated that Alternative 2 would not have met target lake levels in 1940 and 1941, but as explained previously, the climate indicators were estimated for these water years. It is likely modern data collection would have detected the severity of the drought. According to the model, the average June 15 to September 15 lake elevation in those years was slightly less than 2,889.8’ msl. For the other drought years (1944, 1973, 1977, 1987, 1988, 1992, 1994, and 2001) the average June 15 to September 15 lake elevation was just over 2,892.7’ msl.

Land Cover/Habitat

Modeling has shown that Alternative 2 results in generally meeting the lake level targets. No impacts are anticipated for habitats in and around Flathead Lake. For water years similar to 1944, 1977 and 2001, there would be a reduction in minimum instream flows in the lower river. During those water years, riparian habitats would likely not be inundated, creating a temporary impact to those resources.

Fisheries

Similar to Alternative 1, the fisheries impacts associated with Alternative 2 were quantified through the described modeling approach. Under Alternative 2, variations in river flow would generally be similar to Alternative 1, except for water years similar to 1944, 1977, and 2001 during which the minimum flow release would be capped at 8,000 cfs. As noted in section 4.2.2.4, deviations from the minimum instream flows would have been called for in those three years under Alternative 2. The resulting differences in available suitable habitat (shown in Table 4-2), illustrates the sensitivity of fisheries habitat to changes in flow. The impacts to long term fisheries habitat of Alternative 2 would be very similar to those of Alternative 1. The low frequency of a minimum instream flow diversion does not appear to cause dramatic changes in long term habitat availability. However, it does greatly assist in meeting target lake levels while at the same time preserving fisheries habitat.

Terrestrial and Amphibious Species

Modeling has shown that Alternative 2 generally meets the lake level targets. No impacts are anticipated to terrestrial and amphibious species in and around Flathead Lake. For water years similar to 1944, 1977, and 2001, there would be a reduction in minimum instream flows in the lower river. During those water years, riparian habitats would likely not be inundated, creating a temporary impact to those resources.

Avian Species

Modeling has shown that Alternative 2 generally meets the lake level targets. No impacts are anticipated for avian habitats in and around Flathead Lake. For water years similar to 1944, 1977, and 2001, there would be a reduction in minimum instream flows in the lower river. During those water years, riparian habitats would not be inundated, creating a temporary impact to riparian wetland habitats. Water fowl species that rely on those riparian wetland habitats may be impacted in these water years.

Species of Concern

The primary species of concern affected by drought management activities is the bull trout, as discussed above. Table 4-2 shows that Alternative 2 would result in a small increase in habitat availability for juvenile bull trout at all three fisheries study sites, and would result in a small increase in spawning habitat at two of the three study sites, with a small reduction in spawning habitat at the third study site. The reduction in spawning habitat at the third site is less than 1 percent greater under Alternative 2 than Alternative 1.

Wetlands/Riparian Areas

Modeling has shown that Alternative 2 generally would result in maintaining lake level targets. No impacts are anticipated for habitats in and around Flathead Lake. For water years similar to 1944, 1977 and 2001, there would be a reduction in minimum instream flows in the lower river. During those water years, riparian habitats would likely not be inundated, creating a temporary impact to those resources.

Flood Control

Like Alternative 1, Alternative 2 alters flood-control operations. Should drought conditions persist, it calls for a minimum lake elevation of 2,888' msl and for refill to occur as soon as flood conditions allow, potentially exceeding 2,890' msl by May 31. Flathead Lake has a total storage capacity of 1.2 million acre-feet. In moderate to heavy flood years, Article 43 instructs the operator that upon the lake reaching an elevation of 2,886' msl, they are to gradually open the floodgates until the danger of exceeding 2,893' msl has passed. This presumes that the lake has been drawn down prior to the peak of the flow reaching Flathead Lake. In most normal to wet years, Flathead Lake cannot be drafted to 2,883' msl because of a naturally occurring hydraulic restriction just upstream of Kerr dam.

The effect of the restriction is demonstrated by the fact that the average minimum elevation between 1965 and 2004 for Flathead Lake was 2,884.5' msl. However, for the seven drought years, the average minimum elevation was 2,884' msl. In general, it is only during low base flow/runoff conditions or a drought that Flathead Lake can be fully drafted to maximize its storage capacity for flood control.

If the DMP proposed under Alternative 2 is terminated due to changing conditions, lake elevations – under very rare circumstances – may be more difficult to reduce, increasing the risk of flooding (see section 4.2.2.3 for a complete discussion).

4.7 TRIBAL RESOURCES IMPACTS

Chapter 3.0, Section 3.5, discusses the tribal resources that have been impacted by the construction and operation of the Kerr Project, and the relevant section 4(e) conditions in the current Kerr Project license for Drought Management Planning purposes. Changes in lake elevations and flow regimes from implementing the Proposed Action or Alternatives were examined to identify any potential interference with the 4(e) conditions, or negative impacts on the fish and wildlife species and associated habitat that the 4(e) conditions protect. Specifically, the Proposed Alternatives were reviewed to determine if implementation would result in:

- A deviation from the minimum instream flows (Article 56).
- A violation of between-day flow variation requirements (Article 57).
- A violation of hourly flow variation requirements (Article 58).
- Interference with the implementation of the fish stocking, supplementation, and reintroduction plan (Article 64).
- Interference with the protection and restoration of aquatic and riparian habitat on the south half of Flathead Lake and the lower Flathead River (Articles 65 and 67).

Impacts to tribal resources and other cultural resources were also considered in relation to the American Indian Religious Freedom Act (AIRFA – see section 4.12.1.4) and the National Historic Preservation Act (NHPA – see section 4.12.1.5). The Proposed Action and alternatives consider Kerr Project operational modifications that are within the limits of historical lake elevation and river flow maxima and minima. Implementation of the Proposed Action or alternatives would not result in higher lake elevations than those observed during the period of record since the Kerr Project was constructed. Similarly, implementation of the Proposed Action or alternatives would not result in greater flows in the lower Flathead River than those observed during the period of record. This indicates that no archaeological sites would be subject to additional erosion beyond that caused by the construction and operation of the Kerr Project; therefore no new impacts to sites eligible for the National Register of Historic Places are anticipated.

The implementation of the Proposed Action or alternatives would not likely inhibit or deny the CSKT’s inherent freedom to believe, express, and exercise their traditional religions or limit access to sites, use and possession of sacred objects, and the freedom to worship through ceremonial and traditional rites.

Previous sections have discussed in detail effects of the alternatives on the physical environment, land use, water quality, and ecological resources – all issues important to the Tribes. Generally, disproportionate effects to natural resources downstream from the Kerr Dam will have a disproportionate effect on the Tribes, even though they do benefit to some degree from achieving and maintaining lake levels, particularly during the recreation season. A discussion of possible disproportionate effects is included in Section 4.9.

4.8 SOCIOECONOMIC IMPACTS

This section describes the potential socioeconomic impacts that could occur as a result of implementing the Proposed Action or alternatives. For purposes of this analysis, socioeconomic impacts are those that could affect income and employment, property values, recreation and tourism, and power generation from the Kerr Project.

4.8.1 METHODS

This section describes the methods used to determine impacts to income and employment, property values, recreation and tourism, and power generation from the Kerr Project.

4.8.1.1 Income and Employment

A qualitative evaluation of the impacts on income and employment from the implementation of the Proposed Action and alternatives was made based on the potential for lake level and stream flow modifications to affect key employment sectors for the Flathead Lake area. As discussed in Chapter 3.0, Section 3.6.2, the 2006 data indicates that the top three employment and payroll categories for Flathead and Lake counties were retail trade, accommodation/food services, and health care/social assistance. Health care/social assistance is more dependent on the permanent resident base, while retail trade and accommodation/food services rely significantly on seasonal residents and tourists.

Chapter 3.0, Section 3.6.4, notes that from 1998 to 2004, state park and fishing access site visitation was lowest for both the state and for the Flathead Lake area in 2001, a relatively severe drought year. The EIS analysis assumes that DMP alternatives that result in more consistent and higher summer lake elevations would have a better chance of mitigating any impacts of drought on the local economy, and therefore, on income and employment.

Property Values

The Proposed Action or alternatives could impact property values by either making the property unavailable for its intended use or causing property damage due to erosion and ice damage from high year end water levels. For these reasons, inputs to the property value impact analysis include the results of Sections 4.4 (Land Use Impacts) and 4.5 (Water Quality Impacts). Since quantification of property value impacts can vary widely based on differences in valuation, a qualitative approach was used to indicate if there would be high, moderate, low, or no impacts to property value. In general, the temporary nature of drought impacts would not affect lakeshore property as such property is, and is likely to remain, in high demand. However, improvements such as lake access points and docks that are more susceptible to the effects of lower lake levels may make certain properties less desirable than those with deeper access or dockage. The susceptibility of a property to drought impacts would likely always have an impact on its value; however, the selection of a DMP that maintains higher and more consistent lake levels could have a mitigating effect.

Recreation and Tourism

Lake elevation frequency and duration curves were compared to tourism and recreation seasons; the impact analysis focused primarily on accessibility of the lake during periods of low lake elevation. In order to estimate the impact of various alternatives on near shore areas, low-level aerial photos were compared to the lake elevation model. Evaluation of this information allowed an estimate of the number of general use, public facilities, and commercial facilities affected by the Proposed Action and each alternative. In addition, a qualitative assessment of the effects on employment in the tourism and recreation industries under the Proposed Action and alternatives was made.

Power Generation

Power generation levels under the Proposed Action and alternatives were estimated through review of modeled flow duration and frequency data. The overall magnitude change in anticipated power production and operations was summarized by season and annually. A qualitative assessment of the effect on power industry employment was made based on the results of the power generation impact analysis. The No-Action Alternative, the Proposed Action, and Alternative 1 all generally maintain similar power generation potential. Alternative 2, the preferred alternative, reduces minimum instream flow releases which reduces power output only a limited number of drought years.

4.8.2 ALTERNATIVES

This section describes potential socioeconomic impacts that could occur under each of the alternatives.

4.8.2.1 No-Action Alternative

Income and Employment

As discussed in Section 4.2.2.1, continued implementation of the No-Action Alternative could result in a failure to achieve target summer lake elevations during drought conditions, as observed in 2001. The effect of these lower lake elevations on the local economy cannot be quantified due to a number of offsetting variables (for example, the loss of regional tourism during a drought could be offset by the number of local and regional residents focusing their recreation on the lake as it would remain open for recreation during drought conditions, rather than forest areas that may be closed due to concerns over fires) and uncertainties regarding the cause and effect relationship of lake levels and employment/income. Qualitatively, however, continued implementation of the No-Action Alternative would be less likely to mitigate local economic impacts of drought than an alternative that would maintain consistent and higher lake levels and would provide a measure of certainty to area residents.

Property Values

In general, property values in the study area have been growing as discussed in Chapter 3.0, Section 3.6.3. As discussed above, the temporary impacts of drought are unlikely to significantly affect the growth trend of lakeshore property values. However, local variability in lakeshore property value could be affected by continued implementation of the No-Action Alternative if lake elevations consistently fail to meet summer targets during drought years. Review of bathymetric mapping and a near shore bathymetric model of Flathead Lake indicate that the areas most likely to be affected by lower lake levels are docks and access points near:

- Somers,
- Bigfork,
- The point near Woods Bay,
- The southern end of Skidoo Bay,
- The southeastern portion of East Bay,

- The western end of Big Arm Bay,
- The Dayton area, especially near Cromwell Island,
- The inlet off of Shelter Bay near Rollins,
- Hughes Bay, and
- Peaceful Bay near Conrad Point, south of Lakeside.

Not all docks and access points in these areas would necessarily be affected by lower summer lake levels; the bathymetric data only identifies areas that generally are shallower.

Recreation and Tourism

Effects on recreation and tourism from continued implementation of the No-Action Alternative have been partially addressed in the income/employment and property value discussion above. Additional impacts would include loss of access to those public and commercial access points that would be affected by low water levels. The lake accesses at the following locations require a lake elevation of at least 2,890'msl:

- Finley Point State Park,
- Bigfork Fishing Access Site,
- Ducharme Fishing Access Site (good only at full pool – hand launch),
- Woods Bay Marina,
- Bigfork Marina, and
- Marina Cay.

During a severe drought year, summer lake elevations near 2,890' msl would prohibit larger boats from using most of these access points. Lake elevations below 2,890' msl would generally prohibit all watercraft from using these access points. In 2001, from June 15 to September 15 the average lake elevation was approximately 2,891.7' msl, with a high just under 2,982.7' msl (June 18) and a low of 2,891' msl (September 15).

Power Generation

Power generation potential at the Kerr Project would be affected under the No-Action alternative. Without the climate indicators for drought management, additional flexibility to manage power generation at Kerr would be lost.

4.8.2.2 PPL Montana's Proposed Action

Income and Employment

As discussed in Section 4.2.2.2, PPL Montana's Proposed Action includes a lower summer lake level target of 2,892' msl, potential minimum instream flow deviations, and supplemental water from Hungry

Horse Reservoir. As previously discussed, this alternative cannot be reliably modeled. However, the end of December elevation of 2,888' msl annually has the potential in itself to increase lake shore erosion and damage docks which could lead to increased expenditures in dock and shoreline repairs, creating additional economic activity for this type of work – albeit at a substantial costs to property owners.

Property Values

As discussed above, there could be additional damages to lake shore property under the proposed action which could affect property values. Many aspects of this plan cannot be implemented, however, and conflicts between minimum instream flows and lake levels are likely to continue. This uncertainty could have a negative impact on property values.

Recreation and Tourism

Impacts to recreation and tourism would be similar to those noted for the No-Action Alternative. No public access points other than the Ducharme Fishing Access site would be affected by a summer lake elevation of 2,892' msl – provided this elevation could be maintained. As discussed previously, however, maintaining this level is unlikely under the Proposed Action.

Power Generation

Impacts to power generation from the Proposed Action would be similar to those for the No-Action Alternative. The proposed action requires an end of December elevation of 2,888' msl annually which reduces operational flexibility and may have short term impacts on generation.

4.8.2.3 Alternative 1 (Minimum Instream Flows Precedence)

Income and Employment

Income and employment impacts under Alternative 1 would be reduced relative to the impacts of the No-Action Alternative. Specifically, Alternative 1 reduced the likelihood of having conflicts in water years where the droughts are similar to 1940, 1941, 1944, 1997, and 2001. As noted previously, the model of Alternative 1 indicates that the average summer lake elevation for these drought years is slightly less than 2,890.1' msl. This elevation would likely have impacts to commercial and recreational use of the lake and thereby have impacts on income and employment. In other drought years, no impacts would be anticipated as the model indicates that the average summer lake elevation would be approximately 2,892.7' msl.

Property Values

Property value impacts under Alternative 1 would be similar to, although less extensive than the No-Action Alternative. Based on the relationship between property values and lake levels, impacts would be limited to situations represented by water years 1940, 1941, 1944, 1997, and 2001. This reduces the frequency of long-term property impacts, lessening the overall effect on value.

Recreation and Tourism

Recreation and tourism impacts would be limited to water years similar to 1940, 1941, 1944, 1997, and 2001. No effects on the lower Flathead River would be expected as the minimum instream flows would be met. However, failure to meet lake levels may reduce user visits to Flathead Lake and reduce sport fishing charters and certain tour operations (e.g., deep draft sail boat tours and charters).

Power Generation

Power generation would be somewhat improved under Alternative 1 given the limited use of the higher end of December lake elevation and the requirement to meet instream flows during the summer (all instream flows are discharged through the powerhouse).

4.8.2.4 Alternative 2 (Minimum Instream Flows Variance Allowed)

Income and Employment

Alternative 2 modeling indicates that the average summer lake elevation for eight of the ten drought years between 1939 and 2001 would have been approximately 2,892.7' msl. Only in the model runs for 1940 and 1941 were summer lake elevations low (approximately 2,889.8' msl); as discussed in section 4.2.2.4, this may be due to a lack of accurate historical climate data and it is anticipated that modern forecasting would have correctly forecasted the drought. Therefore, income and employment impacts from Alternative 2 are not anticipated as lake levels would fully support commercial operations on Flathead Lake. The flow deviations for water years, 1944, 1977, and 2001 forecasted by the model primarily affect riparian habitats along the lower Flathead River and are not anticipated to have an impact on area income and employment.

Property Values

No property value impacts are anticipated as a result of implementing Alternative 2, since low summer lake levels would be highly infrequent.

Recreation and Tourism

No impacts to recreation and tourism are anticipated as a result of implementing Alternative 2, since low summer lake levels would be highly infrequent.

Power Generation

Alternative 2 modeling shows that releases in the January-April period would be between 3,200 cfs and approximately 8,000 cfs, which would limit power production potential to 25 percent to 65 percent of turbine capacity. Furthermore, in non-drought years where the climate indicators forecasted drought for a portion of the January-April period, management of the lake at 2,888' msl would reduce flexibility in power production. For water years similar to 1944, 1977, and 2001, there would also be a reduced power production potential of about 65 percent of turbine capacity due to reduction in the peak minimum instream flows.

4.9 ENVIRONMENTAL JUSTICE IMPACTS

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (59 FR 7629), directs Federal agencies to identify and address, as appropriate, any activities that may adversely and disproportionately affect minority and low-income populations. The CEQ has published implementing guidance for assessing environmental justice in environmental impact statements (CEQ 1997). This section assesses whether minority and low-income populations would experience disproportionate adverse impacts as a result of the Proposed Action and alternatives. The minority population most likely to be adversely and disproportionately affected by the Proposed Action and alternatives would be Native American people living on the Flathead Reservation.

The CEQ guidance states that agencies should seek tribal representation when considering environmental justice impacts during the NEPA process in a manner that is consistent with the government-to-government relationship between the United States and tribal governments, the Federal government's trust responsibility to federally recognized tribes, and any treaty rights. This EIS has been prepared consistent with this guidance.

4.9.1 METHODS

Analysis of environmental justice impacts used U.S. Census Bureau data to identify the occurrence and geographic location of minority and low-income block groups in a defined environmental justice study area (Census Bureau 2000). The adverse impacts identified in the previous sections for the Proposed Action and alternatives were reviewed to determine if they would be felt disproportionately by residents in these block groups compared to the overall population in the study area.

To identify potential environmental justice impacts, BIA defined a study area that differed somewhat from the study area used for assessing impacts elsewhere in the EIS. The environmental justice study area used is shown in Figure 4-16. It encompasses the block groups that border Flathead Lake in Flathead and Lake counties and includes the entire Flathead Indian Reservation. This area, which includes almost all of Lake County and portions of Flathead, Sanders, and Missoula counties was delineated to encompass the geographic area where most minorities reside and also to include reservation land on both sides of the lower Flathead River. Based on Census 2000 data, the total population of this area was approximately 34,700, of which approximately 25 percent (8,600) were minorities, almost exclusively Native Americans. Approximately 70 percent (68.07 percent) of the people living on Flathead Indian Reservation land are white, that is, are not minorities. This is almost identical to the percent white population in Lake County.

Excluding most of Flathead County from the study area does not exclude any predominantly minority block groups and it only excludes one very sparsely populated (139 inhabitants) predominantly low-income block group located in northwest Flathead County bordering the North Fork Flathead River. The Flathead Indian Reservation includes almost all of Lake County and small portions of Flathead, Missoula, and Sanders counties. Consequently, the demographic characteristics of the reservation closely resemble those of Lake County.

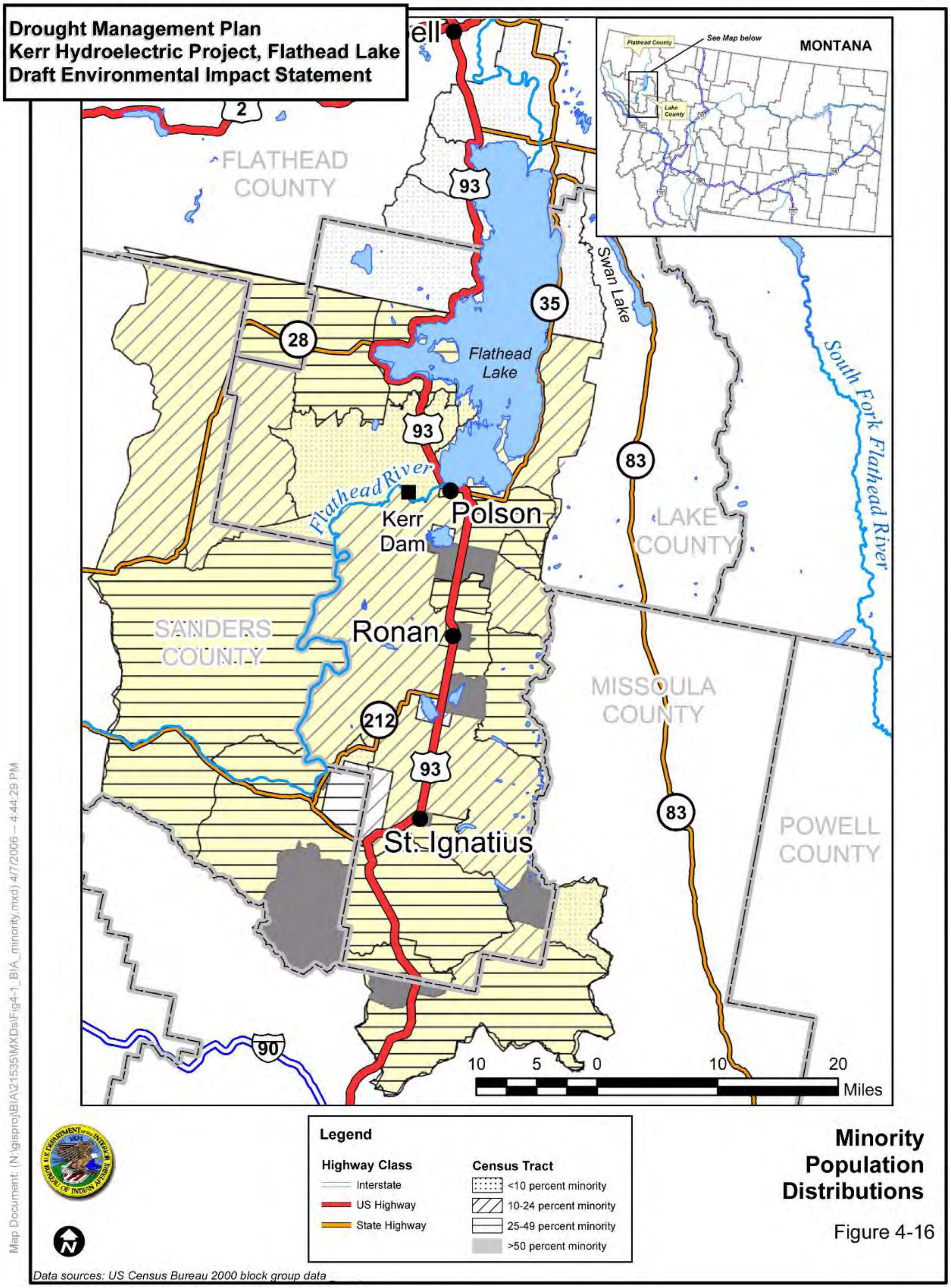
A minority has been defined as individual(s) who are members of the following population groups: American Indian or Alaska Native; Asian or Pacific Islander; Black, not of Hispanic origin, or Hispanic or Latino. A minority population has been identified where the minority population of the affected area exceeds 50 percent of the population. Low-income populations are groups with an annual income below the poverty threshold (Census Bureau 2005).

Census data are compiled at a variety of levels corresponding to geographic areas. In order of decreasing size, the areas used are national, states, counties, census tracts, block groups, and blocks. Census blocks are the smallest entity for which the Census Bureau collects and tabulates census information. Block groups are combinations of census blocks. Block groups generally contain between 600 and 3000 people and are made up of 40 census blocks on average. Because block data are so specific to the individuals within a block (for example, sometimes only one family may live in a block), income data are available only at the block group level and above. Block group data were used to illustrate the distribution of minority and low-income populations in the study area.

Demographic maps were prepared using Census 2000 block group minority population data. Figure 4-16 shows the distribution of minority populations in the study area, including block groups where minority populations represent more than 50 percent of the block group population. As shown in Figure 4-16, there are no block groups where minorities predominate within the portion of Flathead County included in the study area. This is also the case for all of Flathead County.

Eight census block groups having more than 50 percent minority populations are located on the Flathead Indian Reservation. As seen in Figure 4-16, these block groups are widely dispersed along the US 93 corridor south of Polson. These eight block groups have a total minority population of approximately 2,900, the number of minorities in these block groups ranges from 5 to 1,144, and the percent minority in these block groups ranges from 51 to 78. The total minority population in these eight block groups represents 8.4 percent of the total population in the study area and 34 percent of the total minority population in the study area. By comparison in 2000, statewide, minorities accounted for 9.4 percent of the population; Flathead County was 3.7 percent minority and Lake County was 28.6 percent minority (Table 3-11).

Figure 4-16: Minority Population Distributions

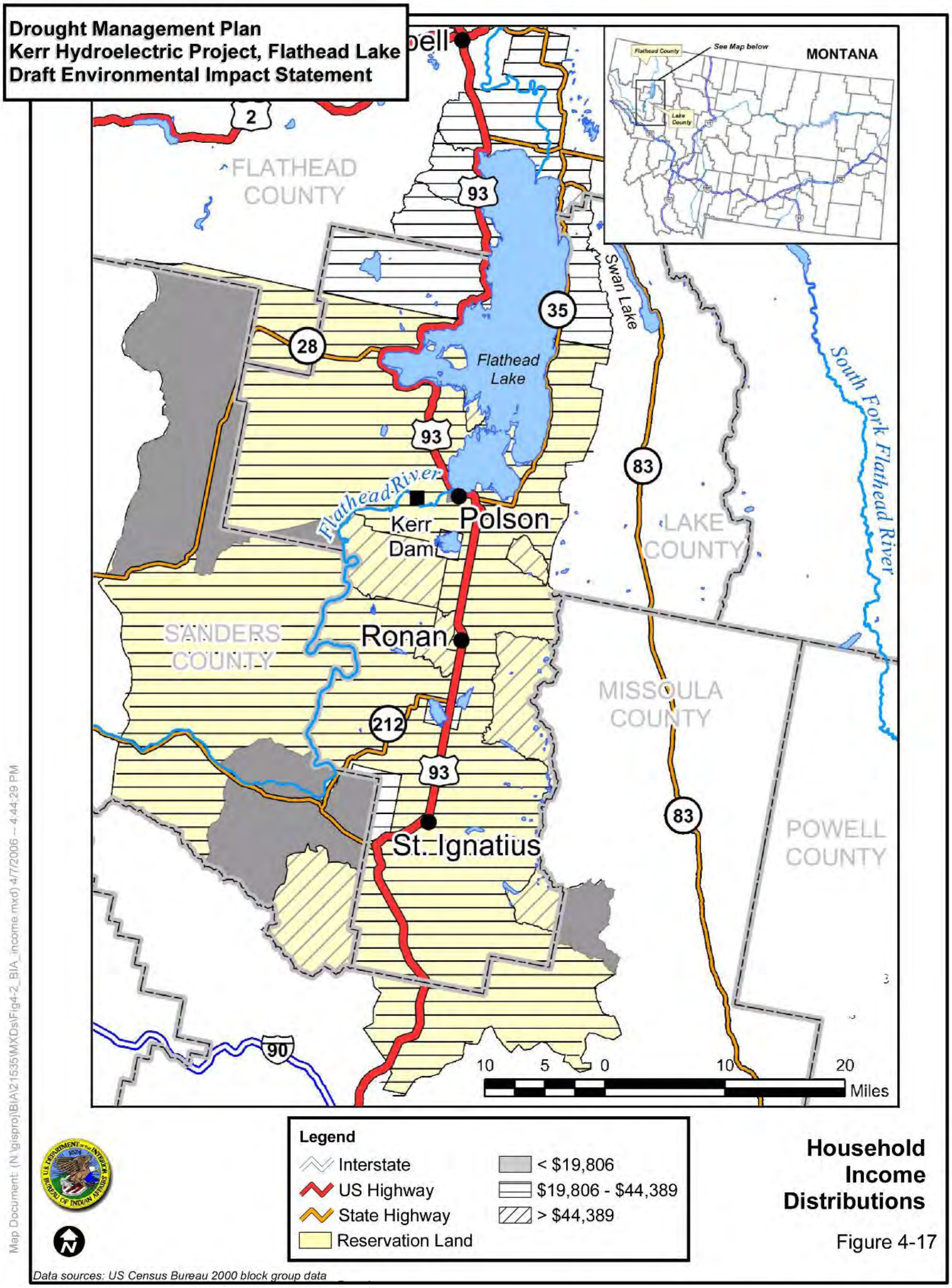


Demographic maps (Figure 4-17) were also prepared using Census Bureau poverty threshold data (Census Bureau 2005). For 2005, the Census Bureau established the poverty threshold for a family of four (2 children) as $19,806. This income threshold was used to identify block groups where low-income households represent more than 50 percent of the total block group population. There are six block groups in the study area where median incomes were below the $19,806 poverty threshold (2000 Census). None of these low-income block groups occurred in the Flathead County portion of the study. The low-income block groups on the Flathead Indian Reservation were widely dispersed geographically. The total low-income population was 2,324, which represents 6.7 percent of the total population in the study area and 27 percent of the total minority population in the study area. For comparison, the median household income (1999) was $33,024 statewide, $34,466 for Flathead County, and $28,740 for Lake County.

Although the aerial extent of the environmental justice study area is predominantly the Flathead Indian Reservation, the demographics and geographic distribution of predominantly minority block groups and predominantly low-income household block groups in this area support a conclusion that, with the exception of adverse impacts to Tribal Resources (Section 4.7), any adverse impacts resulting from the Proposed Action or alternatives would not disproportionately affect these groups. More than 75 percent of the population in the environmental justice study area is white and most of the households in this area have incomes well above the poverty level.

Flathead Lake and the lower Flathead River are the areas where Kerr Project Operational Impacts (Section 4.2), Physical Environment Impacts (Section 4.3), Land Use Impacts (Section 4.4), Water Quality Impacts (Section 4.5), and Ecological Resources Impacts (Section 4.6) from implementation of any DMP would be the greatest. None of the predominantly minority or low-income block groups border Flathead Lake. Impacts to the lower Flathead River, while not directly adjacent to the predominantly minority or low-income block groups, is an impact of importance relative to tribal trust resources. Socioeconomic Impacts (Section 4.8) would affect the entire study area equally. By definition, Tribal Resource Impacts (Section 4.7) would be impacts to a minority population.

Figure 4-17: Household Income Distributions



4.9.2 ALTERNATIVES

The majority of the impacts associated with implementation of the Proposed Action or alternatives would not fall disproportionately on minority or low-income populations, as discussed above. However, the potential for deviating from the minimum instream flows exists in three of the four alternatives. The minimum instream flows are part of the section 4(e) conditions developed by the Secretary for the protection of tribal resources. Deviating from the minimum instream flows would affect the downstream aquatic environment and fisheries in the lower Flathead River as discussed in Sections 4.6 and 4.7.

4.9.2.1 No-Action Alternative

The No-Action Alternative resulted in a deviation from the minimum instream flows in 2001; such deviations would potentially occur in future drought years, especially if the drought were severe. Impacts to the aquatic environment and fisheries would fall predominantly on the minority population of the Flathead Reservation.

4.9.2.2 PPL Montana's Proposed Action

Similar to the No-Action Alternative, PPL Montana's Proposed Action could result in deviation from minimum instream flows in the case of a more severe drought. As discussed in Section 4.9.2.1, the impacts of a minimum instream flow deviation would fall predominantly on the minority population of the Flathead Reservation.

4.9.2.3 Alternative 1 (Minimum Instream Flows Precedence)

Alternative 1 does not allow for deviations from minimum instream flow requirements, and would therefore not likely have impacts on the minority population of the Flathead Reservation. The exception to this would be in the most severe of drought years, where dropping lake levels could potentially fail to supply sufficient water to meet minimum instream flow requirements.

4.9.2.4 Alternative 2 (Minimum Instream Flows Variance Allowed)

Implementation of Alternative 2 could result in the deviation from minimum instream flows for water years similar to 1944, 1977, and 2001. The deviation in minimum instream flows in those water years would result in riparian habitats adjacent to the lower Flathead River not receiving spring flows. This would have temporary/seasonal effects on these environments. As discussed in Section 4.9.2.1, the impacts of a minimum instream flow deviation would fall predominantly on the minority population of the Flathead Reservation whose tribal resources would be impacted.

4.10 CUMULATIVE EFFECTS

4.10.1 INTRODUCTION AND IDENTIFICATION OF ACTIVITIES

CEQ regulations implementing the procedural provisions of NEPA require Federal agencies to consider the cumulative impacts of a proposal (40 CFR 1508.25[c]). A cumulative impact on the environment is the impact that would result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-federal) or person undertakes such other actions (40 CFR 1508.7). This type of assessment is important because significant cumulative impacts can result from several smaller actions that by themselves do not have significant impacts.

To identify past, present, or reasonably foreseeable future actions that could result in incremental cumulative impacts, BIA consulted representatives of several organizations familiar with the study area. These included the City of Polson, the CSKT, the Flathead Lakers Association, the Flathead Basin Commission, PPL Montana, and the Montana Department of Transportation. These consultations identified six current or future activities for consideration in the cumulative impact analysis. The first of these, rapid regional growth, was the most frequently cited activity.

- Rapid regional growth
- Hungry Horse Project flood control and fish operations
- Pacific Northwest Coordinating Agreement
- Flathead Indian Irrigation Project
- New domestic water treatment plant
- Upgrades to Kerr Project turbines

4.10.2 DESCRIPTION OF ACTIVITIES AND POTENTIAL CUMULATIVE IMPACTS

This section describes present and future actions that could, along with implementation of a DMP, result in cumulative environmental impacts.

4.10.2.1 Rapid Regional Growth

Flathead County and Lake County are two of the fastest growing counties in Montana. The populations of both counties grew by approximately 26 percent from 1990 to 2000. From April 1, 2000, to July 1, 2004, Flathead County grew by 9.1 percent and Lake County by 5.1 percent (Census Bureau 2000). The population of Polson grew by more than 11 percent between 2000 and 2003. Completion of the upgrade to US 93 from Evaro to Polson (the People's Way) will result in an improved highway transportation system that is used by the growing population. Improvement of US 93, with reduced travel time and improved driving conditions and convenience will combine with factors such as rural lifestyle, natural environments, and small town atmosphere to further increase the desirability of the area as a place to live (DOT et al. 1996).

The rapidly growing population in Flathead and Lake counties is creating an ever-growing demand for more housing, infrastructure, and water. It is also putting pressure on natural resources including ground and surface water, air quality, wildlife and wildlife habitat, and agricultural resources. Lake County adopted a growth policy in 2003 and Flathead County adopted a growth policy in 2007. In addition to an increasing overall demand for limited water, if DMP provisions were implemented, any adverse impacts that might result would be felt by more people as the regional population continues to grow.

4.10.2.2 Hungry Horse Project Flood Control and Fish Operations

The Hungry Horse Project is described in Chapter 3.0, section 3.1.4. USACE has released a final EIS to assess the potential effects of a proposed Federal action and alternatives related to flood control operations on the Upper Columbia River, including the Hungry Horse Project (USACE 2006). USACE's FEIS addresses the proposed PPL Montana DMP as a cumulative impact and states that implementation of VARQ flood control at the Hungry Horse Project could improve the probability of refill at Flathead Lake by moving winter Hungry Horse Reservoir releases to the spring refill period. It also states that BOR does not anticipate the DMP to have any effects on implementation of VARQ flood control at Hungry Horse (Ibid).

4.10.2.3 Pacific Northwest Coordinating Agreement

The Pacific Northwest Coordinating Agreement (PNCA) was established as an outgrowth of the Columbia River Treaty, which was signed by Canada and the United States in 1961. The PNCA is a complex arrangement that was signed in 1964 by BOR, BPA, USACE, and 15 public and private generating utilities. Its purpose is to coordinate the release of stored water at major U.S. generating facilities as if they belonged to a single owner, in order to maximize usable energy and the Canadian Entitlement under the treaty. By 1992, the PNCA covered 120 hydroelectric projects in Washington, Idaho, Oregon, and Montana. Execution of the original PNCA began in August 1964 and terminated on June 30, 2003. A new PNCA was signed on June 18, 1997 (with an implementation date of August 2003) and expires September 15, 2024. The 1997 PNCA agreement replaces the 1964 agreement and is substantively the same. PPL Montana and BOR are the operators of the Kerr and Hungry Horse projects, respectively, and both organizations are parties to the PNCA. A section-by-section discussion of PNCA provisions and operations was published in 1993 (DOE et al. 1993).

Each year, an annual operating plan (commencing August 1 and concluding July 31) is drawn up for the entire Columbia River basin. The plan is developed by representatives from each participating utility under the auspices of the Northwest Power Pool, which also helps coordinate transmission concerns. Each PNCA party is responsible for submitting annual data about its projected load and hydraulic resources. Studies conducted during plan development determine system firm energy load carrying capability and required levels for each storage reservoir to assure meeting firm load; energy exchanges among PNCA participants; headwater benefits; and rights and obligations of each party for use of headwater project storage. During real-time operations, twice-monthly studies called the "Actual Energy Regulation" are used to change system operation and update draft rights in response to new streamflow forecasts.

Though the PNCA's purpose is coordinated use of resources for power generation, it operates within a framework of other obligations previously committed to by the various parties.

Individual project licenses or Federal authorizing legislation may impose requirements for use of a certain amount of each project's power, or could mandate water levels for navigation, flood control, water supply, recreation, and fish protection. In addition, other non-power requirements can affect individual project operations as reservoir owners attempt to comply with regional processes such as the Northwest

Power Planning Council's salmon recovery program. Individual projects may also be committed to other fish and wildlife agreements that require specific project operations. Power optimization takes place only after non-power requirements (NPRs) are accommodated. While drought management is not specifically cited as an NPR, it is fully consistent with other NPRs discussed in the PNCA guidance.

PNCA considerations are one of many regional and local factors integrated into the Kerr and Hungry Horse project licenses. However, power obligations under PNCA appear to be subordinate to NPRs, such as implementation of a DMP. Consequently, impacts from PNCA operations do not appear to represent a significant incremental impact to DMP implementation impacts.

4.10.2.4 Flathead Indian Irrigation Project

The Flathead Indian Irrigation Project (FIIP) is located on the Flathead Indian Reservation. There are approximately 135,000 total irrigated acres in the project. In addition to providing irrigation water, the FIIP maintains minimum instream flow levels on streams designated and identified by BIA and the CSKT. Approximately 10 percent of the Project's irrigated lands are held in trust by the United States for the benefit of individual Indian landowners and for the CSKT. FIIP facilities include 17 major storage reservoirs, 1,300 miles of canals and laterals and more than 10,000 structures.

The primary source of the water for the FIIP is runoff from the Mission Mountains, which is collected in reservoirs and allocated during the growing season. In general, water from Flathead Lake or the lower Flathead River is not a source of FIIP irrigation water. Generally operation of FIIP would not be expected to significantly affect water resources in the lake or river, although future system upgrades could enhance the overall system efficiency and therefore provide some relief to the demand for irrigation water during periods of drought.

The only infrastructure element connecting the FIIP and Flathead Lake is the Flathead River Pumping Plant located approximately three miles above Kerr Dam on the Flathead Lake forebay. This plant pumps water from the forebay and delivers it via the Pump Canal to the Pablo Reservoir[16] on a seasonal basis. Historically, the pumping station was used only during drought periods to increase water levels in the reservoir. In more recent times it has also been used annually to recharge the reservoir before and after the irrigation season. The maximum pumping rate is 210 cfs, which would remove approximately 420 acre-feet per day. The station typically operates for 90 days a year, which would result in the removal of approximately 37,800 acre-feet annually assuming 24 hr/day operation. FIIP and Kerr Project operating procedures limit the withdrawal to 50,000 acre-feet during any one season. (Corville 2006)

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16 Pablo Reservoir comprises approximately 75 percent of the area of the Pablo National Wildlife Refuge. It is on the Flathead Indian Reservation approximately 2 miles south of Polson, MT. The refuge was established in 1920 by Executive Order 3504 as a refuge and breeding ground for domestic birds. It is operated by the USFWS under agreement with the BIA/FIIP and the CSKT. The BIA/FIIP manages the reservoir for irrigation and flood control. It is the largest reservoir supplying water for the FIIP.

The total volume of water in Flathead Lake is approximately 5.6 cubic miles, or about 19 million acre-feet (University of Montana 2006): http://www.umt.edu/flbs/AboutFLBS/FlatheadLake.htm. The surface area of Pablo Reservoir is approximately 1,850 acres, which is less than 2 percent of the area of Flathead Lake. The amount of water withdrawn from Flathead Lake to recharge Pablo Reservoir will vary annually depending on irrigation requirements and weather. However, the impact on lake water levels would be very minor given the relative volumes of water. For example, the 50,000 acre-foot annual withdrawal limit is less than 0.3 percent of the approximately 19 million acre-feet of water in the lake and withdrawn over the course of 3-4 months would not significantly impact lake water levels.

4.10.2.5 New Domestic Water Treatment Plant

Currently the City of Polson uses chlorinated well water (groundwater) as its domestic water source. The city is considering constructing a new domestic water treatment plant in the 5 to 10-year time horizon and is considering use of lake water instead of or in addition to groundwater. The site under consideration is approximately one-half mile south of the causeway on Flathead Lake. The design features of this plant have not yet been developed. However, if constructed, plant design and operations (for example intake locations) could be affected by changes in target lake water levels during drought periods. Also, if the city converted to use of treated lake water, it would represent an additional demand for lake water during drought. Currently, the city uses sedimentation and evaporation ponds for sewage treatment and there are no plans to change this. Consequently, there would not be cumulative impacts to water quality under existing plans.

4.10.2.6 Upgrades to Kerr Project Turbines

Two aspects of the Kerr Project license pose possible cumulative impact considerations. First, the CSKT, which is a co-licensee with PPL Montana with obligations under certain license articles, holds an option to assume full control of the project in 2015. If the CSKT were to exercise this option, they would be successor to all existing legal and regulatory obligations. For that reason, there would be continuity of operations at the Kerr Project, including implementing the operational provisions of a DMP. Consequently, transfer of the Kerr Project license to the CSKT does not pose a significant cumulative impact.

On May 2, 2006, PPL Montana applied to the Commission for a non-capacity related license amendment to authorize upgrading one of the existing plant turbines. According to PPL Montana, an upgraded turbine runner was installed in the fall of 2006 and increased generating capacity of that turbine from 70 megawatts to 82 megawatts. Because the upgraded turbine would be slightly more efficient, they could decrease the demand for water for power generation and therefore would be a beneficial cumulative impact with regard to drought management operations.

4.10.3 COMPARISON OF CUMULATIVE IMPACTS ON ALTERNATIVES

4.10.3.1 Rapid Regional Growth

Under the Proposed Action and for all alternatives, rapid regional growth would add to the overall regional demand for limited water resources. Flathead County has recently grown at almost twice the rate of Lake County and, the completion of US 93 improvements combined with other factors are expected to continue to stimulate region-wide growth and commuting throughout the Kalispell to Missoula corridor. Consequently, the ongoing rapid regional growth would be an adverse cumulative impact that would increase the pressure (including pollution from runoff and treated and untreated sewage, and demand for water for consumption and irrigation) on limited water resources about equally under any of the alternatives.

4.10.3.2 Flathead Indian Irrigation Project

As discussed in section 4.10.2.4, operation of the Flathead River Pumping station would have little or no effect on water levels in Flathead Lake. Any cumulative impact would be comparable for all alternatives.

4.10.3.3 New Domestic Water Treatment Plant

If the city of Polson were to construct a new domestic water treatment plant on Flathead Lake, the plant would be a new demand for lake water and as such would be a cumulative impact for water under any of the EIS alternatives. However, the impact on lake water levels would be very minor. Based on water usage models, Polson's domestic water usage is approximately 2 million gallons per day (Porrazzo 2006). This is approximately 2,240 acre-feet annually, which is approximately 0.01 percent of Flathead Lake's 19 million acre-feet volume. Lake water levels would not be noticeably impacted if the city used lake water rather than well water as its source of domestic water.

4.10.3.4 Upgrades to Kerr Project Turbines

Upgraded turbines at the Kerr Project would be slightly more efficient and would produce the same amount of power with slightly less water. This would increase power production potential, and would have a minor mitigative effect on the loss of power production potential if a minimum instream flow deviation were approved under the Proposed Action, No-Action Alternative, or Alternative 2.

4.11 UNAVOIDABLE ADVERSE EFFECTS, RELATIONSHIP BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND LONG-TERM PRODUCTIVITY, AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

NEPA and the CEQ regulations implementing NEPA require an analysis of unavoidable adverse effects, the relationship between short-term uses of the environment and long-term productivity, and significant irreversible or irretrievable effects resulting from implementation of proposed actions (40CFR 1502.16). This section addresses those potential impacts under PPL Montana's Proposed Action and the alternatives.

Unavoidable adverse effects arise from the fact that under drought conditions license requirements related to lake levels and minimum instream flows cannot both be met. Each alternative would result in impacts associated with deviations from these requirements. All alternatives would result in lower lake levels under more severe drought conditions; three of the alternatives establish revised lake elevation targets for the summer months. The only alternative that avoids the potential for impacts to the Flathead River below Kerr Dam from minimum instream flow deviations is Alternative 1.

Implementation of a DMP under any of the alternatives would require addressing the short-term need to maintain lake levels during the summer recreation season and the long-term productivity of environmental resources, including bull trout, downstream from Kerr Dam. Deviating from the minimum instream flows, as would be allowed under the Proposed Action, No-Action Alternative, and Alternative 2, would affect the downstream aquatic environment and fisheries in the lower Flathead River as discussed in Section 4.6. In addition, reduction of minimum instream flows would have a seasonal impact on tribal resources as discussed in Section 4.7. The purpose of the section 4(e) conditions is to mitigate for the impacts to tribal resources from Kerr Project operations, and to minimize or avoid future impacts. Any DMP that significantly jeopardizes the protection and utilization of tribal resources must be carefully considered before implementation (see Section 4.7 for more information).

Resources that are irreversibly or irretrievably committed to a project are those that are typically used on a long-term or permanent basis. In addition, those resources used on a short-term basis that cannot be recovered (such as metal, wood, fuel, paper, and other natural resources) are also irretrievable. Human labor is also considered an irretrievable resource. These resources are irretrievable in that they would be used for one project when they could have been used for other purposes. Another impact that falls under the category of irretrievable commitment of resources is the destruction of natural resources that could limit the range of potential uses of that particular environment.

The Proposed Action and alternatives analyzed in this EIS do not involve the use of any significant physical resources such as building materials, fuel, or other natural resources, nor do they entail the commitment of labor or a take of protected species. In essence, the Proposed Action and alternatives are alternate management plans for allocating water in times of drought. The physical apparatus and workforce that would be used in implementing these alternatives are already in place and operational. Moreover, any action undertaken pursuant to a DMP would, by definition, be reversible at such time as the region was no longer experiencing drought conditions or at such time as the DMP was changed or rescinded. The only manner in which the management of water resources could be considered irreversible is in the case of a drought where water released through the Kerr Project would not be available for use in managing lake levels. The analysis of such impacts, as well as the impacts to the downstream environment, is the focus of and is discussed in detail in the previous sections of this EIS.

For these reasons, neither PPL Montana’s Proposed Action nor the alternatives analyzed in this EIS would result in any significant irreversible or irretrievable commitment of resources.

4.12 COMPLIANCE WITH APPLICABLE FEDERAL ENVIRONMENTAL STATUTES AND REGULATIONS

This section discusses laws, regulatory requirements, orders, and licensing authorizations that may be applicable to the preparation of this EIS or the implementation of the DMP.

4.12.1 FEDERAL LAWS AND REGULATIONS

4.12.1.1 National Environmental Policy Act (42 U.S.C. §§ 4321 et seq.)

NEPA and CEQ regulations (40 CFR 1500-1508) require that DOI to have an effective compliance program and implementing procedures and that its bureaus have similar programs and internal guidance. This includes issuing policy, technical, and procedural guidance; providing technical assistance; determining technical and procedural adequacy of certain environmental documents; resolving intra-Departmental differences that involve more than one program, Assistant Secretary, and interagency differences; conducting ongoing evaluation of compliance; and identifying problems, recommending solutions and implementing changes for improving Departmental and bureau compliance programs. NEPA and CEQ regulations affect many DOI activities and specifically require environmental impact statements for major DOI actions having significant environmental effects.

4.12.1.2 Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.)

The purpose of the ESA is to protect and recover imperiled species and the ecosystems upon which they depend. It is administered by the USFWS and the NMFS. The USFWS has primary responsibility for terrestrial and freshwater organisms, while the responsibilities of NMFS are mainly marine species and include salmon and steelhead. Under the ESA, species may be listed as either “endangered” or “threatened.” Endangered means a species is in danger of extinction throughout all or a significant portion of its range. Threatened means a species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. All species of plants and animals, except pest insects and non-native species, are eligible for listing as endangered or threatened.

Section 7 of the ESA requires Federal agencies to use their legal authorities to promote the conservation purposes of the law. This section also requires Federal agencies to consult with the USFWS or NMFS to ensure that actions they authorize, fund, or carry out will not jeopardize listed species. The consulting agency then receives a “biological opinion” on the proposed action. In cases where the USFWS or NMFS determines that the proposed action will jeopardize the species, they must offer “reasonable and prudent alternatives” to modify the proposed action to avoid jeopardy. The ESA also requires the designation of “critical habitat” for listed species when it is judged to be “prudent and determinable.” Critical habitat includes geographic areas that contain the physical or biological features essential to the conservation of the species and that may need special management or protection. Critical habitat designations affect only Federal agency actions or federally funded or permitted activities. Federal agencies are required to avoid “adverse modification” of designated critical habitat. Critical habitat may include areas not occupied by the species at the time of listing but that are essential to its conservation.

Kerr Project relicensing was conducted in the mid to late 1990s and involved detailed consultation with the USFWS and NMFS. Because there will be no effect on salmon and steelhead as a result of this DMP (i.e., all applicable NMFS BiOp requirements will be implemented without change), there is no need for further consultation regarding salmon and steelhead. The USFWS BiOp required completion of a DMP and required that plan to consider the needs of protecting bull trout during drought. The implementation of a DMP at the Kerr Project, and review of potential impacts to bull trout in this EIS fulfills that requirement. Therefore, no further consultation is necessary with USFWS for bull trout.

4.12.1.3 Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.)

The Fish and Wildlife Coordination Act provides the basic authority for the USFWS' and State fish and wildlife agencies to evaluate impacts to fish and wildlife from proposed water resource development projects. It requires that fish and wildlife resources receive equal consideration to other project features. It also requires Federal agencies that construct, license or permit water resource development projects to first consult with the USFWS (and NMFS in some instances) and state fish and wildlife agency regarding the impacts on fish and wildlife resources and measures to mitigate these impacts**.**

4.12.1.4 American Indian Religious Freedom Act of 1978 (42 U.S.C. 1996)

The American Indian Religious Freedom Act passed in 1978, clarifies U.S. policy pertaining to the protection of religious freedom. Despite its title, the law explicitly includes “the traditional religions of the American Indian, Eskimo, Aleut, and Native Hawaiians.” The special nature of Native American religions has frequently resulted in conflicts between Federal laws and policies and religious freedom. Some Federal laws, such as those protecting wilderness areas or endangered species, have inadvertently given rise to problems such as denial of access to sacred sites or prohibitions on possession of animal-derived sacred objects by Native Americans.

AIRFA acknowledged prior infringement on the right of freedom of religion for Native Americans. Furthermore, it stated in a clear, comprehensive, and consistent fashion the Federal policy that laws passed for other purposes were not meant to restrict the rights of Native Americans. The act established a policy of protecting and preserving the inherent right of individual Native Americans to believe, express, and exercise their traditional religions.

AIRFA is primarily a policy statement. Approximately half of the brief statute is devoted to congressional findings. Following those findings, the act makes a general policy statement regarding Native American religious freedom:

> ... henceforth it shall be the policy of the United States to protect and preserve for American Indians their inherent right to freedom to believe, express, and exercise the traditional religions of the American Indian, Eskimo, Aleut, and Native Hawaiians, including but not limited to access to sites, use and possession of sacred objects, and the freedom to worship through ceremonial and traditional rites [42 United States Code (U.S.C.) 1996].

The final section of the act requires the President to order agencies to review their policies and procedures in consultation with traditional native religious leaders.

4.12.1.5 National Historic Preservation Act, Section 106 (16 USC 470)

Section 106 of NHPA requires each Federal agency to identify and assess the effects of its actions on historic resources. The responsible Federal agency must consult with appropriate State and local officials, Indian tribes, applicants for Federal assistance, and members of the public and consider their views and concerns about historic preservation issues when making final project decisions.

Effects are most often resolved by mutual agreement, usually among the affected state's State Historic Preservation Officer or the Tribal Historic Preservation Officer, the Federal agency, and any other involved parties. The Advisory Council on Historic Preservation (ACHP) may participate in controversial or precedent-setting situations.

Section 106 applies when two thresholds are met: there is a Federal or federally licensed action, including grants, licenses, and permits, and that action has the potential to affect properties listed in or eligible for listing in the National Register of Historic Places.

Under section 106's implementing regulations, "Protection of Historic Properties" (36 CFR Part 800), ACHP is tasked with overseeing the section 106 review process; working with Federal agencies on programmatic solutions for integrating their missions and historic preservation needs; being the primary Federal policy advisor to the President and Congress; and providing training, guidance, and public information to make the section 106 review process operate efficiently and with full opportunity for citizen involvement.

4.12.1.6 Federal Power Act

See section 4.12.4.1.

4.12.1.7 Flood Control Act of 1944

See section 4.12.4.2.

4.12.2 MONTANA LAWS

4.12.2.1 Montana Water Use Act of 1973 (Mont. Code Ann. § 85-2-101 et seq.)

Water rights in Montana are regulated by the Montana Water Use Act. The Water Use Act sets up two methods for perfecting a water right. First, all water rights existing prior to July 1, 1973, must be perfected in one of a number of statewide adjudications (§ 85-2-211 et seq.). Pre-1973 domestic and livestock water uses are exempt from the adjudication process. A special water court, divided into four water divisions, was created to adjudicate pre-1973 water rights. Second, new or additional water right claims made after 1973 must be perfected by seeking a permit from the DNRC (§ 85-2-301 et seq.).

4.12.3 Executive Orders and Agency Guidance

4.12.3.1 Executive Order 11514 (Protection and Enhancement of Environmental Quality)

This Executive Order directs Federal agencies to continually monitor and control their activities to protect and enhance the quality of the environment and to develop procedures to ensure fullest practicable provision of timely public information and understanding of Federal plans and programs with environmental impact to obtain the views of interested parties.

4.12.3.2 Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands)

These two Executive Orders require Federal agencies to evaluate actions they may take to avoid, to the extent possible, adverse effects associated with direct and indirect development of a floodplain or a wetland. The study area for this EIS includes both floodplains and wetlands.

4.12.3.3 Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations)

This Executive Order requires each Federal agency to identify and address disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations. The study area for this EIS includes both minority and low-income populations.

4.12.3.4 Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments)

This Executive Order directs Federal agencies to establish regular and meaningful consultation and collaboration with tribal governments in the development of Federal policies that have tribal implications, to strengthen U.S. government-to-government relationships with Indian tribes, and to reduce the imposition of unfunded mandates on Indian tribes. The Proposed Action and alternatives evaluated in this EIS would affect the CSKT.

4.12.3.5 Council of Environmental Quality Environmental Justice Guidance under the National Environmental Policy Act 1997, Washington D.C.

Analysis for the EIS was conducted in accordance with this guidance.

4.12.3.6 Bureau of Indian Affairs NEPA Handbook 1994 (30 BIA Supplement 1)

Analysis for the EIS was conducted in accordance with this guidance.

4.12.4 Licensing Authorities

4.12.4.1 Kerr Hydroelectric Project (Federal Power Act)

Operation of the Kerr Project is authorized under the Federal Power Act, 16 U.S.C. §§ 791a-797, 798-824a, and 824b-825r, June 10, 1920, as amended. The Act provides for Federal regulation and development of water power and resources, authorizing the Commission to issue licenses for hydroelectric project works, including dams, reservoirs, and other works to develop and improve navigation and to develop and use power. Section 4(e) of the Federal Power Act authorizes the Secretary to include conditions in hydropower licenses for the protection and utilization of Reservations under his jurisdiction, including Indian Reservations. Under this authority, the Secretary required that certain articles be included in the Kerr Project license for the protection and utilization of the Flathead Indian Reservation. Among these license articles are Article 56, which requires minimum instream flow rates for the protection of fisheries and other resources in the Lower Flathead River below Kerr Dam; and Article 60, which requires the development and implementation of a DMP.

4.12.4.2 Hungry Horse Dam Hydroelectric Project (Flood Control Act of 1944)

Operation of the Hungry Horse Project is authorized under the Flood Control Act of 1944 (Public Law 329, 78th Congress, Second Session, approved June 5, 1944). Under the Act, the Secretary was authorized to "proceed as soon as practicable with the construction, operation, and maintenance of the proposed Hungry Horse Dam (including facilities for generating energy), to such height as may be necessary to impound not less than one million acre-feet of water." Hungry Horse Dam was subsequently constructed on the South Fork of the Flathead River, Montana. BOR operates the Hungry Horse Project and, in coordination with USACE under section 7 of the Flood Control Act of 1944, has responsibility for flood control operations.

CHAPTER 5.0 LIST OF PREPARERS

NAME / PROJECT ROLE	EDUCATION AND PROFESSIONAL EXPERIENCE
BUREAU OF INDIAN AFFAIRS	
BOB DACH **Hydropower Program Manager** **Division of Natural Resources** **Bureau of Indian Affairs**	Mr. Dach has participated in design, research and development, operations and maintenance, and extended monitoring of hydropower facilities for approximately 20 years. The focus of these efforts has been evaluating environmental effects from small diversion dams to large hydroelectric facilities and developing strategies to reduce long term impacts. He has held positions with the U.S. Army Corps of Engineers, NOAA (National Marine Fisheries Service), U.S. Fish and Wildlife Service, and the Bureau of Indian Affairs. Bachelor of Arts, Environmental, Populations, Organisms Biology, University of Colorado, 1988
JEFFERY LOMAN **Chief of Natural Resources** **Bureau of Indian Affairs** **Project Manager**	Mr. Loman has 17 years experience in environmental and natural resources management. Bachelor of Arts, Education, Northern Michigan University, 1978 CHMM, University of California, San Diego, 1992 Harvard Senior Executive Fellows, Harvard JFK School of Government, 2005
KIMBERLY OWENS **U.S. Department of the Interior** **Office of the Solicitor** **Legal Review and Editing**	Ms. Owens has over 14 years of experience in environmental law, including statutory and regulatory compliance issues associated with the National Environmental Policy Act, Endangered Species Act, Federal Power Act, and National Historic Preservation Act. Master of Laws, International Environmental Law, American University, 2004 Juris Doctor, Villanova University, 1995
HDR ENGINEERING, INC.	
BOB BEDUHN, PE Principal	Bob Beduhn is a senior vice president with more than 20 years experience in the water resources field. He has contributed to the development of HDR's national water resources program with extensive experience in the Midwest. Master of Science, Civil Engineering, University of Minnesota System, 1998 Bachelor of Science, Civil Engineering, University of Minnesota System, 1990 Associate of Arts, Environmental Sciences/Studies (Environmental Analysis), Arrowhead Community College, Vermilion, 1985
ALLISON MacEWAN, PE Systems Analysis of Drought Management Alternatives	Ms. MacEwan has 23 years of civil engineering experience, focusing on project management, watershed planning and management, water resource engineering design, and the modeling of water resource systems. Master of Engineering, Civil Engineering (Environmental Engineering and Science), University of Washington, 1991 Bachelor of Arts, Civil Engineering (Engineering), Dartmouth College, 1986

NAME / PROJECT ROLE	EDUCATION AND PROFESSIONAL EXPERIENCE
JOHN HENZ Hydro-Climatology	Mr. Henz has been a successful consulting meteorologist in Colorado since 1973 and serves on the Statewide Flood/Drought Task Force and State Engineer's Extreme Precipitation Committee. He has led site-specific Probable Maximum Precipitation (PMP) projects in Colorado, Wyoming, Nevada, and Arizona. Master of Science, Atmospheric Science, Colorado State University, 1974 Bachelor of Science, Atmospheric Science (Meteorology), University of WI Madison, 1968
SCOTT REED, PG Project Manager	Mr. Reed has more than 20 years of experience in managing environmental projects including Environmental Impact Statements, Environmental Assessments, Environmental Assessment Worksheets, and wetland and water resource permitting Master of Business Admin, Environmental Management Concentration, University of St. Thomas, Minneapolis, 2002 Bachelor of Science, Geology, University of Minnesota, 1991
JANE GORDEN Technical Editing/Document Production	Ms. Gorden has more than 27 years administrative experience and 9 years experience in environmental report editing and production. Bachelor of Arts., English Language and Literature, University of Minnesota, 1980
SHANNA ADAMS, PE, CFM Water Resources	Ms. Adams has more than seven years of experience in the planning, design, and construction of engineering projects, which includes environmental impact analysis and documentation in accordance with the NEPA process and state environmental regulations. Bachelor of Science, Civil Engineering, University of Utah, 2003
CHAD BABCOCK Socioeconomic Resources	Mr. Babcock is an Environmental Scientist in HDR's Kansas City office with more than 10 years experience in environmental review and permitting. Bachelor of Science, Environmental Sciences/Studies (Natural Resources), University of Nebraska Lincoln, 1997
WILLIAM BADINI Hydro-Climatology	Mr. Badini's 14 years experience has been focused on hydro-meteorological services, including short-term heavy precipitation forecasting and post-event analysis. His forecasting experience also extends to long-range temperature/precipitation forecasts that impact interest in water supply and energy/weather derivative markets. Master of Science, Atmospheric and Oceanic Science, University of Wisconsin, Madison, 1999 Bachelor of Science, Atmospheric and Oceanic Science, University of Wisconsin, Madison, 1995
CAROL SERSLAND, AICP GIS	Ms. Sersland has 28 years experience as an environmental planner and scientist preparing field information, supporting public meetings, preparing application templates, and also providing engineering support Bachelor of Science, Recreation Resource Management, University of Minnesota System, 1981

NAME / PROJECT ROLE	EDUCATION AND PROFESSIONAL EXPERIENCE
FOAD HUSSAIN Water Resources	Mr. Hussain has a bachelor and masters degree in Civil Engineering and experience in water resources, hydraulics, hydrology, and variety of environmental issues. Bachelor of Science, Civil Engineering, University of Engineering and TE, 2002 Master of Civil Engineering, Civil Engineering (Water Resources, Civil Engineering), University of Minnesota System, 1900
CONNIE HEITZ Senior Environmental Planner	Ms. Heitz has 21 years experience participating in and managing NEPA and other environmental planning projects. Master of Public Affairs, Environmental and Natural Resource Management, Indiana University, 1990 Bachelor of Science Public Affairs, Indiana University, 1985.
BATTELLE MEMORIAL INSTITUTE	
WILLIAM FALLON **Cumulative Impacts and Environmental Justice**	Mr. Fallon has 29 years experience in environmental documentation. Ph.D. Pharmaceutical Sciences, 1979 Bachelor of Arts, Biology, 1968
LUCINDA LOW SWARTZ, ESQ. **Quality Control**	Ms. Swartz has 30 years experience in environmental and quality assurance review. (In 2008, Ms. Schwartz left the Battelle Institute to open her own environmental consulting firm.) Bachelor of Arts, Political Science and Administrative Studies, 1976 Juris Doctor, 1979

CHAPTER 6.0 LIST OF RECIPIENTS

Copies of this Final Environmental Impact Statement have been sent to the following agencies, organizations, and individuals:

U.S. Department of the Interior
Office of Environmental Policy and Compliance
1849 C Street NW – MS 2342
Washington, DC 20240

(Note: OEPC distributes the DEIS document to bureaus and services under DOI management)

U.S. Department of the Interior
Bureau of Reclamation
Northwest Regional Office
1150 North Curtis Road, Suite 100
Boise, ID 83706-1234

U.S. Environmental Protection Agency
Office of Federal Activities
EIS Filing Section
Ariel Rios Building, Room 7220
1200 Pennsylvania Avenue NW
Washington, DC 20004

U.S. Environmental Protection Agency
Region 8 (8EPR-N)
999 18th Street, Suite 300
Denver, CO 80202-2466

U.S. Army Corps of Engineers
Northwestern Division
Columbia Basin Water Management Division
P.O. Box 2870
Portland, OR 97208-2870

U.S. Army Corps of Engineers
Seattle District
P.O. Box 3755
Seattle, WA 98124-3755

U.S. Fish and Wildlife Service
Ecological Field Services Office
780 Creston Hatchery Road
Kalispell, MT 59901

Montana Department of Environmental Quality
1520 East Sixth Avenue
P.O. Box 200901
Helena, MT 59620-0901

National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northwest Regional Office
7600 Sand Point Way NE
Seattle, WA 98115-0070

Federal Energy Regulatory Commission
Mail Code: DHAC, PJ-12.3
888 First Street NE
Washington, DC 20426

Confederated Salish and Kootenai Tribes
Natural Resources Department
301 Main Street
Polson, MT 59860

Senator Max Baucus
511 Hart Senate Office Building
Washington, DC 20510

Senator Jon Tester
Senate Dirksen Building
Room B40 E
Washington, DC 20510

Representative Dennis Rehberg
516 Cannon House Office Building
Washington, DC 20515

State of Montana
Office of the Governor
Montana State Capitol Building
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Helena, MT 59620-0801

PPL Montana
45 Basin Creek Road
Butte, MT 59701

Montana Department of Fish, Wildlife and Parks
1420 East Sixth Avenue
P.O. Box 200701
Helena, MT 59620-0701

Montana Historical Society
State Historic Preservation Officer
P.O. Box 201201
225 North Roberts
Helena, MT 59620-1201

Montana Department of Natural Resources and Conservation
1625 Eleventh Avenue
Helena, MT 59620

Flathead Lakers
Executive Director
P.O. Box 70
Polson, MT 59860

Flathead Joint Board of Control
P.O. Box 639
St. Ignatius, MT 59865

National Organization to Save Flathead Lake
P.O. Box 1834
Bigfork, MT 59911

In addition, the Bureau of Indian Affairs has posted an electronic copy of this FEIS on the project website (www.flatheadlake-eis.com).

CHAPTER 7.0 PUBLIC INVOLVEMENT AND AGENCY COORDINATION

7.1 SCOPING

As part of the EIS process, BIA conducted scoping meetings and a series of public workshops. The purpose of these meetings and workshops was to solicit input from agencies and the public to help identify the relevant issues to address in the EIS. BIA used the input from the scoping process to develop a reasonable range of alternatives to the proposed Drought Management Plan for evaluation in the EIS.

BIA prepared a report, "Results of Scoping" issued August 8, 2003, to document the scoping process conducted for the EIS and the results of that process, including the comments received. The report also describes BIA's general approach for developing alternatives to the proposed Drought Management Plan. The report includes the following information related to the scoping process and development of the EIS:

- Background on the Kerr Project and the proposed Drought Management Plan
- List of cooperating agencies with BIA in preparing the EIS
- Description of BIA's outreach efforts, scoping meetings, and public workshops
- Summary of issues raised by agencies and the public during the scoping process
- Description of PPL Montana's proposed Drought Management Plan (Proposed Action)
- Description of the No Action Alternative
- Summary of BIA's process for developing alternatives
- Description of components of potential alternatives to be considered when developing a reasonable range of alternatives

7.1.1 SCOPING MEETINGS

The BIA held an agency scoping meeting to solicit agency input on PPL Montana's proposed Drought Management Plan. The meeting took place in Kalispell, Montana on July 9, 2002. Representatives from 13 Federal, tribal, state, and local agencies were present at the meeting. Participants offered a number of comments and recommendations regarding the NEPA process, the proposed Drought Management Plan, Kerr Project operations, the modeling process, and impacts to socioeconomic and environmental resources. The BIA considered these comments during development of the Draft EIS.

In addition, two public scoping meetings and four public workshops were held as follows:

- Agency Scoping Meeting, July 9, 2002 – Kalispell, Montana
- Public Scoping Meetings, July 9-10, 2002 – Kalispell and Charlo, Montana
- Drought Management Plan Alternative Development Workshop, August 27-28, 2002 – Kalispell, Montana

- Drought Management Plan Alternative Development Workshop – Phase 2, October 22-23, 2002 – Kalispell and Polson, Montana

Public comments during these meetings and workshops included questions about the NEPA process and the BIA's role in the process; increasing local involvement in the process; need for a Drought Management Plan; project history and particulars of the Kerr Project operations and license; alternatives and their development; concerns about lake level impacts; impacts to water, fish and wildlife resources, and tribal resources; and socioeconomic concerns. One of the key concerns mentioned during the scoping process was the need for early drought indicators. The BIA also considered these comments during development of the Draft EIS.

7.1.2 SCOPING COMMENT SUMMARY

The following are issues that various agencies raised during BIA's scoping process as well as in comments on PPL Montana's proposed Drought Management Plan and through correspondence.

Drought Management Plan Development and NEPA Process

- Local involvement in the NEPA process
- Evaluation of potential impacts

Background Information

- Kerr Project operations

Alternatives

- Definition of a drought
- Drought Management Plan triggers
- Modification of minimum instream flow requirements
- Utilization of Hungry Horse Reservoir and the effect on its operations
- Preparation of agreed-upon operating curves and operation of the Kerr Project under those curves
- Kerr Project operational procedures
- Development of lake level alternatives
- Development of modeling and forecasting tools
- General Comments on PPL Montana's proposed Drought Management Plan.
- 1962 Memorandum of Understanding and Article 43
- Use of VARQ data in modeling

Land

- Effects on agriculture

Water

- Impacts on water quality
- Living Resources (Wildlife, Vegetation, and Other Living Resources)
- Threatened and endangered species
- Effects on salmon
- Effects on fisheries and other living resources

Cultural Resources

- Effects on cultural resources

Tribal Resources

- Effects on tribal resources

Socioeconomic Resources

- Economic evaluation

Other Issues

- Environmental justice

The following are issues that the public raised during BIA's scoping process as well as in comments on PPL Montana's proposed Drought Management Plan.

Drought Management Plan Development and NEPA Process

- Role of BIA
- Agency and stakeholder involvement in drought management planning
- Local public involvement in the NEPA process
- Evaluation of potential impacts
- NEPA process and schedule

Need for Action

- Need for and cost of the Drought Management Plan and EIS

Background Information

- Kerr Project operations
- Article 56 of Kerr Project license
- National Marine Fisheries Service and U.S. Fish & Wildlife Service Biological Opinions
- History of Flathead Lake and the Kerr Project
- Ownership of Flathead Lake

Alternatives

- Stakeholder sharing of impacts
- Impact and definition of a drought
- Drought Management Plan triggers
- Modification of minimum instream flow requirements
- Utilization of Hungry Horse Reservoir and the effect on its operations
- Prioritizing of operations among the Kerr Project, Hungry Horse Reservoir, and the Federal Columbia River Power System
- Consideration of the Columbia River drainage system
- General Comments on PPL Montana's proposed Drought Management Plan
- U.S. Army Corps of Engineers DMP1 rule curve
- Preparation of agreed-upon operating curves and operation of the Kerr Project under those curves
- Continued use of current operational standards
- Development of lake level alternatives
- Modeling and forecasting
- Balance of inflows and outflows of Flathead Lake
- Use of VARQ data in modeling

Land

- Effects on agriculture
- Increase in soil and bank erosion

Water

- Increase in erosion and other impacts on water quality
- Water rights and water demands
- Effects on groundwater

Living Resources (Wildlife, Vegetation, and Other Living Resources)

- Threatened and endangered species
- Effects on salmon and fishery resources
- Effects on wetlands

Tribal Resources

- Effects on tribal resources

Socioeconomic Resources

- Damage to docks and shoreline structures
- Loss of income to the local economy due to loss of tourism and recreation from low summer lake levels
- Economic evaluation
- Loss of waterfront land to erosion
- Effects on farmland
- Effects downstream
- Power generation customers
- Environmental Justice

Resource Use Patterns (Hunting, Agriculture, Recreation, and Other Resources)

- Loss of recreational opportunities from limited access

Other Issues

- AVISTA Generation Company
- Expansion of Waterton National Park

Mitigation Measures

- Compensation by PPL Montana
- No wash/no wake speed limit on Flathead River

7.2 ADDITIONAL PUBLIC AND AGENCY COORDINATION

BIA conducted additional public and agency coordination during the development of the DEIS. These efforts included:

- Discussions with BOR regarding the Flathead Lake model, and how to more effectively capture the effects of Hungry Horse operations.
- Meetings with the CSKT regarding the results of the updated modeling and continued discussion of social, economic, and environmental issues.
- Discussions with USACE regarding the use of climate indicators to augment or as an alternative to standard runoff forecasting techniques.

BIA also held supplemental public information meetings on September 21 and 22, 2005 in Polson, Montana. These meetings provided the public and interested agencies an update on the progress of the Drought Management Plan EIS. Eighteen people attended these meetings. The BIA presented information regarding:

- The environmental review process.

- Activities completed to date; including scoping, alternatives development, and EIS documentation.
- A summary of the incorporation of Hungry Horse operations into the Flathead Lake model.
- A review of climate indicator identification, development, and application for the Drought Management Plan.
- A review of runoff hydrographs for wet, normal, and dry years.
- A review of the topic areas that will be addressed in the EIS.
- The anticipated project schedule.

7.3 DEIS COMMENTS

The Draft EIS was released for public comment on July 26, 2006. An agency hearing was held on August 29, 2006 in Kalispell, Montana. Six agencies were represented at the agency hearing: BIA, USACE, BOR, Environmental Protection Agency (EPA), CSKT, and DOI. In addition, 16 comment letters were received from agencies, community organizations, and individuals. Approximately 70 people attended two public hearings held on August 29 and August 30, 2006 in Kalispell and Polson, Montana. The written comment letters and public hearing transcript comments combined for a total of 248 individual comments on the DEIS.

Table 7-1 provides a list of the organizations and individuals who provided comments on the DEIS. A summary of written and verbal comments on the DEIS, with responses, is included in Appendix C. The summary is organized in two ways – by DEIS section or comment category, and by commenter or commenting organization. Each commenter or commenting event was assigned a code and comments were consecutively numbered within each code.

Table 7-1: DEIS Commenters

Commenter	Category	Commenter Code
Montana Water Trust	Companies and Organizations Letter	CO1
Northwest Power and Conservation Council – Letter 1	Companies and Organizations Letter (Dated Sept 28, 2006)	CO2
Northwest Power and Conservation Council – Letter 2	Companies and Organizations Letter (Dated October 25, 2006)	CO3
National Organization To Save Flathead Lake	Companies and Organizations Letter	CO4
Flathead Lakers	Companies and Organizations Letter	CO5
PPL Montana, LLC	Companies and Organizations Letter	CO6
Flathead Lakers	Companies and Organizations Letter	CO7
USEPA	Federal Agency Comment Letter	FA1
USACE	Federal Agency Comment Letter	FA2
USDI-BOR	Federal Agency Comment Letter	FA3
Clinton Whitney	Individual Letter	IND1
Henry Oldenburg	Individual Letter	IND2

Commenter	Category	Commenter Code
Flathead County Board Of Commissioners	Local Agency Comment Letter	LA1
Confederated Salish and Kootenai Tribes of the Flathead Nation	Native American Tribes Comment Letter	NAT1
Public Meeting August 29, 2006	Public Meeting Transcript	PM1
Public Meeting August 30, 2006	Public Meeting Transcript	PM2
Montana Fish, Wildlife, and Parks – Letter 1	State Agency Comment Letter (Dated Sept 29, 2006	SA1
Montana Fish, Wildlife, and Parks – Letter 2	State Agency Comment Letter (Dated October 30, 2006	SA2

The comments in Appendix C are summarized from the comment letters and public hearing transcripts received on the DEIS. The 248 individual comments address a variety of issues. The following list provides a brief summary of the general comment subject matter.

DEIS Distribution and Comment Period

- Availability of DEIS and length of comment period

2002 Drought Management Plan (DMP)

- Insufficient detail provided in DMP, particularly regarding drought conditions

Alternatives and Proposed Action

- Requests for monitoring and adaptive management as part of the preferred alternative
- Requests for more specificity regarding activation of drought management plan and achieving lake target levels
- Coordination between Hungry Horse and Kerr Dam
- Potential impacts to system flood control downstream of Kerr Dam
- Analysis of the effects of Hungry Horse operations on the Drought Management Plan
- Potential impacts to threatened and endangered species
- The role of Hungry Horse in the alternatives analysis
- Proposed alternatives that mimic the natural system
- NEPA analysis and evaluation of a No-Action alternative
- Additional explanation regarding drought indicators
- Description of Proposed Action
- Clarification of lake elevations used in the alternatives analysis
- Tier 4 response
- Analysis of target lake elevations
- Significance of lake elevation 2,892.2' msl
- Water forecasts

Affected Environment

- Concerns over potential property damage and impacts to users of Flathead Lake as a result of water levels below or above 2,893' msl

Environmental Consequences

- Lake water level effect on septic systems and farmland
- Protection of and potential impacts to Bull trout
- Economic impacts
- Potential impacts to shoreline properties
- Climate change

Cumulative Impacts

- Evaluation of cumulative impacts on Flathead River below the dam

Technical Support Document (Appendix B)

- Additional detail and explanation of statistical analysis used to determine Drought Management Plan diagnostic and prognostic triggers

Drought Indicators

- Definition of drought and severe drought
- Drought triggers
- Frequency of droughts
- Clarification of drought indicators and periods of record

General Comments

- Coordination with Hungry Horse Dam operations and discharge strategies

Instream Flows

- Difference between Article 56 minimum levels and instream flows

Modeling

- Additional modeling data for Alternatives 1 and 2
- Clarification of modeling inputs
- Hydrologic data
- Modeling years used

CHAPTER 8.0 GLOSSARY

above mean sea level	The elevation (on the ground) or altitude (in the air) of any object, relative to the average sea level.
acre-feet	A unit of volume used to measure the capacity of reservoirs. One acre foot is a volume one foot deep covering an area of one acre. Thus an acre-foot contains exactly 43,560 cubic feet, about 325 851.4 U.S. gallons, or about 1233.482 cubic meters (0.123 348 hectare meter).
alluvial deposits	An accumulation of alluvium (sediment), sometimes containing valuable ore and gemstones, or simply consisting of gravel, sand, or clay, in the bed or former bed of a river.
amphibious	Capable of living both in and out of water; in some cases, may not survive if forced to live either entirely in or entirely out of water.
anadromous	Migrating up rivers from the sea to breed in fresh water. Used of fish.
aquifer	When a water-bearing rock readily transmits water to wells and springs.
Baseload Facility	A power generating facility that is operated to provide a constant supply of power to the electric transmission/distribution system.
basin	A natural depression in the surface of the land often with a lake at the bottom of it; "the basin of the Great Salt Lake."
BiOps	Biological Opinions
bulrushes	Plant found on the plains and intermountain basins along the edges of ponds and areas with a high water table.
candidate species	Plants and animals for which the USFWS has sufficient information on their biological status and threats to propose them as endangered or threatened under the ESA, but for which development of a proposed listing regulation is precluded by other higher priority listing activities.
Census block groups	The smallest geographical unit used by the United States Census Bureau is a census block. Census blocks are organized into census block groups that are a subdivision of a census tract.

census tracts	Small, relatively permanent statistical subdivisions of a county.
confluence	A coming or flowing together of two or more streams and the combined stream formed by conjunction.
coniferous	Any of an order (Coniferales) of mostly evergreen trees and shrubs including forms (as pines) with true cones and others (as yews) with an arillate fruit.
connectivity	The quality or state of being connective or connected.
Cooperating Agency	Any federal agency other than a lead agency which has jurisdiction by law or special expertise with respect to any environmental impact involved in a proposal or a reasonable alternative for legislation or other major Federal action significantly affecting the quality of the human environment.
deciduous	Falling off or shed seasonally or at a certain stage of development in the life cycle <deciduous leaves> <deciduous trees>.
deleterious	Harmful often in a subtle or unexpected way.
diving ducks	Ducks that feed in deep water by swimming down to reach food,
downstream	In the direction of or nearer to the mouth of a stream
drawdown	The lowering of the surface elevation of a body of water, the water surface of a well, the water table, or the piezometric surface adjacent to the well, resulting from the withdrawal of water therefrom.
Drought or Low-water Year	A drought is an extended period where water availability falls below the statistical requirements for a region. Drought is not a purely physical phenomenon, but instead is an interplay between natural water availability and human demands for water supply.
end moraine	A ridge-like accumulation of till along the terminal margin of a glacier.
extirpated	A species that has been completely removed from an area, island, or land mass but which still exists in another area.
floodplain	A low area of land surrounding water bodies, which holds the overflow of water during a flood

forage	Food for animals, especially when taken by browsing or grazing.
Full Pool Elevation	For Flathead – 2,893 feet amsl
groundwater	water within the earth that supplies wells and springs
high water mark	The highest point which a body of water attains: the ocean at high tide; a river at peak flood; the contents of a bath tub.
Hydroclimate Indicators	A set of meteorological measurements that predict the occurrence of a wet, normal, or dry year.
hydroelectric	Generating electricity by conversion of the energy of running water.
hypolimnion	The part of a lake below the thermocline made up of water that is stagnant and of essentially uniform temperature except during the period of overturn.
impaired water	Surface and ground waters that are negatively impacted by pollution resulting in decreased water quality. The Clean Water Act requires states to publish un updated 303 (d) list every two years of streams and lakes not meeting their designated uses because of excess pollutants.
inflow	The act or process of flowing in or into: an inflow of water; an inflow of information. Something that flows in or into: a lake fed by a freshwater inflow.
inundation	To cover with a flood.
invertebrate	Lacking a spinal column; also relating to invertebrate animals.
kilowatt	1000 watts
kilowatt hour	A unit of work or energy equal to that expended by one kilowatt in one hour or to 3.6 million joules.
lacustrine	Relating to, formed in, living in, or growing in lakes.
land use	How a certain area of land is utilized (e.g., forestry, agriculture, urban, industry).
Lead Agency	The agency or agencies preparing or having taken primary responsibility for preparing the environmental impact statement.

licensee	One that is licensed.
Load-following Facility	A power generating facility that makes real time adjustments in power generation in order to respond to varying levels of demand.
loam	A soil consisting of a friable mixture of varying proportions of clay, silt, and sand.
mainstem	The main channel of a river as opposed to the streams and smaller rivers that feed into it.
mallard	A common and widely distributed wild duck (Anas platyrhynchos) of the northern hemisphere the males of which have a green head and white-ringed neck and which is the source of the domestic ducks.
marsh	A tract of soft wet land usually characterized by monocotyledons (as grasses or cattails).
megawatt	One million watts
metamorphosed sedimentary formations	Rocks deposited as sediments from water that has been altered by hear and/or pressure.
migratory	Relating to or characterized by migration, and wandering/roving.
Minimum Instream Flows	The lowest volume of discharge from a reservoir that can sustain downstream habitat, especially fish habitat. It is subject to the priority system and does not affect water rights established prior to its institution.
Missoula group	Contains another fluvial clastic wedge, derived from the south, from a different river system than supplied the Ravalli Group or display cyclic aggrading contacts between sedimentation events driven ultimately by floods in large fluvial systems.
National Flood Insurance Program	Federal program created by Congress in 1968 that makes flood insurance available in communities that enact and enforce satisfactory floodplain management regulations.
natural outlet	Any outlet into a watercourse, pond, ditch, lake, bay, ocean, or other body of surface water, or outlet into the groundwater.
non-migratory	Animals that do not migrate.

Nonpoint sources	Nonpoint source pollution does not have a single point or origin, but rather comes from diffuse sources. Nonpoint source pollution occurs when the rate of materials entering a waterbody exceeds natural levels.
non-vascular	Lacking blood vessels or a vascular system.
Nutrient Management Plan	A written site-specific plan which describes how the major plant nutrients (nitrogen, phosphorus, and potassium) are to be managed, annually, to minimize adverse environmental effects, primarily upon water quality.
Operating Curve	Usually presented in a graph of elevation versus time, an operating curve describes how lake levels will be managed during a given period of time, usually a water year (see also Rule Curve).
osprey	A fish-eating hawk (Pandion haliaetus) having plumage that is dark on the back and white below. Also called fish hawk.
outflow	The act or process of flowing out, such as an outflow of water from a power plant.
out migration	To move out of one community, region, or country in order to reside in another.
palustrine	Pertaining to or living in a marsh or swamp.
Peak Load Facility	A power generating facility that is operated intermittently to deliver electricity during periods of high demand.
Piegan group	(Middle Belt Carbonate) consists of cyclic carbonate-siliciclastic deposits.
pintails	A duck (Anas acuta) of the Northern Hemisphere, having gray, brown, and white plumage and a sharply pointed tail. Also called sprigtail.
point and nonpoint sources	A pollutant source that can be treated in a dispersion model as though pollutants were emitted from a single point that is fixed in space.
Ramping rates	The rate of change in discharge from a reservoir, often expressed as cubic feet per second per hour (cfs/hr). Ramping rates are commonly used to reduce mortality of or disruption to aquatic organisms.

ramp-up	Increase, as with activity or production.
raptor	Any of a number of carnivorous birds that hunt and kill other animals.
riparian	Relating to the banks of a natural course of water, or living or located on the bank of a watercourse (as a river or stream, sometimes a lake).
river miles	Miles calculated from the mouth of the river or, for upstream tributaries, from the confluence with the main river.
riverine	Located on or inhabiting the banks of a river; riparian.
Rule Curve	A rule curve describes how much water storage must be maintained in a reservoir at different times in the year to ensure that water discharge requirements can always be met.
runoff	Rainfall not absorbed by soil. The water that flows overland to lakes or streams during and shortly after a precipitation event.
salmonid family	Each kind of salmon and trout.
sedges	Perennial herbs common to most fresh water wetlands. Superficially they resemble grasses, but are really very different; one feature is a clearly marked triangular stem.
socioeconomic	Of or involving both social and economic factors.
spill-gate	The spill-gate is a safety valve for a dam or reservoir. Excess water can be released from the structure to prevent damage or overflow.
stormwater	An abnormal amount of surface water due to a heavy rain or snowstorm.
terrestrial	Of or relating to the earth or its inhabitants. Living or growing on land; not aquatic: a terrestrial plant or animal.
topography	Detailed, precise description of a place or region. Graphic representation of the surface features of a place or region on a map, indicating their relative positions and elevations.
Total Maximum Daily Load Study	A TMDL describes the amount of a pollutant that a waterway can receive without violating water quality standards.

tributary	A stream that flows into a larger stream or other body of water.
trophic cascade	are interactions between trophic levels (decomposer, producer, herbivore, predator) that result in inverse patterns in abundance or biomass across more than one trophic link in a food web
turbidity	The amount of solid particles that are suspended in water and that cause light rays shining through the water to scatter. Thus, turbidity makes the water cloudy or even opaque in extreme cases. Turbidity is measured in nephelometric turbidity units (NTU).
VARQ	A flood control strategy that manages reservoir levels and discharges to better mimic natural snowmelt and runoff conditions. The acronym ‘VARQ’ is derived from the words ‘variable discharge’; ‘VAR’ meaning variable, and ‘Q’ being engineering shorthand for discharge or flow.
vascular	Of, characterized by, or containing vessels that carry or circulate fluids, such as blood, lymph, or sap, through the body of an animal or plant.
velocity	Rapidity or speed of motion; specifically, the distance traveled per unit time.
volt	The practical meter-kilogram-second unit of electrical potential difference and electromotive force equal to the difference of potential between two points in a conducting wire carrying a constant current of one ampere when the power dissipated between these two points is equal to one watt and equivalent to the potential difference across a resistance of one ohm when one ampere is flowing through it
water quality	The condition of water with respect to the amount of impurities in it.
Water Year	Any twelve-month period, usually selected to begin and end during a relative dry season. Used as a basis for processing streamflow and other hydrologic data. The period from October 1 to September 30 is widely used in the U.S.
waterfowl	Swimming game birds, such as ducks and geese, considered as a group.

watershed A ridge of high land dividing two areas that are drained by different river systems. Also called water parting. The region draining into a river, river system, or other body of water.

watt The absolute meter-kilogram-second unit of power equal to the work done at the rate of one joule per second or to the power produced by a current of one ampere across a potential difference of one volt : 1/746 horsepower

wet year Year in which streamflow records show runoff significantly greater than the mean annual runoff.

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CHAPTER 10.0 INDEX

APPENDIX A

Notice of Intent and other Legal Notices

If the application is recommended for approval, then it will be presented to the National Advisory Environmental Health Sciences Council.

VII. Reporting Requirement

All terms and conditions of the current award shall remain in full force and effect for the supplemental awards.

VIII. Mechanism of Support

Support will be in the form of supplements to FDA's cooperative agreement with the UM–NCNPR. This agreement will be subject to all policies and requirements that govern the research grant program of the PHS, including provisions of 42 CFR part 52 and 45 CFR part 74.

IX. Legend

Data and information included in the application, if identified by the applicant as trade secret or confidential commercial information, will be given confidential treatment as trade secret or confidential commercial information to the extent permitted by the Freedom of Information Act (5 U.S.C. 552(b)(4)) and FDA's implementing regulations (21 CFR 20.61).

Dated: June 12, 2002.

Margaret M. Dotzel,

Associate Commissioner for Policy.

[FR Doc. 02–15492 Filed 6–19–02; 8:45 am]

BILLING CODE 4160–01–S

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

[Docket No. FR–4723–C–2D]

FY 2002 Super Notice of Funding Availability (SuperNOFA) for HUD's Discretionary Grants Programs for Fiscal Year 2002; Notice of Extension of Application Deadline

AGENCY: Office of the Secretary, HUD.

ACTION: Super Notice of Funding Availability (SuperNOFA) for HUD's discretionary grant programs; notice of extension of application deadline.

SUMMARY: On March 26, 2002, HUD published its Fiscal Year (FY) 2002 Super Notice of Funding Availability (SuperNOFA) for HUD's discretionary grant programs. This notice extends the application due date for applicants in Charles, Dorchester and Calvert counties, Maryland (designated as disaster areas as the result of tornados) and in McDowell, Mercer, Mingo, Logan and Wyoming counties, West Virginia (designated as disaster areas as the result of severe storms, flooding, and landslides) who are seeking funding under the Continuum of Care Homeless Assistance Programs-Supportive Housing Program (SHP), Shelter Plus Care (S+C), Section 8 Moderate Rehabilitation Room Occupancy Program for Homeless Individuals (SRO).

DATES: The application due date for the Continuum of Care Homeless Assistance Programs—Supportive Housing Program (SHP), Shelter Plus Care (S+C), and Section 8 Moderate Rehabilitation Room Occupancy Program for Homeless Individuals (SRO) programs for applicants located in the Federally designated disaster areas has been extended to July 19, 2002. For all other applicants for this funding, the due date remains June 21, 2002.

FOR FURTHER INFORMATION CONTACT: For the programs affected by this notice, please contact the office or individual listed under the **FOR FURTHER INFORMATION** heading in the individual program section of the SuperNOFA, published on March 26, 2002 at 67 FR13826.

SUPPLEMENTARY INFORMATION: On March 26, 2002 (67 FR 13826), HUD published its Fiscal Year (FY) 2002 Super Notice of Funding Availability (SuperNOFA) for HUD's discretionary grant programs. The FY 2002 SuperNOFA announced the availability of approximately $2.2 billion in HUD program funds covering 41 grant categories within programs operated and administered by HUD offices. This notice published in today's **Federal Register** extends the application due date for the Continuum of Care Homeless Assistance Programs-Supportive Housing Program (SHP), Shelter Plus Care (S+C), and Section 8 Moderate Rehabilitation Room Occupancy Program for Homeless Individuals (SRO) programs for applicants located in counties declared disaster areas by the Federal Emergency Management Agency (FEMA) declarations FEMA–1409–DR and FR–1410–DR. Specifically, these declarations cover Charles, Dorchester and Calvert counties, Maryland and McDowell, Mercer, Mingo, Logan and Wyoming counties, West Virginia. Any additional counties designated as federal disaster areas under FEMA–1409–DR or FR–1410–DR will be posted on HUD's web page (www.hud.gov) and published by Federal Emergency Management Agency (FEMA) in the **Federal Register**. For all other applicants for this funding, the application due date of June 21, 2002 remains unchanged.

Dated: June 17, 2002.

Donna M. Abbenante,

General Deputy Assistant Secretary for Community Planning and Development.

[FR Doc. 02–15645 Filed 6–17–02; 4:31 pm]

BILLING CODE 4210–29–P

DEPARTMENT OF THE INTERIOR

Bureau of Indian Affairs

Notice of Intent To Prepare an Environmental Impact Statement for a Proposed Drought Management Plan for Operation of the Kerr Hydroelectric Project, Flathead Lake, MT

AGENCY: Bureau of Indian Affairs, Interior.

ACTION: Notice of intent and public scoping meeting.

SUMMARY: This notice advises the public that the Bureau of Indian Affairs (BIA), intends to gather information necessary for preparing an Environmental Impact Statement (EIS) for a proposed drought management plan relating to operation of the Kerr Hydroelectric Project, Flathead Lake, Montana. This notice also announces public meetings to determine the scope of issues to be addressed in the EIS.

The purpose of this notice is to obtain suggestions and information from other agencies and the public on the scope of issues to be addressed in the EIS. Comments and participation in this scoping process are encouraged.

DATES: Meeting Dates—

1. July 9, 2002, from 6:30 p.m. to 9:30 p.m., Kalispell, Montana.

2. July 10, 2002, from 6:30 p.m. to 9:30 p.m., Charlo, Montana.

Comment Dates: Comments on the scope and implementation of this proposal must be received before July 26, 2002.

ADDRESSES: Mail or hand deliver written comments to Jeffery Loman, Chief, Division of Natural Resources, Office of Trust Responsibilities, Bureau of Indian Affairs, MS–3061, 1849 C Street NW., Washington, DC 20240. You may also fax comments to Chief, Division of Natural Resources, (202) 219–0006 or (202) 219–1255.

The first meeting will be held at the West Coast Outlaw Hotel, 1701 Highway 93 South, Kalispell, Montana.

The second meeting will be held at the Nine Pipes Lodge, 4100 Highway 93, Charlo, Montana.

FOR FURTHER INFORMATION CONTACT: Jeffery Loman, Chief, Division of Natural Resources, Office of Trust Responsibilities, Bureau of Indian

Affairs, MS: 3061, 1849 C St., NW., Washington, DC 20240, (202) 208–7373.

SUPPLEMENTARY INFORMATION: Flathead Lake is the largest natural fresh water lake in the western United States. It is home to the Confederated Salish and Kootenai Tribes of the Flathead Nation, whose Reservation encompasses an area including approximately the southern half of Flathead Lake. Flathead Lake is regulated by the operation of Kerr Dam, located at River Mile 72.0 at Polson, Montana. The Kerr Dam and Hydroelectric Project is located inside the exterior boundaries of the Flathead Indian Reservation and operates under a joint license issued by FERC on July 17, 1985 to PPL Montana, LLC, successor-in-interest to the Montana Power Company, and the Confederated Salish and Kootenai Tribes. The license has been amended several times since initial issuance.

Section 4(e) of the Federal Power Act authorizes the Secretary of the Interior to include conditions in hydropower licenses for the protection and utilization of Indian reservations. Under this authority, the Secretary of the Interior required that certain articles be included in the Kerr Project license for the protection and utilization of the Flathead Indian Reservation. Among these license articles are Article 56, which requires minimum instream flow rates for the protection of fisheries and other resources in the Lower Flathead River below Kerr Dam and Article 60, which requires the development and implementation of a drought management plan.

In addition, as set forth in Article 43, the Kerr Project is currently operated for flood control according to a 1962 Memorandum of Understanding, as amended, between PPL Montana, LLC, successor-in-interest to the Montana Power Company, and the U.S. Army Corps of Engineers.

During low water years, conflicts may occur between the minimum instream flow requirements of Article 56 and these flood control requirements. The drought management plan required by Article 60 is to resolve such potential conflicts.

The proposed action is to meet the requirements of Article 60 of the Kerr Hydroelectric Project license, issued by the Federal Energy Regulatory Commission (FERC). Article 60 calls for the development and implementation of a drought management plan by the licensees in consultation with the U.S. Army Corps of Engineers, U.S. Bureau of Reclamation, Bureau of Indian Affairs and Montana Department of Environmental Quality. Article 60 also requires that the drought management plan include a re-evaluation and adjustment of flood control requirements and other provisions necessary for compliance with lower Flathead River minimum instream flow mandates. PPL Montana, LLC, current operator of the Kerr Project, submitted a proposed drought management plan to the Secretary of the Interior on March 4, 2002. Under Article 60, the Secretary of the Interior has the authority to reject, modify, or otherwise alter the proposed drought management plan.

The Bureau of Indian Affairs has been delegated the responsibility to serve as the Lead Agency for National Environmental Policy Act compliance in connection with the proposed drought management plan. Issues to be addressed in the environmental analysis include, but are not limited to, hydroelectric power production, recreation, tourism, irrigation and farming, treaty-protected fisheries, biological resources, wildlife habitat, and Indian traditional and cultural properties and resources.

Alternatives to the proposed drought management plan to be examined in the EIS may include a variety of measures, such as adjustments to flood control rule curves, implementation of advanced climate prediction initiatives, and deviation from minimum instream flow requirements. The range of environmental issues and alternatives will be further developed based upon comments received during the scoping process.

Authority

This notice is published in accordance with section 1501.7, Council on Environmental Quality Regulations (40 CFR Parts 1500 through 1508) implementing the procedural requirements of the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 *et seq.*) and the Department of the Interior Manual (516 DM 1.6) and is within the exercise of authority delegated to the Assistant Secretary—Indian Affairs by 209 DM 8.1.

Dated: June 17, 2002.

Neal A. McCaleb,

Assistant Secretary—Indian Affairs.

[FR Doc. 02–15628 Filed 6–19–02; 8:45 am]

BILLING CODE 4310–5M–P

DEPARTMENT OF THE INTERIOR

Bureau of Land Management

[NV–040–02–5101–ER–F330; (N–74943)]

Notice of Realty Action; Notice of Availability of Draft Amendment and Draft Environmental Impact Statement; Correction

AGENCY: Bureau of Land Management, Interior.

ACTION: Notice; correction.

SUMMARY: The Bureau of Land Management published a document in the **Federal Register** May 31, 2002 (67 FR 38145) which announced the availability of the Draft Toquop Disposal Amendment to the Caliente Management Framework Plan and Draft Environmental Impact Statement for the Toquop Energy Project, located in Lincoln, Clark, and Washoe Counties. The **Federal Register** Notice of Realty Action, Notice of Availability, included public meeting dates and locations. The July 9 and July 10 meeting locations were incorrect.

FOR FURTHER INFORMATION CONTACT: Dan Netcher, Team Lead, Bureau of Land Management, Ely Field Office, HC 33 Box 33500, Ely, NV 89301–9408.

Correction

In the **Federal Register** May 31, 2002 (67 FR 38145) on page 38146, in the first column correct the **DATES** caption to read:

DATES: The DEIS will be made available to the public on May 31, 2002. Copies of the DEIS will be mailed to individuals, agencies, or companies who previously requested copies. Mailed comments on the DEIS must be postmarked by August 29, 2002. Written comments on the document should be addressed to Gene A. Kolkman, District Manager, Bureau of Land Management, Ely Field Office, HC 33, Box 33500, Ely, NV 89301–9408.

Oral and/or written comments may also be presented at four scheduled public meetings to be held at the following locations.

—Monday, July 8, 2002, from 7 p.m. to 9 p.m.; City Hall, 100 Depot Avenue, Caliente, Nevada
—Tuesday, July 9, 2002, from 7 p.m. to 9 p.m.; Las Vegas BLM Field Office, 4701 Torrey Pines Drive, Las Vegas, Nevada
—Wednesday, July 10, 2002, from 7 p.m. to 9 p.m.; City Hall, 10 E. Mesquite Boulevard, Mesquite, Nevada
—Thursday, July 11, 2002, from 7 p.m. to 9 p.m.; Airport Plaza Hotel, 1981 Terminal Way, Reno, Nevada

AFFIDAVIT OF PUBLICATION

State of Montana)
)
County of Lake)

Sandra Schell, being first sworn, deposes and says that he is Clerk of the Lake County Leader, a newspaper of general circulation, published and printed in Polson, Lake County, Montana, and that the attached notice has been correctly published in the regular and entire issue of every number of said paper for one (1) week, commencing on the seventeenth (17) day of August, 2006.

Signed: ______________________
Sandra Schell

Subscribed and sworn to before me this 11th day of October, 2006

____
Victoria L. Thomson
State of Montana, County of Lake

VICTORIA L. THOMSON
NOTARY PUBLIC, for the State of Montana
Residing at Polson, Montana
My Commission Expires July 14, 2010

NOTICE OF PUBLIC HEARINGS

The Bureau of Indian Affairs is holding two public hearings regarding the Draft Environmental Impact Statement for a Drought Management Plan for the Operation of the Kerr Hydroelectric Project on Flathead Lake, Montana.

LOCATION and TIME

Tuesday, August 29, 2006
6:30 PM to 9:30 PM
Red Lion Hotel Kalispell
Ballroom A
20 North Main Street
Kalispell, MT 59901

Wednesday, August 30, 2006
6:30 PM to 9:30 PM
Polson City Library
Community Meeting Room
2 First Avenue East
Polson, MT 59880-0820

606184ln

[redacted]

No. 10923

NOTICE OF PUBLIC HEARINGS

The Bureau of Indian Affairs is holding two public hearings regarding the Draft Environmental Impact Statement for a Drought Management Plan for the Operation of the Kerr Hydroelectric Project on Flathead Lake, Montana.

LOCATION and TIME

Tuesday,
August 29, 2006
6:30 PM to 9:30 PM
Red Lion Hotel
Kalispell
Ballroom A
20 North Main Sheet
Kalispell, MT 59901

Wednesday,
August 30, 2006
6:30 PM to 9:30 PM
Polson City Library
Community Meeting Room
2 First Avenue East
Polson, MT
59880-0820

August 17, 24, 2006

STATE OF MONTANA

FLATHEAD COUNTY

AFFIDAVIT OF PUBLICATION

CHRIS SCHULDHEISS BEING DULY SWORN, DEPOSES AND SAYS: THAT SHE IS THE LEGAL CLERK OF THE **DAILY INTER LAKE** A DAILY NEWSPAPER OF GENERAL CIRCULATION, PRINTED AND PUBLISHED IN THE CITY OF KALISPELL, IN THE COUNTY OF FLATHEAD, STATE OF MONTANA, AND THAT **NO. 10923 LEGAL ADVERTISMENT** WAS PRINTED AND PUBLISHED IN THE REGULAR AND ENTIRE ISSUE OF SAID PAPER, AND IN EACH AND EVERY COPY THEREOF ON THE DATES OF **AUG 17, 24, 2006**

AND THE RATE CHARGED FOR THE ABOVE PRINTING DOES NOT EXCEED THE MINIMUM GOING RATE CHARGED TO ANY OTHER ADVERTISER FOR THE SAME PUBLICATION, SET IN THE SAME SIZE TYPE AND PUBLISHED FOR THE SAME NUMBER OF INSERTIONS.

Chris Schuldheiss

Subscribed and sworn to
Before me this **AUGUST 24, 2006**

Dorothy Glencross Notarial Seal State of Montana

Dorothy Glencross

Notary Public for the State of Montana
Residing in Kalispell
My Commission expires 9/11/09

''* * * to conserve (A) fish or wildlife which are listed as endangered species or threatened species * * * or (B) plants'' (16 U.S.C. 1534 (Endangered Species Act of 1973)).

The Refuge was established to protect endangered species, and to conserve migratory birds and other wildlife by preserving habitat and open space while providing compatible wildlife-oriented outdoor recreation to the public. While the Refuge was formally established in 1970, lands were not acquired until 1974.

The Service anticipates a draft CCP and EA to be available for public review and comment in 2007.

Doug S. Vandegraft,

Acting Manager, CA/NV Operations, Sacramento, California.

[FR Doc. E6–11915 Filed 7–25–06; 8:45 am]

BILLING CODE 4310–55–P

DEPARTMENT OF THE INTERIOR

Bureau of Indian Affairs

Notice of Availability of a Draft Environmental Impact Statement for a Drought Management Plan for Operation of the Kerr Hydroelectric Project, Flathead Lake, MT

AGENCY: Bureau of Indian Affairs, Interior.

ACTION: Notice of availability and public hearings.

SUMMARY: The Bureau of Indian Affairs (BIA) announces the availability of a draft Environmental Impact Statement (EIS) for a drought management plan for the operation of the Kerr Hydroelectric Project, Flathead Lake, Montana. In addition to mailing the draft EIS to cooperating agencies and those who previously requested the document, the BIA has made the draft EIS available at the Polson City Library, 2 First Avenue East, Polson, Montana, and the Flathead County Library, 247 First Avenue East, Kalispell, Montana. Additionally, the draft EIS may be obtained on the following Web site: *http://www.flatheadlake-eis.com.* The purpose of this notice is to inform the public, other Federal agencies, tribal, State, and local governments, organizations and businesses of the availability of the draft EIS and to announce public hearings to discuss the draft EIS.

DATES: Comments on the draft EIS must be received by September 29, 2006. The hearing dates and locations are:

1. August 29, 2006, 6:30 p.m. to 9:30 p.m., Red Lion Inn, 20 North Main Street, Kalispell, Montana.

2. August 30, 2006, 6:30 p.m. to 9:30 p.m., Polson City Library, Community Meeting Room, 2 First Avenue East, Polson, Montana.

ADDRESSES: Mail or hand deliver written comments to Jeffery Loman, Chief, Natural Resources Division, Office of Trust Services, Bureau of Indian Affairs, Mail Stop 4655–MIB, 1849 C Street, NW., Washington, DC 20240. You may also fax comments to Chief, Natural Resources, (202) 219–0006 or (202) 219–1255.

FOR FURTHER INFORMATION CONTACT: Jeffery Loman, Chief, Natural Resources Division, (202) 208–7373 or (202) 903–8295.

SUPPLEMENTARY INFORMATION: Flathead Lake is the largest natural fresh water lake in the western United States. It is home to the Confederated Salish and Kootenai Tribes of the Flathead Nation, whose reservation encompasses an area including approximately the southern half of Flathead Lake. Flathead Lake is regulated by the operation of Kerr Dam, located at River Mile 72.0 at Polson, Montana. The Kerr Dam and Hydroelectric Project are located within the exterior boundaries of the Flathead Indian Reservation. The Project operates under a joint license issued by the Federal Energy Regulatory Commission on July 17, 1985 to PPL Montana, LLC, successor-in-interest to the Montana Power Company and current operator of the Kerr Project, and the Confederated Salish and Kootenai Tribes. The license has been amended several times since initial issuance.

Section 4(e) of the Federal Power Act authorizes the Secretary of the Interior to include conditions in hydropower licenses for the protection and utilization of Indian reservations. Pursuant to this authority, the Secretary required that certain articles be included in the Kerr Project license for the protection and utilization of the Flathead Indian Reservation. Among these is license Article 56, which requires minimum instream flow rates for the protection of fisheries and other resources in the Lower Flathead River below Kerr Dam. In addition to the Secretary's section 4(e) conditions, Article 43 of the Kerr Project license requires the operator to regulate Flathead Lake in accordance with a 1962 Memorandum of Understanding, as amended in 1965, between the Montana Power Company and the U.S. Army Corps of Engineers. The purposes behind the MOU include providing for flood control by drawing down Flathead Lake every spring, and supporting recreation, tourism and associated activities on Flathead Lake by refilling the lake in time for the summer season.

During low-water years, there may be an insufficient volume of water to achieve Article 43 lake levels while maintaining the minimum instream flow requirements of Article 56. Accordingly, the Secretary also included Article 60 in the Project license, which requires that the licensees develop and implement a drought management plan in consultation with the U.S. Army Corps of Engineers, U.S. Bureau of Reclamation, Bureau of Indian Affairs, and Montana Department of Environmental Quality. Article 60 further requires that the drought management plan include a re-evaluation and adjustment of flood control requirements and other provisions necessary for compliance with lower Flathead River minimum instream flow mandates.

Pursuant to Article 60, PPL Montana submitted a proposed drought management plan to the Secretary of the Interior on March 4, 2002. Under Article 60, the Secretary has the authority to reject, modify, or otherwise alter the proposed drought management plan. The Secretary determined that the decision on the proposed drought management plan constitutes a major federal action that could significantly affect the quality of the human environment. The National Environmental Policy Act therefore requires preparation of an EIS. PPL Montana's plan serves as the proposed action in the EIS.

The Bureau of Indian Affairs was delegated the responsibility to serve as the Lead Agency for NEPA compliance in connection with the proposed drought management plan. On June 20, 2002, BIA published a Notice of Intent in the **Federal Register** (67 FR 42054) informing agencies and the public of BIA's intent to gather information necessary to prepare an EIS for the proposed drought management plan and initiating the formal scoping process (See Appendix A). The Notice of Intent encouraged comments and participation in the scoping process and included meeting dates, times, and locations. BIA held a series of public meetings and workshops in Kalispell, Charlo and Polson, Montana, on July 9–10, 2002, August 27–28, 2002, and October 22–23, 2002.

The drought management plan ultimately approved by the Secretary will govern how the Kerr Project licensees will prepare for and operate the Project during a drought and will benefit the public by providing information regarding the operation of the Kerr Project in drought conditions. The NEPA process will allow the Secretary of the Interior to issue a Record of Decision selecting an alternative regarding a drought management plan. Issues addressed in the environmental analysis include, but are not limited to, hydroelectric power production, recreation, tourism, irrigation, treaty-protected fisheries, biological resources, wildlife habitat, and Indian traditional and cultural properties and resources. Alternatives to the proposed drought management plan examined in the EIS include a variety of measures, such as adjustments to flood control rule curves, implementation of advanced climate prediction initiatives, and deviation from minimum instream flow requirements. The range of environmental issues and alternatives was developed through comments received during the scoping process, including the public scoping meetings and workshops held in Montana.

Authority

This notice is published in accordance with section 1503.1, Council on Environmental Quality Regulations (40 CFR parts 1500 through 1508) implementing the procedural requirements of the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 *et seq.*), and the Department of the Interior Manual (516 DM 1.6) and is within the exercise of authority delegated to the Principal Deputy Assistant Secretary—Indian Affairs by 209 DM 8.

Dated: July 19, 2006.

Michael D. Olsen,

Principal Deputy Assistant Secretary—Indian Affairs.

[FR Doc. E6–11936 Filed 7–25–06; 8:45 am]

BILLING CODE 4310–W7–P

DEPARTMENT OF THE INTERIOR

National Park Service

Minor Boundary Revision at Fire Island National Seashore

AGENCY: National Park Service, Interior.

ACTION: Announcement of park boundary revision.

SUMMARY: Notice is given that that the western boundary of Fire Island National Seashore is revised to include Tract No. 17–04 as depicted on map number 615/81,487 prepared by the National Park Service in October 2005. This map and other supporting documentation are available for inspection at the National Park Service, Northeast Region, Land Resources Division, New England Office, 222 Merrimack Street, Suite 400E, Lowell, Massachusetts 01852, and in the Offices of the National Park Service, Department of the Interior, Washington, DC 20240.

FOR FURTHER INFORMATION CONTACT: Superintendent, Fire Island National Seashore, 120 Laurel Street, Patchogue, NY 11772.

SUPPLEMENTARY INFORMATION: Section 7c) of the Land and Water Conservation Fund Act of 1965, as amended, 16 U.S.C. 460*l*–9(c), authorizes the Secretary of the Interior to make minor revisions to the boundaries of a unit of the National Park System that will contribute to and are necessary for the proper preservation, protection, interpretation, or management of such a unit. To provide for the proper protection and management of Fire Island National Seashore, it is necessary to include within the boundaries of the national seashore certain property referred to as Tract No. 17–04, consisting of 0.82 acre of Federal land, more or less, on Fire Island in the Town of Islip, Suffolk County, New York, located adjacent to federally owned Tract No. 17–01. The tract is owned by the United States of America by resumption of title from and with the acknowledgement of the State of New York pursuant to the Act of June 7, 1924, Public Law 252.

Dated: May 10, 2006.

Mary A. Bomar,

Regional Director, Northeast Region.

[FR Doc. 06–6476 Filed 7–25–06; 8:45 am]

BILLING CODE 4310–YV–M

DEPARTMENT OF THE INTERIOR

National Park Service

Draft General Management Plan/ Environmental Impact Statement, Hovenweep National Monument, Colorado and Utah

AGENCY: National Park Service, Department of the Interior.

ACTION: Notice of termination of the Environmental Impact Statement for the General Management Plan, Hovenweep National Monument.

SUMMARY: The National Park Service (NPS) is terminating preparation of an Environmental Impact Statement (EIS) for the General Management Plan, Hovenweep National Monument, Colorado and Utah. A Notice of Intent to prepare the EIS for the Hovenweep National Monument General Management Plan was published in Vol. 68, No. 167, of the August 28, 2003, **Federal Register** (2351). The National Park Service has since determined that an Environmental Assessment (EA) rather than an EIS is the appropriate environmental documentation for the general management plan.

SUPPLEMENTARY INFORMATION: The general management plan will establish the overall direction for the national monument, setting broad management goals for managing the area over the next 15 to 20 years. The plan was originally scoped as an EIS. However, few public comments were received in the scoping process. Although some concerns were expressed during the public scoping process, particularly on the potential for impacts related to energy exploration in areas adjacent to the national monument, no issues were identified for the general management plan that have the potential for controversial impacts.

In the general management planning process the NPS planning team developed two alternatives for the national monument, neither of which would result in substantial changes in the operation and management of the monument. As the park does not have a general management plan, management under the no-action alternative would continue existing operations with no changes in interpretation, resource protection strategies, or facility development. The action alternative would focus on maintaining and protecting resources, addressing park maintenance/operations needs and developing a maintenance facility within previously disturbed areas. The preliminary impact analysis of the alternatives revealed no major (significant) effects on the human environment or impairment of park resources and values. Most of the impacts to the national monument's resources and values were negligible to minor in magnitude.

For these reasons the NPS determined the appropriate National Environmental Policy Act documentation for the general management plan is an environmental assessment.

DATES: The draft general management plan/environmental assessment is expected to be distributed for a 30 day public comment period in the fall of 2006 and a decision is expected be made in the fall of 2006. The NPS will notify the public by mail, Web site, and other means, and will include information on where and how to obtain a copy of the EA, how to comment on the EA, and the length of the public comment period.

FOR FURTHER INFORMATION CONTACT: Coralee Hays, Superintendent,

APPENDIX B

Technical Support Document

FLATHEAD LAKE DROUGHT MANAGEMENT PLAN

TECHNICAL SUPPORT DOCUMENT

Prepared by

BUREAU OF INDIAN AFFAIRS

November 2007

(Revisions December 2009)

HDR Engineering, Inc.
701 Xenia Avenue South, Suite 600
Minneapolis, MN 55416

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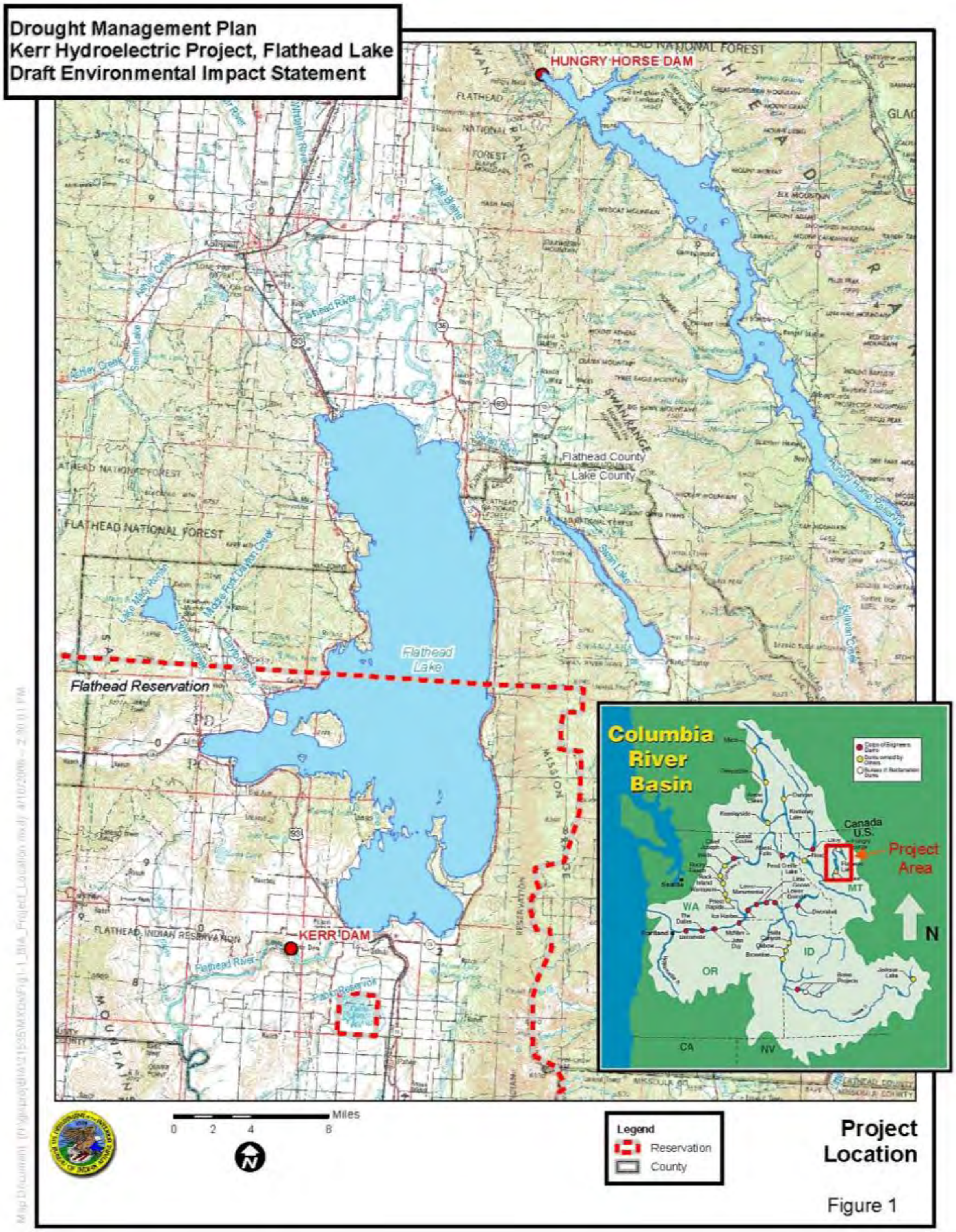
INTRODUCTION

On June 20, 2002, BIA published a Notice of Intent in the *Federal Register* informing agencies and the public of BIA's intent to gather information necessary to prepare an Environmental Impact Statement (EIS) on a proposed Drought Management Plan for Flathead Lake, and initiated the formal scoping process (67 Fed. Reg. 42,054 (2002). As a result of this scoping process, BIA developed a reasonable range of alternatives to be analyzed in the Flathead Lake Drought Management Plan EIS. These alternatives and the process used to develop them are described in this report. Included in this report are:

- The basis of report preparation
- Development process of Drought Management Plan (DMP) Diagnostic and Prognostic Triggers
- Analysis of historic precipitation, flow data, and different drought indicators to identify useful relationships between them
- Results of data analysis conducted to recognize the DMP activation and cancellation process
- A description of the DMP alternative development process and potential impacts of various DMP alternatives
- Technical limitations that affect the development of alternatives and description of the alternatives considered for analysis in the EIS
- Additional statistical analysis developed to address comments on the draft EIS

Flathead Lake is located on the Flathead River in western Montana and is the largest natural freshwater lake in the western United States (79 FERC 61, 376, 1997). Kerr Dam, located at River Mile 72.0 of the Flathead River in Polson, Montana, regulates lake outflow generated by a watershed of over 8,000 square miles. The Flathead River, including the North, Middle, and South Forks, is the primary tributary to Flathead Lake. Hungry Horse Dam and Reservoir regulate the South Fork of the Flathead River. Additional tributaries discharging into Flathead River include the Whitefish and Stillwater Rivers. The Swan River discharges into Flathead Lake at Big Fork, Montana. The watershed also includes several smaller tributaries and drainage systems immediately adjacent to the lake. A map of the Flathead River Basin (Figure 1) identifies rivers, tributaries, lakes, reservoirs, and other points of interest.

Figure 1
Flathead Basin Map



Operations of the Kerr Dam are governed by the license issued by the Federal Energy Regulatory Commission (FERC). The FERC license also incorporates various agreements and the requirements imposed by the Secretary of Interior for the protection of tribal trust resources (see Section 2.0).

Hungry Horse Dam, located at River Mile 5.2 of the South Fork Flathead River and 50.9 miles upstream of Flathead Lake, regulates a watershed of 1,654 square miles (USACE, 1999).It has a useable storage of 2.9 million acre-feet, with normal operating elevation ranging from 3336 to 3560 feet (USACE, 1999).

Hungry Horse Dam is operated by the Bureau of Reclamation (BOR) primarily for flood control and hydropower but recreation and fisheries management are additional uses. The reservoir controls approximately 30 percent of the inflow into Flathead Lake.

Additional information regarding Flathead Lake, the Kerr Hydroelectric Project, and Hungry Horse Dam is provided in the "Drought Management Plan and Environmental Impact Statement for the Kerr Hydroelectric Project, Flathead Lake, Montana."

Chapter 1.0 CLIMATE ANALYSIS

1.1 PURPOSE OF CLIMATE ANALYSIS

The purpose of the climate analysis was to develop and provide a reliable indication of drought early in the Water Year to enhance operation of the Kerr Project and management of Flathead Lake. Therefore, an analysis was conducted to determine if definable relationships between basin precipitation, stream flow, and large-scale climatic regimes could be identified for the Flathead Basin. The goal was to develop a reliable set of climate indicators to determine when a drought management plan may be put into action. HDR investigated the correlation between various regional climate indicators to stream flow utilizing traditional linear regression techniques. In addition, an independent statistical analysis was completed utilizing logistic regression and principal components analysis techniques. The results of the analysis are summarized in this report.

Detailed analyses were conducted to develop climate indicators specifically for drought prediction and decision making relative to drought management planning for Flathead Lake. The analyses indicated that a prognostic indicator, the Multi-variant El Niño Index, (Wolter & Timlin, 1993), (referred to as the MEI) is an effective predictor of drought conditions early in the water year (the water year starts on October 1 and ends on September 30). The MEI is a measure of a number of atmospheric and oceanic variables tied to El Niño/La Niña variability including sea surface and air temperatures in the tropical Pacific Ocean which in turn affects the tropical northward moisture and energy transport. These weather parameters have been shown to affect climate and precipitation in northern latitudes. This indicator links with the position of the jet stream to influence the magnitude and frequency of fall/winter storms that cross the Montana mountain ranges.

The climate analyses initially used Montana Climate Division 1 precipitation data to determine the potential for drought conditions. However, Montana Climate Division 1 covers 10 counties in the northwest and west central portions of Montana. The diagnostic Flathead Precipitation Runoff Index (FPRI) was developed by BIA to provide a more basin-specific drought indicator for use in this EIS**.** The FPRI is based on observations of precipitation from October through March at eight precipitation stations located in the key sub-basins affecting the Flathead basin.

A BIA evaluation of existing “official” water supply forecasting methods revealed that the methods relied on a combination of observations and predictions based on average runoff and/or precipitation values. The assumption of average precipitation conditions in years that ultimately resulted in a drought during a given Water Year can result in a volumetric runoff forecast that is wetter than observed conditions. In addition, the BIA-developed methodology provided here is intended as an indicator- to activate or deactivate a Drought Management Plan. The official forecasts would still be used to make water management decisions relative to flood control or other operations within the context of the activated Drought Management Plan.

Ultimately, the climate analysis process relies on a combination of the prognostic MEI indicator and the diagnostic FPRI indicator. The MEI would be used to anticipate the potential for a drought year from

October to December whereas the FPRI would be used from January through April to gauge the potential spring/summer runoff volume of the Flathead basin. Specifically, a Drought Management Plan would be activated if the MEI value was greater than or equal to (≥) 0.50 (El Niño)[1] in the October to December period. The FPRI is then used in combination with the MEI or independently to either maintain or end the use of the Drought Management Plan from January to April.

During the alternatives development process, a screening analysis which used data for water years 1951 to 2003 was conducted. The analysis indicated that use of the MEI results provided a greater than 70 percent correct decision to activate the Drought Management Plan when applied from October to December. This analysis was subsequently confirmed through use of a logistic regression model which confirmed that 75% of the observed drought years were predicted correctly.

Application of the regression modeling to the combination of the MEI and the FPRI in January and February demonstrated a potential for an 86 percent correct Drought Management Plan activation decision. Application of the regression modeling to the FPRI alone in March and April demonstrated a potential for a correct Drought Management Plan activation decision 96 percent of the time for water years 1951 to 2003[2]. A concern with using traditional regression modeling is the potential for multicollinearity among predictor variables which can influence the overall regression model fit and compromise the results – that is, use of overlapping information would affect the accuracy of the forecast. A principal components analysis was conducted to address the multicollinearity issue. The analysis found that, while there is multicollinearity among the regression model variables, it does not affect the overall results of the prediction.

A key factor in these combined FPRI/MEI indicators is that no low runoff years are missed by the forecasting approach. This application of the drought indicators may over-predict the occurrence of low runoff years. However, the monthly evaluations provide the opportunity to deactivate the Drought Management Plan in time for Article 43 flood control operations to resume, minimizing any additional risk of flooding.

1.2 SELECTION AND ANALYSIS OF OBSERVATIONAL PRECIPITATION DATA FOR SEASONAL RUNOFF APPLICATION

1.2.1 SOURCES

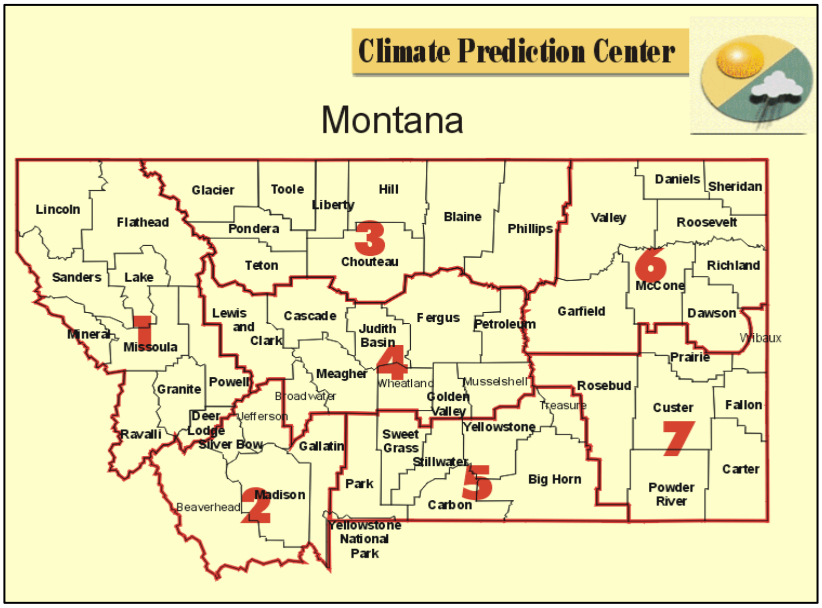
The monthly precipitation data utilized in the analysis for the Flathead Lake basin were retrieved from the National Oceanic Atmospheric Administration-National Climate Data Center (NOAA-NCDC) with a data record that extends from 1896 to present. The values in this dataset are a weighted average of the different

[1] The MEI is made up of six separate components that assist in forecasting storm tracks and jet stream positions that affect weather patterns in Montana. These components are combined to make the index. Index values greater than 0.5 are considered El Nino, 0.5 to -0.5 are considered a Neutral phase and values less than a -0.5 are considered La Nina. An MEI value greater than 0.50 is statistically correlated to low water years in the Flathead Basin.

[2] MEI values were not calculated prior to 1951.

precipitation observations within a specified climate region, which in this study is Montana Climate Division 1 (Figure 2).

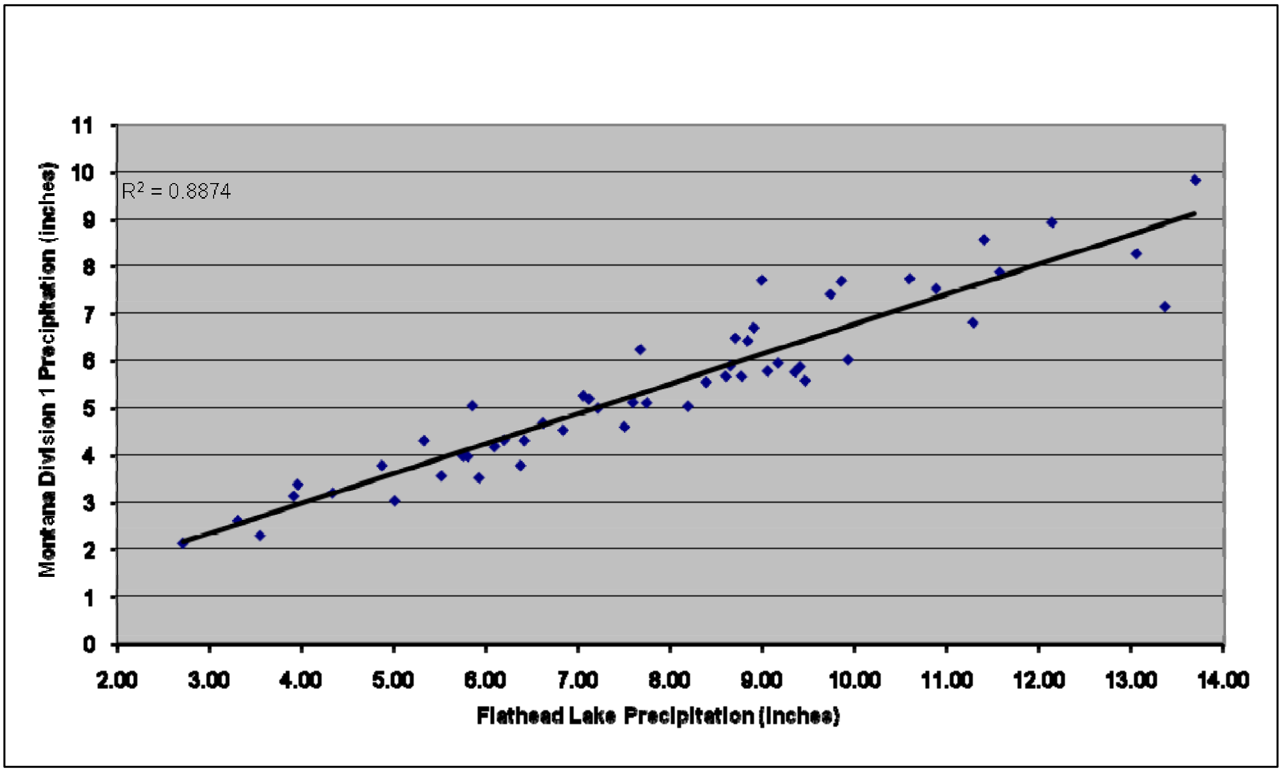
Figure 2
Montana Climate Divisions used in Precipitation Analyses



HDR evaluated the effectiveness of using the Montana Division 1 data to represent the precipitation distributions in the Flathead Basin portion of the Climate Division. The Flathead Lake drainage basin is approximately 40 percent of this defined climate regions' aerial coverage. The concern was that the use of Climate Division 1 observations might obscure drier or wetter conditions in the upper portion of the Climate Division where the Flathead Lake basins are located. For example, if dry conditions were noted in the upper half of the basin, would wet conditions in the lower half obscure the dry problems?

In order to answer this question, an evaluation was performed on a sub-set of Climate Division 1 observations that were located within or very near the Flathead basins. This sub-set of observations was compared to all the Climate Division 1 stations for a 52-year record of water years (WY) 1950 to WY 2002 (note that the WY starts October 1, and ends September 30. For example, WY 1995 would start on October 1, 1994, and end on September 30, 1995). This period of record included many dry and wet WYs and provided a valid comparison of the two databases. The evaluation showed that the October to December precipitation correlated to an R-squared of 0.89 and the October to March precipitation to an R-squared of 0.90. For the purpose of a screening evaluation, either value can be used as a "surrogate" of the other with little lost accuracy. The results are shown below (Figure 3). However, as the alternatives analysis progressed, it was decided to utilize the basin-specific precipitation values to reduce the potential errors that may occur from a more broadly defined data set.

Figure 3
Comparison of Flathead Basin and Montana Division 1 Precipitation for WY 1950 to WY 2002



1.3 EVALUATION OF CLIMATE PROGNOSTIC INDICES FOR USE AS DROUGHT MANAGEMENT PLAN INDICATOR

Numerous oceanic/atmospheric indices were evaluated for potential prognostic use. The intent of the climate analyses was to determine if information exists during the October to December portion of the WY that could provide a reasonable outlook of WY basin precipitation and/or stream flow. The key prognostic result would identify whether the WY tends toward above, near, or below normal precipitation values.

The most opportune time for this early outlook to be released would be in October to assist operators in determining the appropriate lake levels for the next three months. Additionally, any observational or prognostic insights into the precipitation and stream flow that could assist the January forecast were evaluated.

The analysis indicated that the strongest indices that related to both Montana Division 1 precipitation and stream flow in the Flathead Lake basin were the Multi-Variant El Niño and Southern Oscillation (ENSO) Index (MEI), and the Southern Oscillation Index (SOI). Other indices that were examined for potential, prognostic value in this analysis phase were the North Atlantic Oscillation (NAO), the Arctic Oscillation (AO), the Pacific Decadal Oscillation (PDO), and the standardized anomalies of the sea surface temperatures in the region of 5 degrees N-5 degrees S from 170 degrees W to 120 degrees W, commonly referred to by climatologists as the Niño 3.4 index region.

The two key oceanic/atmospheric indices that demonstrated the strongest tendencies are described in the following sections.

1.3.1 MEI (MULTIVARIATE ENSO INDEX)

The MEI was derived by Wolter and Timlin, 1993, primarily to encompass multivariate atmospheric and oceanic data that is noted to fluctuate with different phases of ENSO-related variability. The six components of this MEI Index are: sea-level pressure, the north-south and east-west components of the wind, sea surface temperature, surface air temperatures, and total cloud cover fraction of the sky. The MEI represents a comprehensive index that either directly or indirectly measures several components that provide an insight into the transport of moisture and energy from the tropics that can influence the position of the Northern Hemispheric storm track or jet stream position that the other indices do not fully represent. The MEI appears to be the most robust climatic index relative to Climate Division 1 precipitation and subsequently, to basin specific rainfall.

1.3.2 SOI (SOUTHERN OSCILLATION INDEX)

The SOI is one of the most fundamental indices utilized in the analysis and characterization of ENSO events by scientists. The SOI is an index that is derived by the difference in standardized sea level pressure between Tahiti and Darwin, Australia. Prolonged periods of anomalous pressure differences between these two stations are deemed to have a robust relationship with anomalously strong episodes of warm or cool waters in the eastern and central equatorial Pacific Ocean. The purpose of examining a five month (June through October) average of the SOI in our analysis was to eliminate relatively small-term variations that can occur across these two stations from other atmospheric phenomenon that can offer brief but notable fluctuation in the SOI value. Upon review, it was determined that the SOI (used either on its own or in conjunction with the MEI) did not provide a significant prognostic advantage over use of the MEI. Therefore, it was dropped from further consideration.

1.4 DROUGHT MANAGEMENT PLAN ACTIVATION MECHANISM BASED UPON MEI INDICATOR

The results of the climate analysis resulted in the following approach to DMP activation; the MEI would be used to anticipate the potential of a drought year from October to December based solely on the MEI value being greater than 0.50, indicating an El Niño climate indicator. The DMP activation decision would be made on the basis of a five-month running average MEI value calculated for each month from October to December. The DMP can be deactivated beginning in January based on current FPRI and MEI values (see Chapter 4.0).

The National Oceanic & Atmospheric Administration Climate Diagnostics Center (NOAA-CDC) has developed a database for the MEI values which was used as a primary source to compute monthly MEI average values. The MEI values derived by the NOAA-CDC would be analyzed and examined by the operator on or before the eighth day of each month.

The MEI average values for each month were computed using the running average of five preceding MEI values. For example, the MEI average value for the month of October (MEI AVG^{Oct}) was obtained by averaging the five most recent MEI values (April/May, May/June, June/July, July/August, and August/September MEI values). The numerical average of these five values was used to determine if the ENSO phenomenon is either in a 'La Niña,' 'Neutral,' or an 'El Niño' phase. The MEI development procedure for each month has been explained further in Chapter 4.0.

The historic MEI time series from 1951 to 2003 was analyzed to generate early October, November, and December MEI average values. An individual comparison of October, November, and December average MEI and April to September percent normal naturalized flow was plotted (Figure 4, Figure 5, and Figure 6). The horizontal line parallel to the x-axis represents 72.6 percent of the average April to September runoff for WYs 1951-2003. Any point below this line is considered as a low runoff or drought WY indication and requires DMP activation and vice versa. The vertical line parallel to the y-axis defines the MEI criteria for DMP activation. Any point on the right side of this line is considered as a drought year indication and required DMP activation and vice versa.

The graph was divided into four quadrants based on the correct or false prediction of the drought year and consequently the DMP activation status for Flathead Lake. The false predictions were divided into two categories: False (+) and False (-). False (+) implies that the MEI value incorrectly predicted *DMP activation status* for Flathead Lake and in reality there was no drought (since the respective year had more than 72.6 percent of average runoff). False (-) implies that the MEI value incorrectly predicted *No DMP activation status* for Flathead Lake and in reality there was a drought (since the respective year had less than 72.6 percent of average flow). Similarly, the correct predictions were divided into two categories: Correct (+) and Correct (-). Correct (+) implies that the MEI value correctly predicted *No DMP activation status* for Flathead Lake and in reality there was no drought in that respective year. Correct (-) implies that the MEI value correctly predicted *DMP activation status* for Flathead Lake and in reality there was a drought in that respective year.

Under the above analysis, the MEI produced a 68 percent correct DMP activation decision in early October for WYs 1951 to 2003. It is noticed that the MEI based correct DMP activation percentage improves to 72 percent and 74 percent for the month of November and December, respectively (Figure 4, Figure 5, and Figure 6).

Based on comments received on the DEIS during the public and agency review period, a logistic statistical analysis was conducted and determined that the MEI indicator is a statistically significant variable in predicting drought for the coming water year (see Section 1.7).

Figure 4
Drought Management Plan Activation Summary Based upon MEI Indicator (1951-2003)
Comparison of Early October MEI Average and April to September
Percent Normal Naturalized Flow

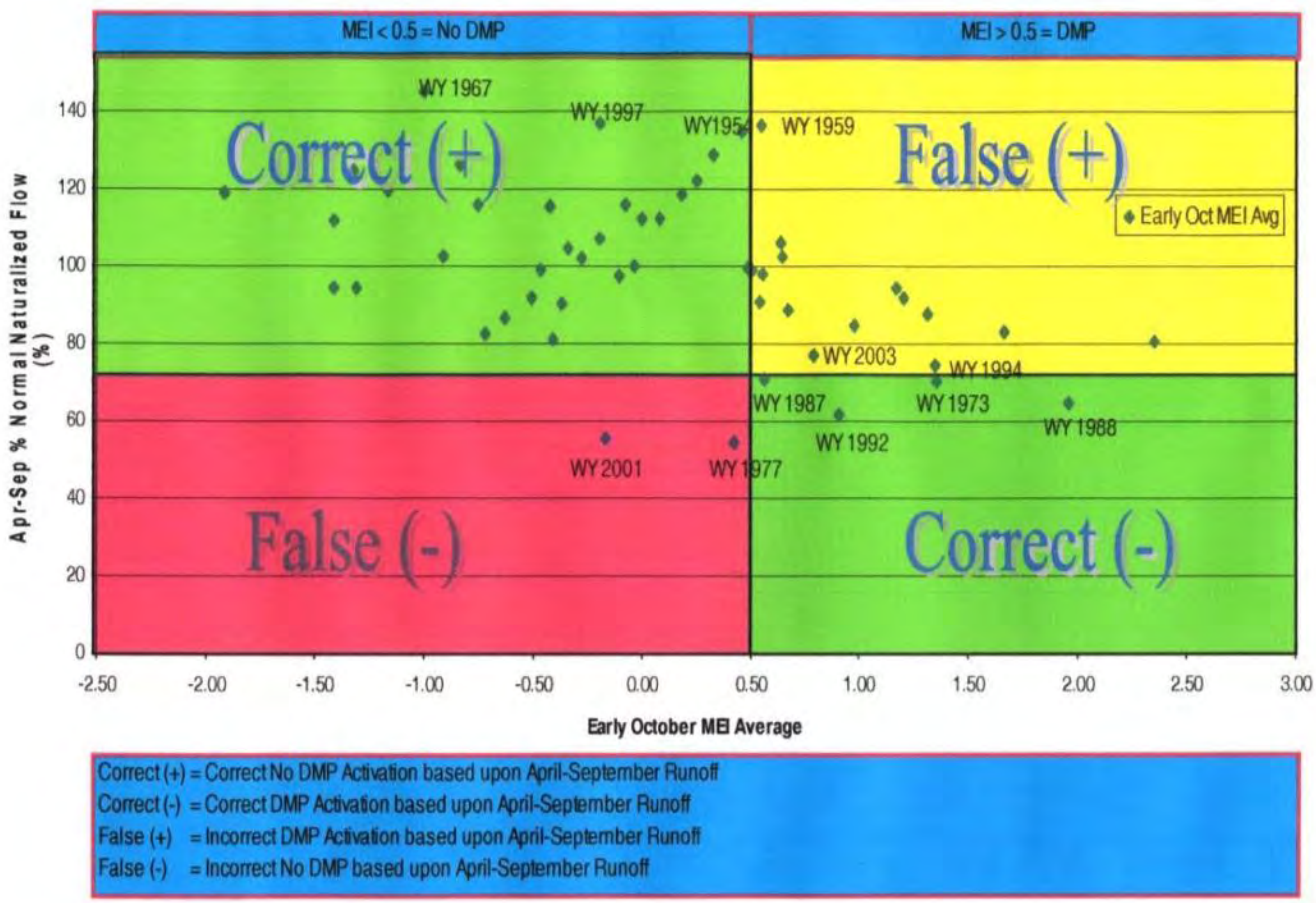


Figure 5
Drought Management Plan Activation Summary Based upon MEI Indicator (1951-2003)
Comparison of Early November MEI Average and April through September
Percent Normal Naturalized Flow

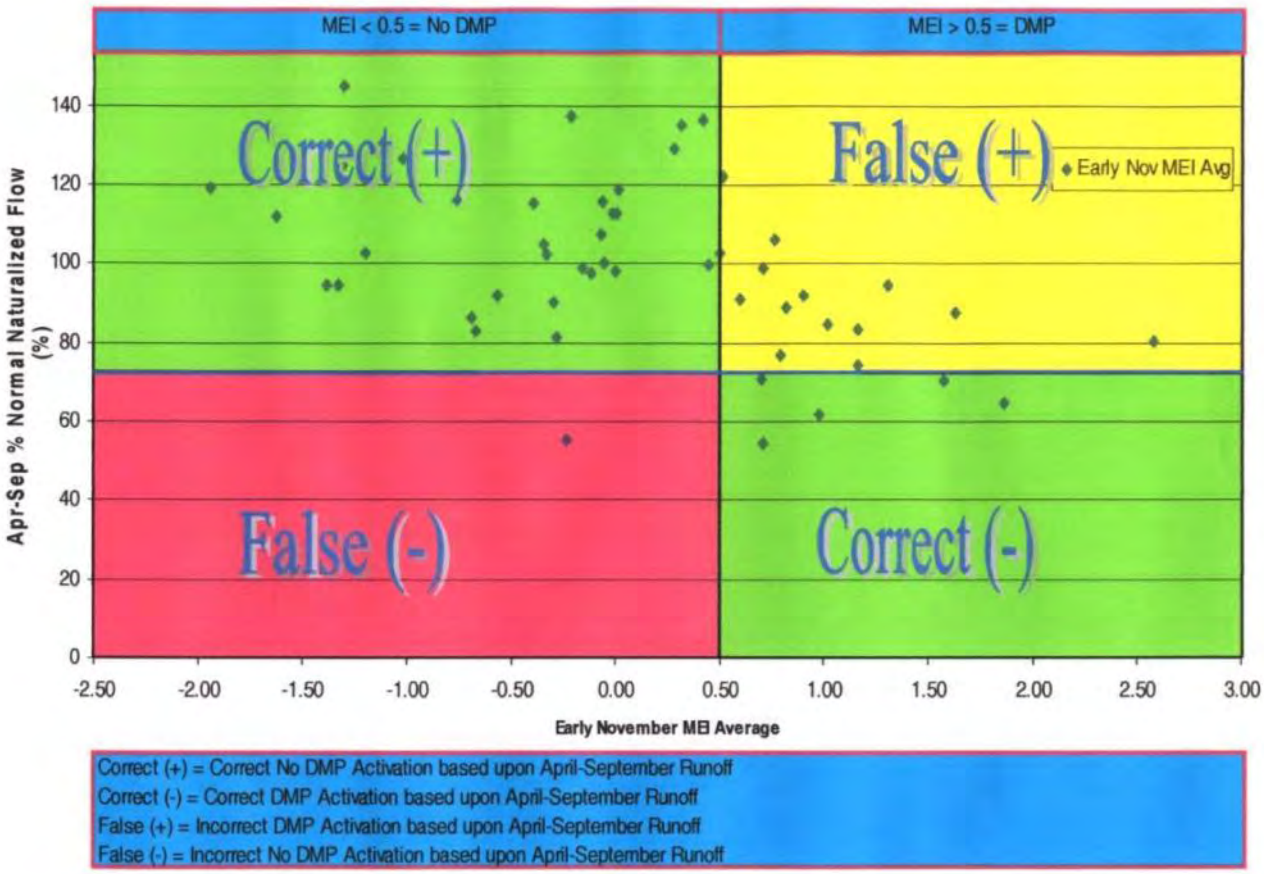
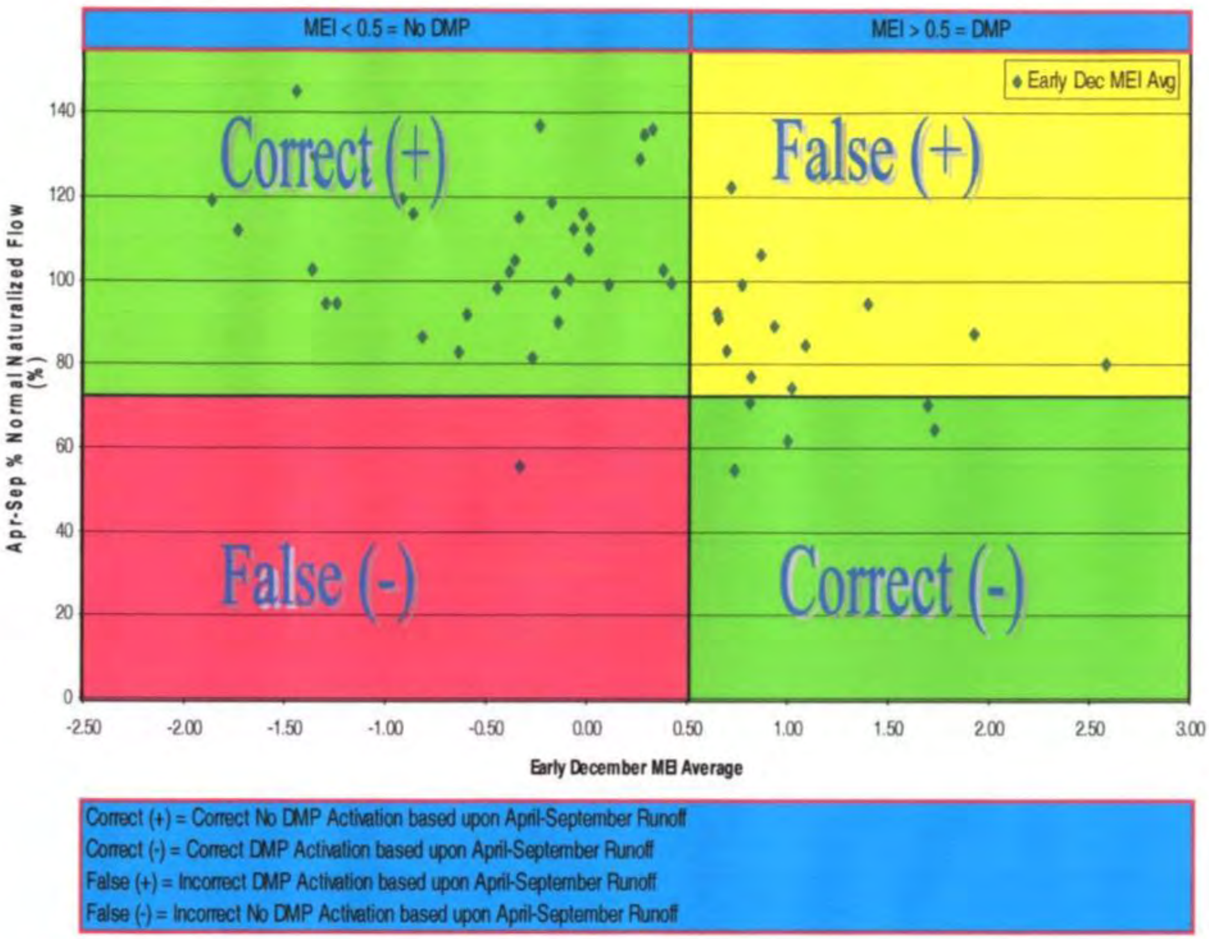


Figure 6
Drought Management Plan Activation Summary Based upon MEI Indicator (1951-2003)
Comparison of Early December MEI Average and April through September
Percent Normal Naturalized Flow



1.5 EVALUATION OF DIAGNOSTIC INDICES FOR USE AS DROUGHT MANAGEMENT PLAN INDICATOR

During the early stages of the climate analysis the October to December Montana Climate Division 1 precipitation was used as a diagnostic indicator for drought conditions (this information is generally available in the beginning of January). It was also noticed that if the Climate Division 1 precipitation was less than 3.50 inches for October to December, then October to March precipitation of less than 70 percent of normal would be expected.

Montana Climate Division 1 covers 10 counties in the northwest and west central portions of Montana. To provide an indicator that would be more representative of the Flathead basin, the Montana Division 1 precipitation was refined and the diagnostic Flathead Precipitation Runoff Index (FPRI) was developed. The FPRI is based on observations of precipitation in October through April at eight precipitation stations located in the key sub-basins affecting the Flathead basin. Figure 7 shows the location of these eight stations and

Table 1 shows the station identification and elevation.

The development of the FPRI is predicated upon the statistical relationship between the observed April to September runoff and the observed October to April precipitation at the eight precipitation stations. The R-squared of the October to March Climate Division precipitation to the following April to September naturalized runoff is calculated to be approximately 0.71 for the period 1951 to 2003. By comparison, the R-squared of the FPRI (given information available in early April) is approximately 0.83 when compared to the April to September runoff for the same period (Figure 8). Chapter 3.0 includes an evaluation and summary demonstrating the effectiveness of the FPRI.

The FPRI Method differs from the traditional “official” forecast prepared by the National Weather Service – Northwest River Forecast Center, in the following manner:

- The FPRI is an index of available water in the snowpack at a given point in time.
- The FPRI does not include a look-ahead forecast of potential runoff until the April FPRI is calculated.
- The use of the FPRI is for monitoring low runoff conditions. Once the index trends into near normal runoff, the official forecast should be used.

Based on comments received on the DEIS during the public and agency comment period, the robustness of the FPRI was evaluated using a statistical analysis technique known as Principal Components Analysis (PCA). The results of the PCA confirmed that the FPRI is an equivalent indicator to that produced by the PCA of the actual runoff potential in the Flathead basin (see section 1.7).

Figure 7
Locations of the Eight Key Precipitation Stations Used to Develop the Flathead Precipitation/Runoff Index

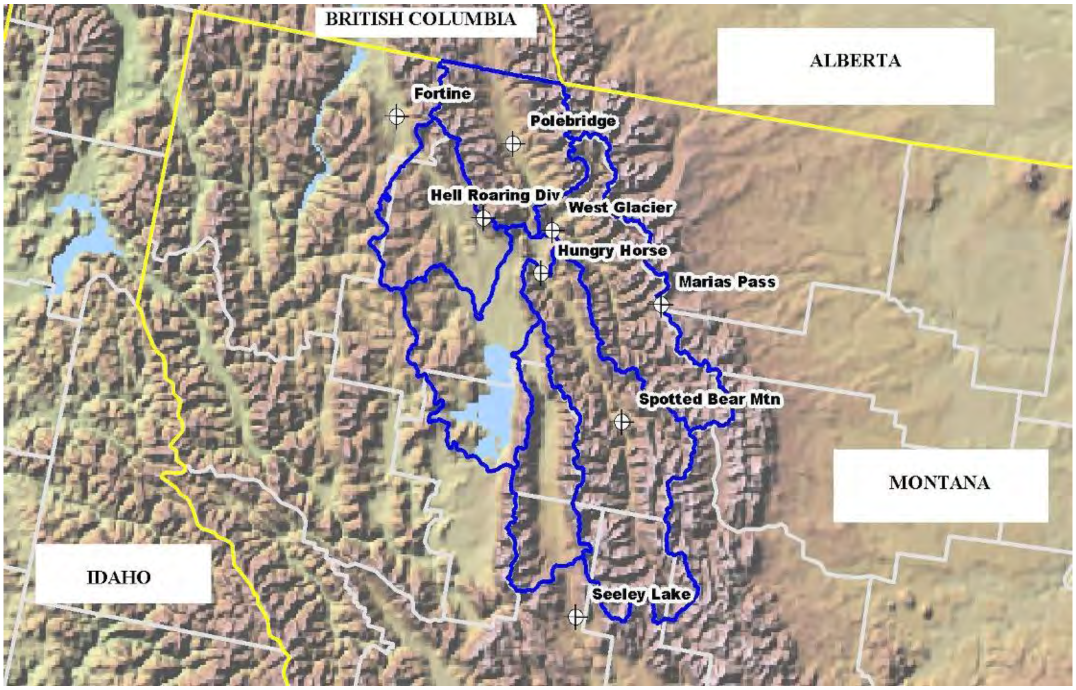
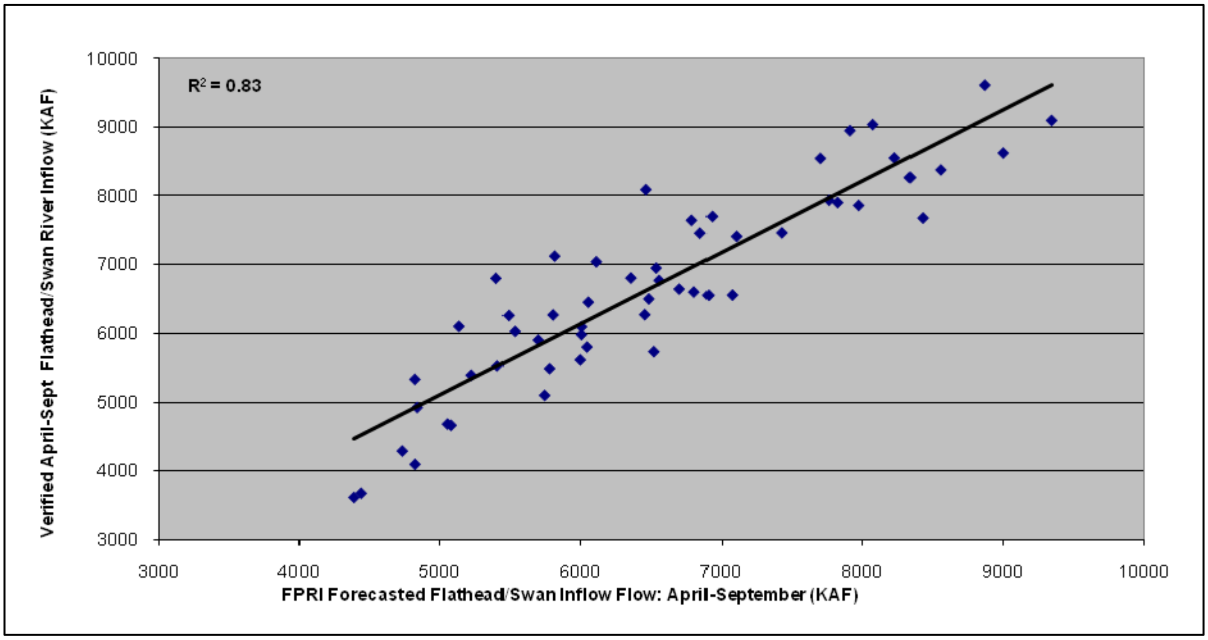


Table 1
Eight Key Precipitation Stations Used to Develop the Flathead Precipitation/Runoff Index and their Elevations

North Fork	
Station	**Elevation (ft)**
West Glacier	3,150
Polebridge	3,520
Fortine 1N	3,000
Hell Roaring Divide	5,700
South-Middle Fork + Swan	
Station	**Elevation (ft)**
West Glacier	3,150
Hungry Horse	3,160
Seeley Lake	4,100
Marias Pass	5,250
Spotted Bear Mtn.	7,000

Figure 8
Relationship of the Flathead Precipitation Runoff Index Forecasted versus Observed April to September Naturalized Runoff for WY1951-2003



1.6 DROUGHT MANAGEMENT PLAN ACTIVATION MECHANISM BASED UPON MEI AND FPRI INDICATORS

As noted above, the FPRI was derived to provide a more robust guideline in monitoring the precipitation of the winter/early spring. The historic precipitation data (1951 to 2003) collected at specific stations in the Flathead Lake basin was analyzed to calculate the FPRI value for January, February, March, and April. The result of the FPRI computation is an index of the water content reflected in units of thousand acre feet (KAF) applicable to the month that the value is calculated.

The current DMP activation approach uses the MEI index October through December to reflect the anticipated climate influence on the upcoming WY runoff. During the period of January and February a combination of the MEI and the FPRI are used to reflect the equal importance of accumulated (FPRI) and anticipated (MEI) basin precipitation. The FPRI is a robust stand-alone index for the crucial March-April period prior to the spring runoff season.

An individual comparison of January, February, March, and April FPRI and average MEI values and April to September percent normal naturalized flow was plotted as shown in Figure 9-Figure 12. The Horizontal line parallel to the x-axis represents 72.6 percent of the average April to September runoff for WYs 1951-2003. Any point below this line is considered as a low runoff or drought WY indication and requires DMP activation. If runoff is above 72.6 percent, the DMP would not need to be activated. The vertical lines parallel to the y-axis defines the FPRI criteria for DMP activation.

The application of the precipitation-based Flathead Precipitation Runoff Index, in concert with the Multi-Variant ENSO Index, results in an 87 percent correct DMP activation decision in January that improves to 96 percent correct in April for WYs 1951 to 2003. A key factor in these forecasts is that no low runoff years are missed by the forecasting approach. This application of the drought indicators may over-predict the occurrence of low runoff years; however, in April (the final decision month for the DMP), this incorrect prediction occurred in only two out of the 53 years evaluated (see Figure 12). Furthermore, in those two years the actual runoff was below normal. The monthly evaluations also provide the opportunity to discontinue the use of the drought management plan once it has been activated. In addition, the official forecast process is ongoing and is relied upon by the Corps of Engineers and others for the purposes of flood control and other management needs.

Chapters 3 and 4 present a step-by-step guide for the calculation and application of the climate indicators in the drought management plan. The use of drought management indices should result in a reliable outlook for low runoff years. Figure 13 shows the verification of the Flathead Lake DMP for the period of WYs 1951 to 2003.

Figure 9
Drought Management Plan Activation Summary Based upon MEI and FPRI Indicators (WYs 1951-2003) Comparison of January FPRI and April through September Percent Normal Naturalized Flow

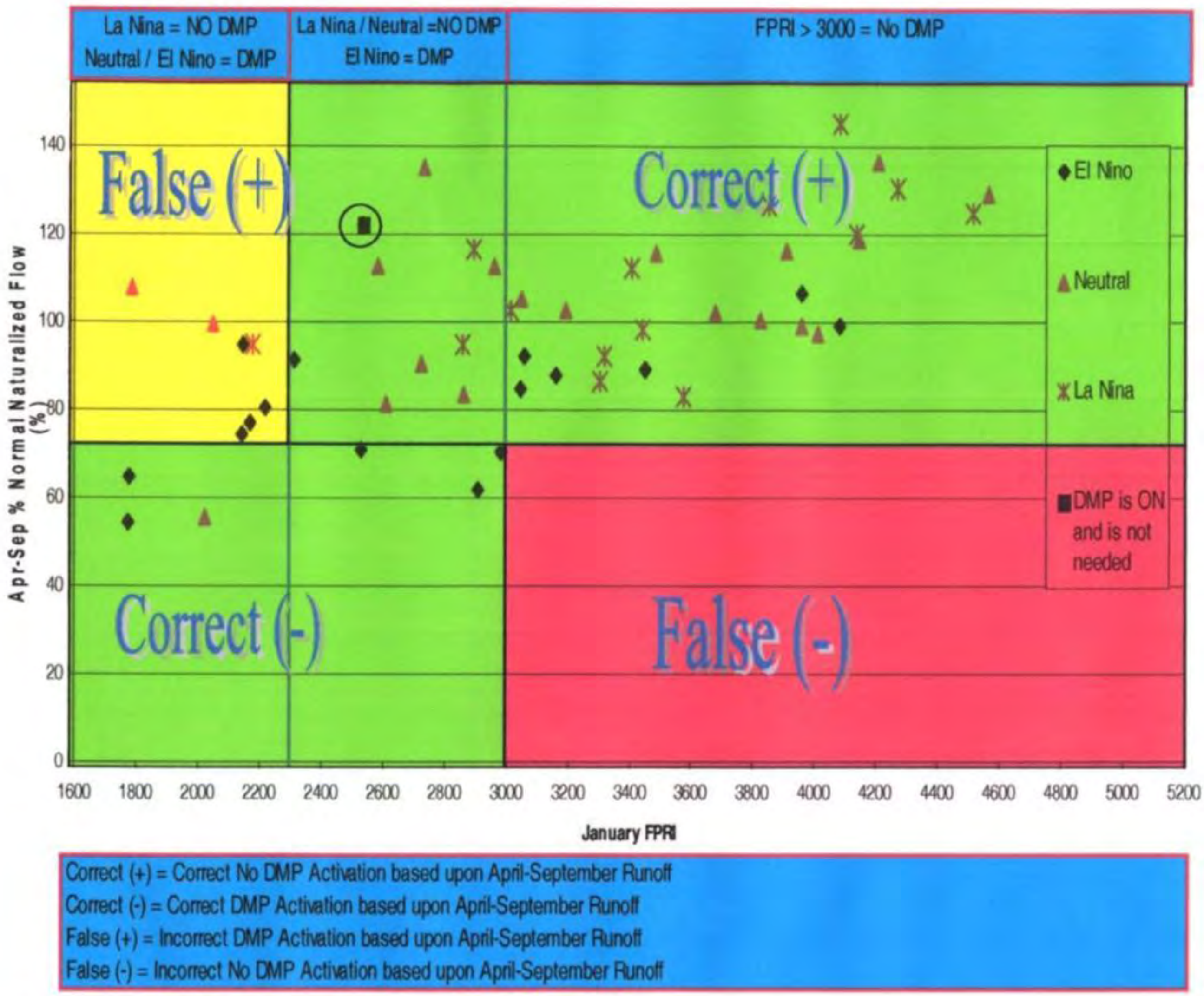


Figure 10
Drought Management Plan Activation Summary Based upon MEI and FPRI Indicators (WYs 1951-2003) Comparison of February FPRI and April through September Percent Normal Naturalized Flow

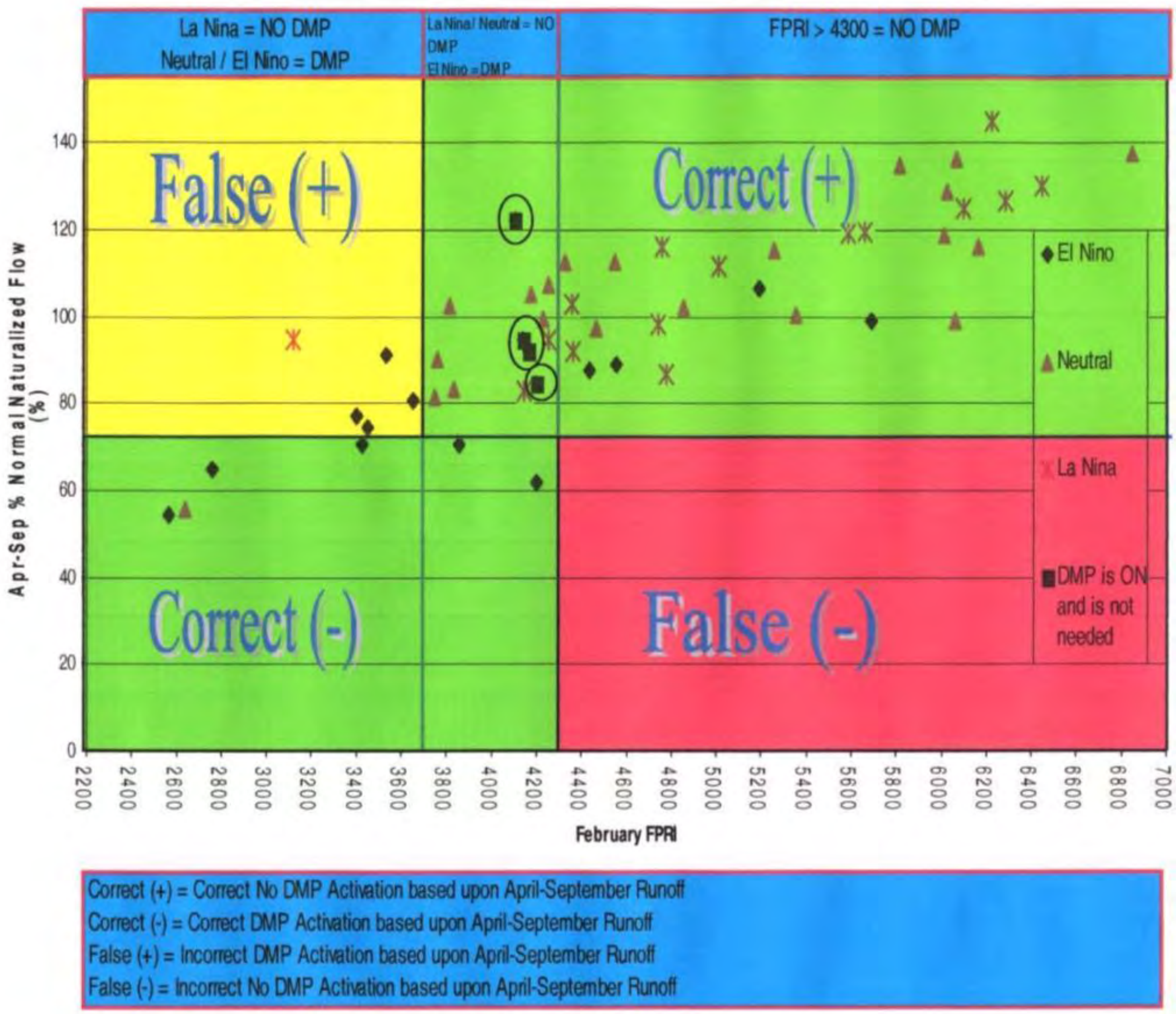


Figure 11

Drought Management Plan Activation Summary Based upon FPRI Indicator (WYs 1951-2003)
Comparison of March FPRI and April through September Percent Normal Naturalized Flow

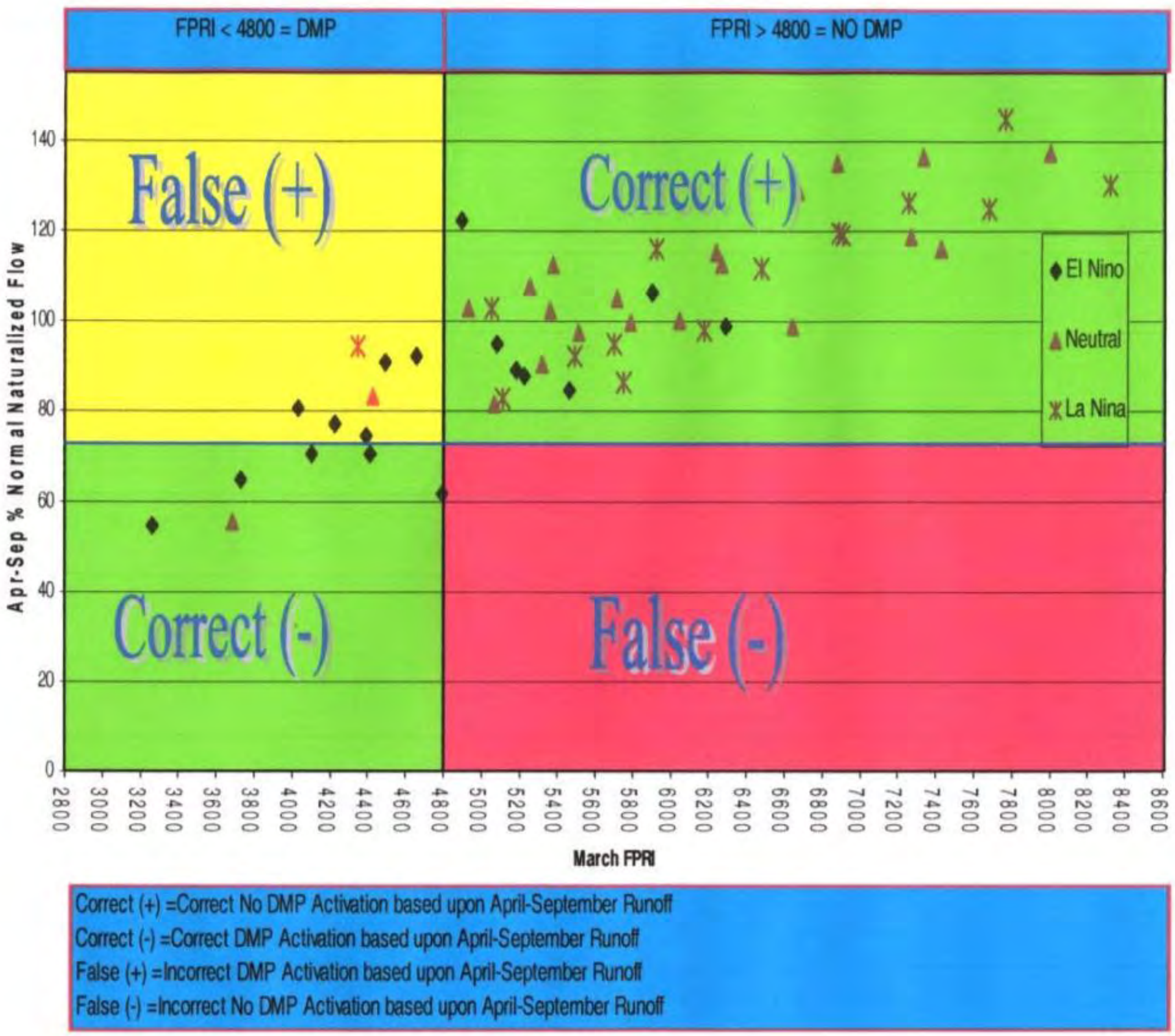


Figure 12
Comparison of April FPRI and April through September Percent Normal Naturalized Flow

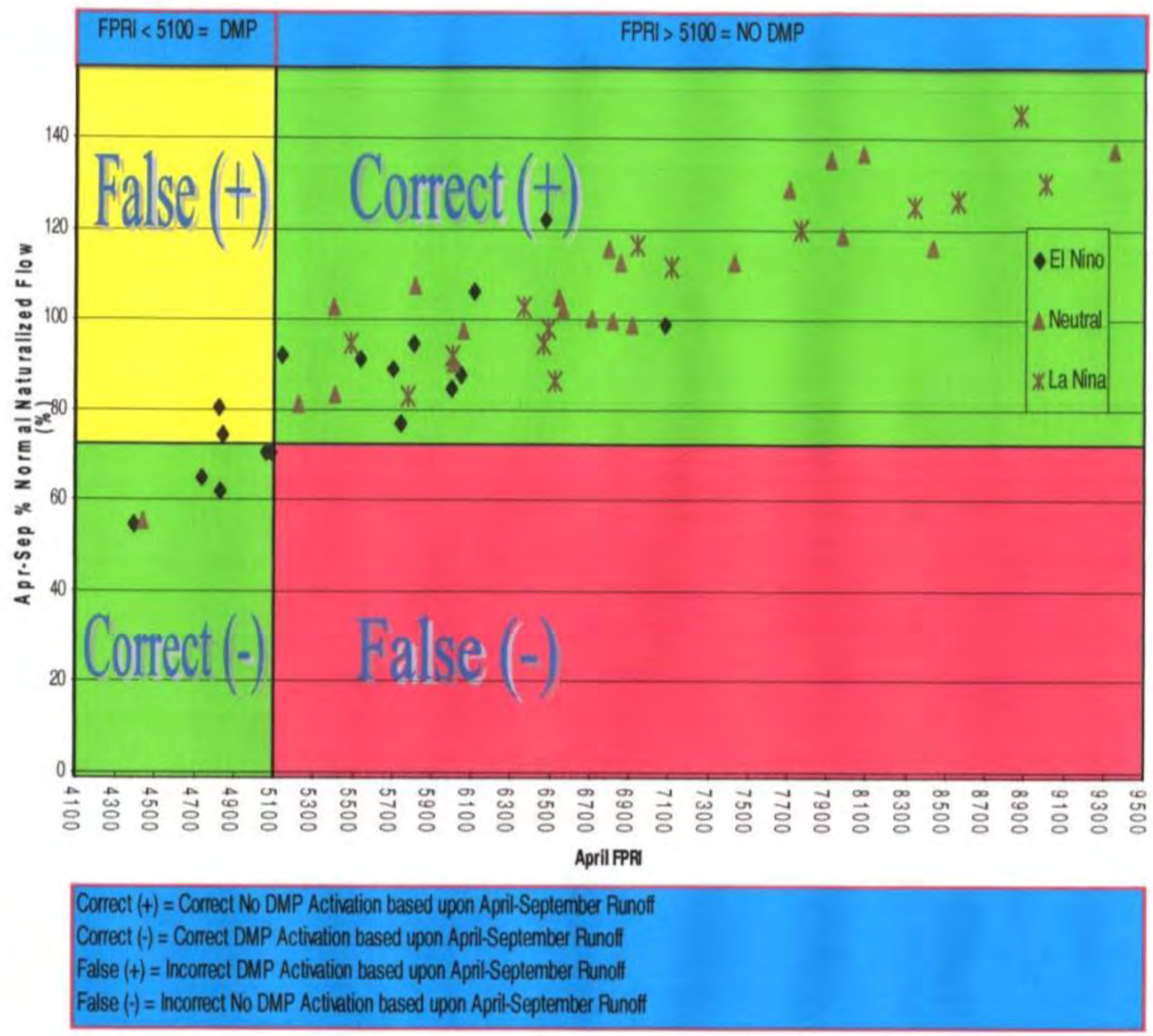
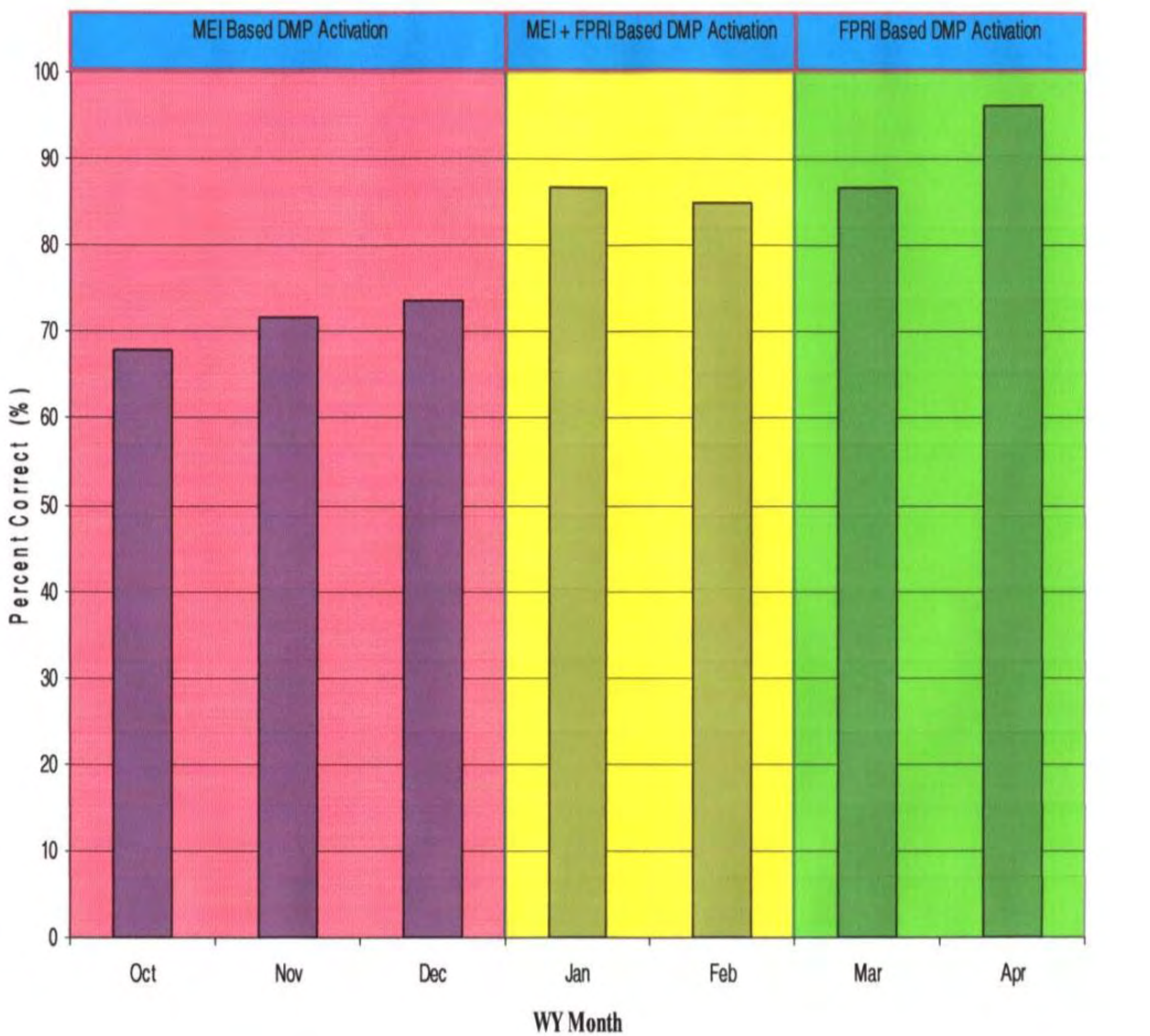


Figure 13
Percent of WYs (1951-2003) from October to April with Correct DMP Activation Decision



1.7 INDEPENDENT STATISTICAL ANALYSIS OF THE FPRI AND MEI AS DROUGHT INDICATORS

The FPRI is a runoff index model that uses precipitation and snow-course site measurements from stations in or near the Flathead Basin stations to assess and predict overall naturalized flow for the basin. Since the observations from these stations are all measurements of the "moisture input" to the basin, and are all driven by similar weather and climate, the data from these stations are often correlated. As a result, the predictor variables in the FPRI linear regression models will be correlated. The intercorrelation of the predictor variables may lead to the FPRI results that are unrepresentative of the true hydro-meteorological nature of the Flathead Basin. To address this concern, a principal components analysis (PCA) of the FPRI was conducted, the results of which are presented in section 1.7.1, below.

The USACE undertook an independent assessment of the FPRI and as a result is now able to support our overall approach of using the FPRI and MEI as indicators to activate and deactivate the Drought Management Plan. Along with the PCA investigation, the USACE made a number of suggestions intended to improve the accuracy of the FPRI forecasting tool including adjusting the component stations in the FPRI to account for stations that are no longer in service, estimating additional data to account for missing information, and using a longer period of record. These suggestions will be further reviewed and included in the ROD as appropriate.

The following section of this technical document (section 1.7.1) explains the analytical assessment used to verify the indices included in Alternatives 1 and 2. Although we expect to revise some of the model inputs based on recommendations made by the USACE, the overall approach of using the MEI and FPRI indicators to activate and deactivate a drought Management Plan is not likely to substantively change.

1.7.1 DATA AND ANALYSIS

A modeling dataset was constructed using meteorological data from the Flathead Basin. The April-September stream flow for the North Fork, Swan River, Middle Fork, South Fork, and the full Flathead Basin for years 1950-2006 was utilized. Precipitation data included October-March monthly liquid equivalent measurements and January-April monthly snow water equivalent measurements from select NRCS snow courses for the years 1950-2006. The following stations were utilized in the analysis:

- North Fork: Polebridge, Fortine, West Glacier, Hell Roaring Divide
- South Fork: West Glacier, Hungry Horse, Seeley Lake, Spotted Bear Mountain, Marias Pass

Several stations had missing observations. Since it is desirable to conduct the PCA on a complete dataset, missing observations were imputed. For each station with missing data, the most correlated stations for a given sub-basin or river fork, station type, and month were identified. A linear regression equation was estimated using the correlated station's data as the predictor for the missing observations and the resulting predicted values replaced the missing observations. For the January prediction month, an additional 14 years (1950-1963) were imputed over the original analysis to ensure a complete dataset for modeling.

In traditional regression modeling, the response variable is estimated using observed predictor variables. The best regression models are those in which the predictor variables each correlate highly with the dependent variable, but correlate at most only minimally with each other. When predictor variables are highly inter-correlated, model results may not be reliable.

A PCA will address these concerns since it is designed to reduce the dimensionality of a data set by eliminating redundancy among predictor variables. Principal components (PC) are linear combinations of the observed variables and are created without knowledge of the dependent variable. By using principal components as predictors in the models rather than the observed variables, the possibility of correlations among predictors is eliminated since principal components are independent of one another (i.e., there is zero correlations among principal components)

The response variable used for all principal component models is the April-September naturalized Flow for the entire Flathead Basin. The predictor variables are the liquid equivalent and snow water equivalent observations for the following stations[3]

- North Fork: Fortine, West Glacier, Hell Roaring Divide
- South Fork: West Glacier, Hungry Horse, Seeley Lake, Spotted Bear Mountain, Marias Pass

Eight PC models were fit: one for each fork (North and South) and prediction month (January through April). In all eight models, only the first principal component was found to be significant. In comparing the fit of the principal component models to their traditional linear model counterparts, it was found that model fit decreased very minimally, with a maximum decrease in the R-squares values of 5.0%. Therefore, the use of principal components has eliminated multicollinearity among the predictor variables with minimal effect on the overall model fit.

The predicted values from the PC regression models are highly correlated to prior FPRI results, with a minimum correlation coefficient of 0.96. Summaries of the traditional linear model and PC model results for the North and South Fork can be found in Table 2 and Table 3 below.

Table 2 Summary of North Fork Model Results

North Fork	January	February	March	April
Standard Regression Coefficients				
Intercept	3,597,545	2,725,562	1,802,109	1,035,082
Fortine	261,985	337,159	230,371	209,406
West Glacier	68,085	43,608	59,463	85,419
Hell Roaring Divide	108,994	77,640	98,750	90,066
R-Square	0.4711	0.6647	0.7171	0.7805

[3] A concern exists regarding the calculation method of liquid equivalent and snow water equivalent at the Polebridge station in the North Fork of the Flathead River. This site was removed from the principal components analysis with little reduction in the R-squared value. Future updates to the FPRI should consider removal of the Polebridge site from the FPRI index analysis

North Fork	January	February	March	April
PC Coefficients				
Intercept	6,609,490	6,609,490	6,609,490	6,609,490
PC1	624,234	730,748	768,902	822,613
R-Square	0.4654	0.6494	0.7090	0.7747
Correlation of PC Model Predicted Values to prior FPRI	0.991	0.987	0.991	0.979

Table 3 Summary of South Fork Model Results

South Fork	January	February	March	April
Standard Regression Coefficients				
Intercept	3,635,031	2,405,370	2,098,156	1,379,666
West Glacier	194,214	71,265	51,758	95,946
Hungry Horse	27,069	79,848	68,109	53,127
Seeley Lake	-26,270	-2,326	28,889	22,270
Spotted Bear Mountain	111,604	111,448	43,173	82,819
Marias Pass	58,342	94,234	116,011	77,461
R-Square	0.4222	0.6798	0.7493	0.8146
PC Coefficients				
Intercept	6,609,490	6,609,490	6,609,490	6,609,490
PC1	476,665	607,712	632,709	678,165
R-Square	0.4011	0.6607	0.7284	0.7949
Correlation of PC Model Predicted Values to prior FPRI	0.995	0.993	0.993	0.957

A set of principal component models were fit using the naturalized flows from the separate forks to investigate if this would improve the model fits. The April-September Naturalized Flow for the North Fork was used as the new response variable in the North Fork models, while the sum of the April through September Naturalized Flows for Swan River, Middle Fork, and South Fork was used as the new response variable in the South Fork models. For the February through April models, the maximum percent change in the R-square between the models using the full basin flow and those using the fork-specific flows is 4.9. For the January model, the percent change is -14.0 for North Fork and 12.9 for South Fork, however these effects will cancel each other out since North Fork and South Fork models are summed to obtain the FPRI estimates. Therefore, since the use of the fork-specific flows do not lead to a significant improvement in model fit, and for simplicity, it is recommended to continue using the overall basin Naturalized Flow as the response variable in all models.

Logistic regression models were used to test the ability of the MEI and the FPRI (produced using the output from the PC regression models) in forecasting drought conditions in the Flathead Basin. The models produce an index between 0 and 1. The closer the predicted value is to 1, the more likely the event of interest (in this case a drought) will occur. In order to test the ability of the MEI index and FPRI to forecast a drought, the following steps were taken:

- HDR updated the natural stream flow information from 1940-2006 and calculated for each WY the percent of averaged natural stream flow for each water year
- Utilized observations from 1951-2006 (years in which MEI data is available)
- Determined that 6 out of 56 years would have met the criteria (less than 72.6 percent of normal runoff).

However, use of a 72.6 percent of normal runoff produced a data set of only 6 possible years which was deemed too few to conduct the statistical analysis. Therefore, for the purpose of this analysis, the 30th percentile value of 88.6 percent was chosen. This value produced 15 of 56 observed years where below 88.6 percent of normal runoff occurred. The statistical analysis then was conducted to validate if use of the MEI and the FPRI had the statistical capability to predict a “drought” year.

In total, seven logistic regression models were prepared as follows:

- Period 1: October prediction based upon September MEI observations
- Period 2: November prediction based upon October MEI observations
- Period 3: December prediction based upon November MEI observations
- Period 4: January Prediction based upon December MEI observations and FPRI
- Period 5: February Prediction based upon January MEI and FPRI
- Period 6: March Prediction based upon FPRI
- Period 7: April Prediction based upon FPRI

Cut-off points within the range of 0 to 1 were determined for each period such that if the predicted value from the logistic regression model went over the cut-off value, there was a higher than average chance that a drought would occur.

Several evaluated measures were used to gage the statistical models and cut-off points. These include determining the significance of each model coefficient and calculating the classification error measurement statistics.

- Correctness = (number of correctly predicted events + the number correctly predicted non-events)/total number of observations
- Sensitivity = number of correctly predicted events/number of observed events
- Specificity = number of correctly predicted non-events/number of observed non-events
- False Positives = number of incorrectly predicted events/number of predicted events
- False Negatives = number of incorrectly predicted non-events/number of predicted non-events

For the purpose of measuring the classification error rates, an event is considered a year where a DMP was activated.

In general, models with high sensitivity and low false negatives are required to have a confidence in the ability of the regression model or indicator to predict future events. Table 4 summarizes the results of the logistic regression analysis.

Table 4 Classification Errors Based on Logistic Regression Models (1951-2006)

Period	Forecast in Month	Cut-off Point	Correctness	Sensitivity	Specificity	False Positives	False Negatives
1	OCT	0.3428	77%	75%	77%	65%	5%
2	NOV	0.3612	80%	88%	79%	59%	3%
3	DEC	0.3788	80%	88%	79%	59%	3%
4	JAN	0.3505	84%	100%	81%	53%	0%
5	FEB	0.4439	86%	100%	83%	50%	0%
6	MAR	0.3774	86%	100%	83%	50%	0%
7	APR	0.6812	95%	100%	94%	27%	0%

The MEI and current FPRI use correlation and frequency analysis in order to determine cut-off values for decision criteria. This approach works well since these two hydro-meteorological values are so highly correlated in a linear fashion with percent of average naturalized flow and observed drought. The MEI and current FPRI have the advantage over the PCA and logistic regression approaches as they are currently in place and have been used and tested for drought management planning in the Flathead Basin. The advantage of the latter methods is that they follow a set methodology and have a higher level of objectivity in determining outcomes. In addition, there is a statistical estimate of variability around the coefficients related to the MEI and FPRI predictor variables.

The fact that a different and more complex approach (combination of principal component analysis and logistic regression) essentially produced the same outcome gives credence to the methodology used and has a higher level of objectivity in determining outcomes. Table 5 below shows comparable classification errors to that produced using the PCA and logistic regression modeling approaches.

Table 5 Classification Errors Based on MEI and Current FPRI Decision Criteria (1951-2006)

Period	Forecast in Month	Correctness	Sensitivity	Specificity	False Positives	False Negatives
1	OCT	77%	88%	75%	63%	3%
2	NOV	79%	88%	77%	61%	3%
3	DEC	79%	88%	77%	61%	3%
4	JAN	84%	100%	81%	53%	0%
5	FEB	84%	100%	81%	53%	0%
6	MAR	93%	100%	92%	33%	0%
7	APR	98%	100%	97%	11%	0%

The methods used to select cut-off FPRI and MEI values are based upon observed historical limits. While this is logical, it assumes that the historical climate regime will be reflective of future conditions. A trend analysis was completed for both the percent normal flow and the averaged monthly MEI (Figures 14 and 15).

The trend analysis indicates that there are statistically significant trends in both the percent of normal flow and average monthly MEI. The percent of normal flow has been slowly decreasing as the MEI has been slowly increasing from 1951 to 2006. The significance of both the trend lines suggests that periodic updates of the FPRI and MEI indicators and their cut-off values should be implemented. It is recommended that a review of the MEI and the FRPI's predictive ability be done at least once every five years.

Figure 14
Trend analysis of Percent of Normal Flow on Flathead River from 1951-2006

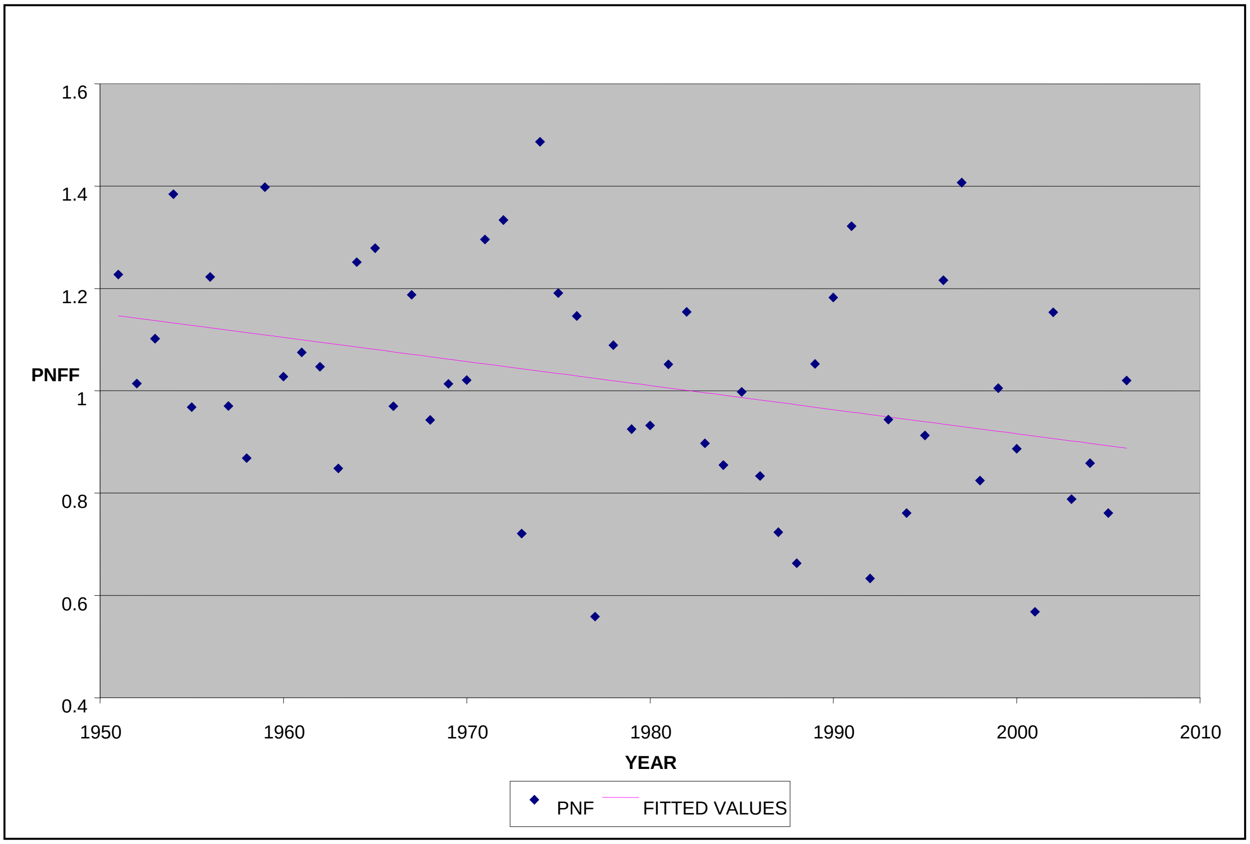
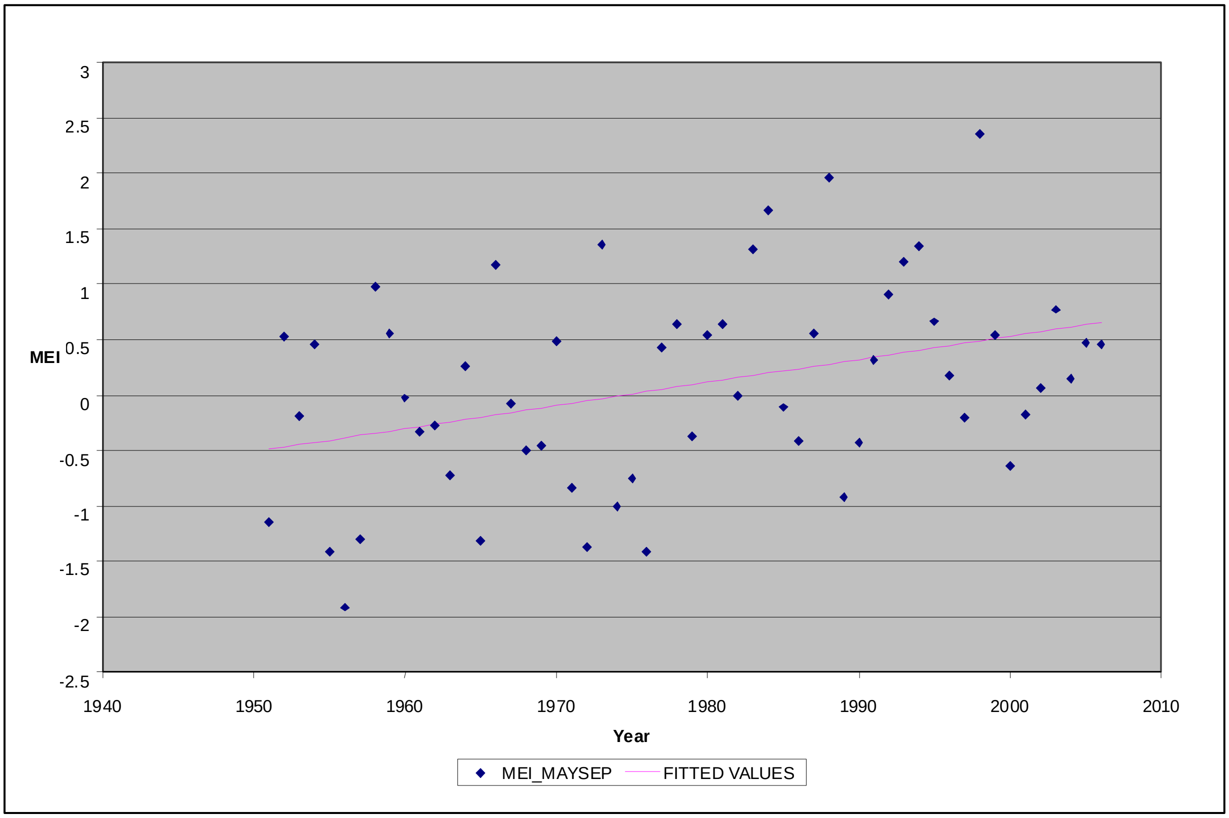


Figure 15
Trend analysis of Percent of MEI (May-Sep) on Flathead River from 1951-2006



Overall, based on the results of the model development, outcomes of DMP activation were forecasted at a success rate of 75 percent at the start of the forecast period and up to 100 percent capture by the January forecast. False positives are high at the beginning of the forecast period at 65 percent and drop to 27 percent by March for the April forecast. Further validation of the models were done by re-fitting the logistic regression model using only observations from 1951 to 2001 to forecast for years 2002 through to 2006. Forecasts were compared to observations if a DMP was activated in that same forecast period or not. Based on the results of the model validation, the FPRI and MEI models can correctly forecast an outcome from 77 percent to 95 percent of the time depending on the period. Other real time forecasting methods and outlooks are needed to continue monitoring weather conditions that may influence runoff after the March period. The FPRI and MEI indicators could easily be developed into a spreadsheet or GIS-based decision support tool to aid in analysis and data management for management of the reservoir.

Chapter 2.0 FLATHEAD LAKE MODEL DEVELOPMENT AND MODELING OF ALTERNATIVES

Simulation models of Flathead Lake were used to support the Drought Management Plan Environmental Impact Statement process for the operation of the Kerr Hydroelectric Project at Flathead Lake, Montana.

The Flathead Lake model was constructed using the STELLA™ software package developed by High Performance Systems, Inc. STELLA™ is a graphical and object-based software package for creating systems analysis models. The model is used in water resources planning, business forecasting, and other similar applications. STELLA™ strengths include flexibility and facility of customization. The Flathead Lake model used version 7.01 of the STELLA™ software in a Windows operating environment.

2.1 DROUGHT MANAGEMENT PLAN ALTERNATIVES MODELING

The Flathead Lake drought management EIS model provides operational details regarding Alternatives 1 and 2. In general, both alternatives rely on climate indicators to determine if a drought is likely. If a drought is predicted, both Alternative 1 and Alternative 2 adopt a lake elevation of 2,888’ msl for the January 1 through April 15 period. Under Alternative 2, if the April FPRI is less than 4,566 (equivalent to a runoff prediction of < 65 percent of normal), a deviation from the minimum instream flow requirement of 12,700 cfs between May 15 and June 30 to 9,000 cfs would be allowed. No minimum instream flow deviations would be allowed under Alternative 1.

Under both Alternatives, the lake elevation target for the June 15 through September 15 period would be revised from 2,893’ msl to 2, 892.2’ msl.

2.1.1 MODELING APPROACH FOR ALTERNATIVE 1

An understanding of the operational effects of Alternative 1 was obtained through modeling. Three variations of the Alternative 1 model are evaluated based on the assumptions regarding lake refill. These variations are classified as 1A, 1B, and 1C as shown in Figure 16, Figure 17, and Figure 18.

The model used daily input data from the period of record between WYs 1939 and 2001. In general, the model was set to operate Flathead Lake to meet lake level targets of 2,888’ msl between January 1 and April 15, if the historic climate indicators predicted drought. If at anytime during the January through April period the climate indicators resulted in the deactivation of the drought management plan, the model would revert to the requirements of Article 43.

It is evident from the figures below that the rule curves 1A, 1B, and 1C are modeled in such a way that they mimic each other from October 1 to April 15. For alternative 1A, 1B, and 1C rule curves, the lake elevation gradually decreases from 2,892.2’ msl, to minimum target lake elevation of 2,888’ msl during a period of three months (October 1 to December 31). The lake is modeled to keep the elevation of 2,888’ msl from January 1 to April 15 of the WY for the three rule curves.

Under rule curve 1A, the system is driven to achieve lake refill as soon as possible. To achieve this, the rule curve used in the model includes an instantaneous increase from 2,888' msl to 2,893' msl on April 16, as shown in Figure 16. This rule curve was created so that the model logic would not place any artificial constraints on refill. The model would allocate the incoming flows to satisfy ramping and minimum instream flow requirements and place the rest of the water into storage in Flathead Lake thereby raising the water level. The model cannot mimic potential real time operations which would be anticipating future rain or runoff events based upon weather forecasts. The point of this analysis was to demonstrate the effectiveness of relaxing the May 30th, target elevation for Flathead Lake during period of low precipitation and runoff. Under rule curve 1B, the model uses a relaxed approach to lake refill, and the rule curve increases linearly from 2,888' msl to 2,893' msl during period of April 16 to June 15 shown in Figure 17 For rule curve 1C (Figure 18), the model strikes a balance between the instantaneous and relaxed approaches, calling for a linear lake level target increase from 2,888' msl to 2,893' msl during period of April 16 to May 15.

Figure 16
Comparison of Flathead Lake Alternative 1A Rule Curve, Article 43 Target Lake Elevation and Simulated Lake Elevation for WY 1973

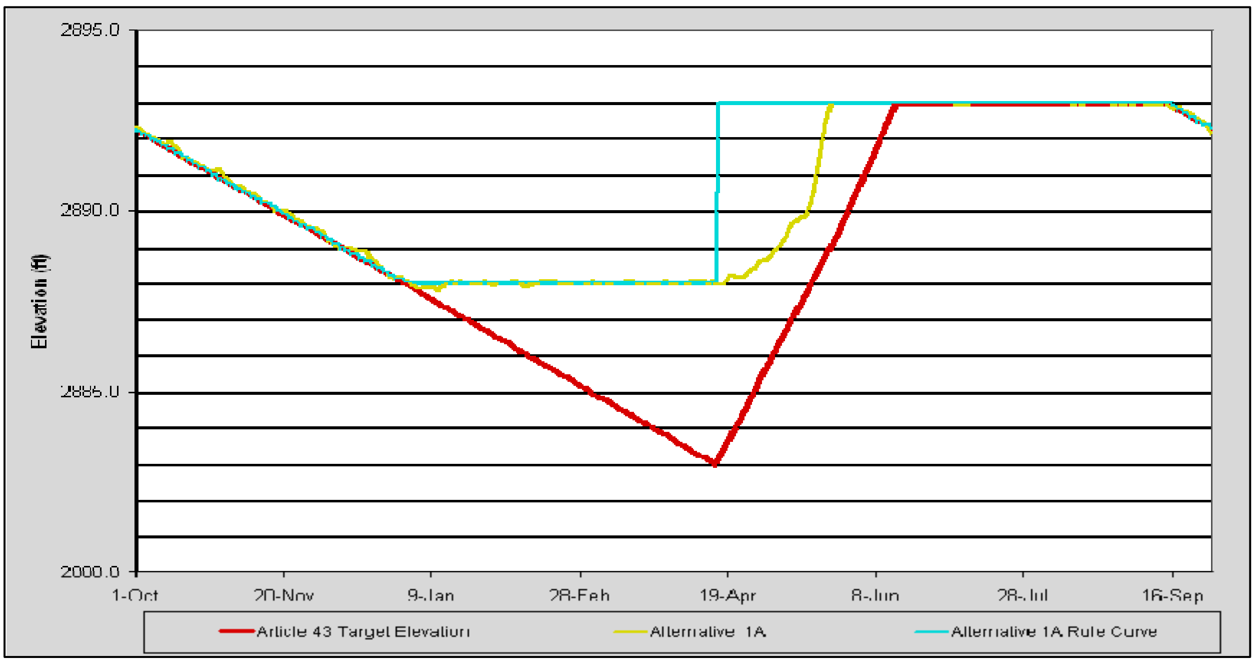


Figure 17
Comparison of Flathead Lake Alternative 1B Rule Curve, Article 43 Target Lake Elevation and Simulated Lake Elevation for WY 1973

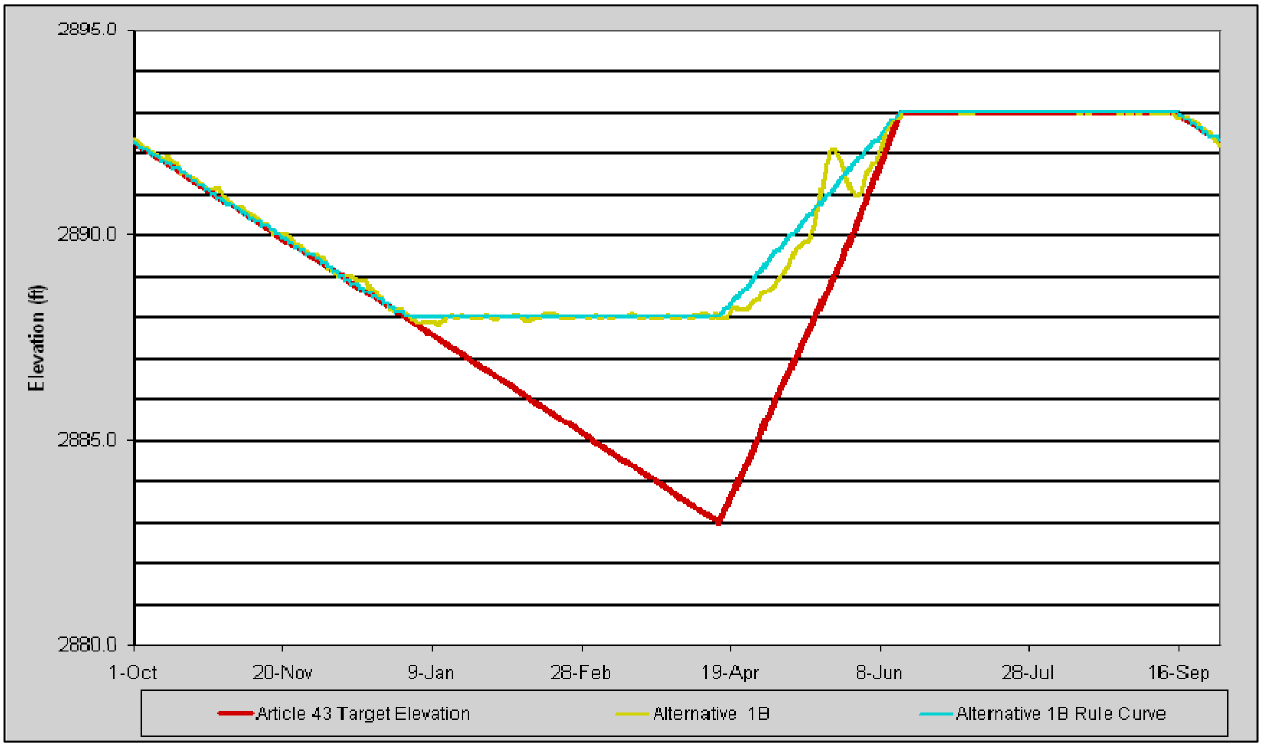
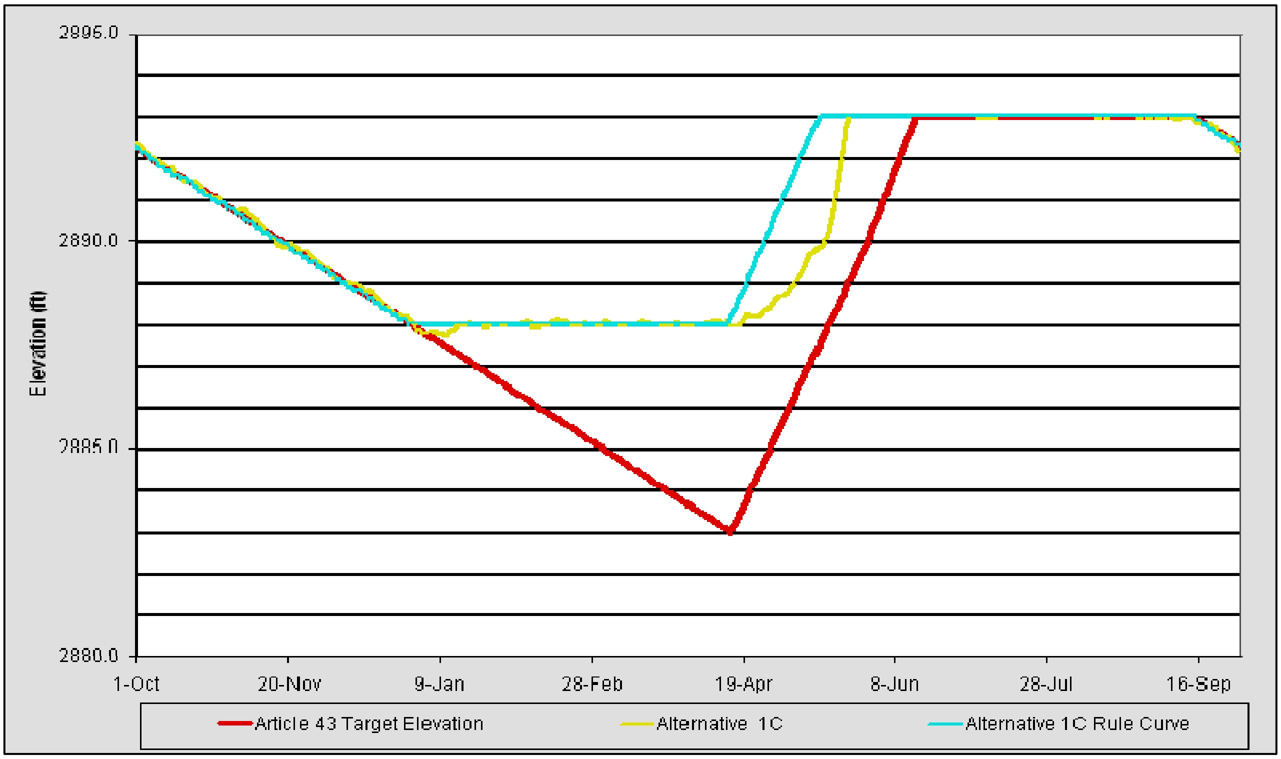


Figure 18
Comparison of Flathead Lake Alternative 1C Rule Curve, Article 43 Target Lake Elevation and Simulated Lake Elevation for WY 1973



The modeling results for ten drought years (1940, 1941, 1944, 1973, 1977, 1987, 1988, 1992, 1994, and 2001) were evaluated to determine if the implementation of Alternative 1 would have met the revised target average lake elevation of 2,892.2' msl for the June 15 to September 15 period. The summary of the results for Alternative 1 is shown in Table 6. A "Y" in the table means that the lake achieves an average elevation of 2,892.2' msl or greater over the June 15 to September 15 period; an "N" indicates that the target average elevation was not met.

The model results indicate that in 1973, 1987, 1988, 1992, and 1994, the average lake elevation would have met or exceeded this target. The average lake elevation for these five drought years was just over 2,892.7' msl. However, for the more severe drought years of 1940, 1941, 1944, 1977, and 2001, the June 15 to September 15 average lake elevation was slightly under 2,890.1' msl. Alternative 1A and 1C meet the average lake elevation criteria as shown in Table 6. In short, Alternative 1A and 1C meet the lake level criteria for 50 percent (5/10) of drought water years. Figure 19 presents the lake elevation results from the model run of Alternative 1 for 1973, a year where Alternative 1 would have been successful in achieving full pool through the summer months. As a comparison, Figure 20 shows the results from the model run for 1977, a more severe drought year where Alternative 1 is ineffective in achieving summer lake elevations.

Table 6 BIA Flathead Lake DMP EIS Comparison of Preliminary Modeling Results*

Year	Alternative 1 No MIF Deviations			Alt 2	Alternative 2 MIF Deviations Allowed					Alternative 2 MIF Deviations Allowed				
				12700	Assumed Minimum - 10500					Assumed Minimum - 8000				
	1A	1B	1C	2C Shift	2A	2B	2C	2C Shift	MIF Dev?	2A	2B	2C	2C Shift	MIF Dev?
1940	N	N	N	N	N	N	N	N	N	N	N	N	N	N
1941	N	N	N	N	N	N	N	N	N	N	N	N	N	N
1944	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y
1973	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	N
1977	N	N	N	N	N	N	N	N	Y	Y	Close	Y	Y	Y
1987	Y	N	Y	Y	Y	N	Y	Y	N	Y	N	Y	Y	N
1988	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	N
1992	Y	N	Y	Y	Y	N	Y	Y	N	Y	N	Y	Y	N
1994	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	N
2001	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

* A "Y" in the table means that the lake achieves an average elevation of 2892.2 or greater over the June 15 to September 15 period; an "N" indicates that the target average elevation was not met.

A frequency analysis of modeled lake elevations was conducted to further evaluate the effectiveness of Alternative 1. Figure 21 presents a comparison of the lake elevation frequency curves for modeled lake elevations (Alternative 1C) and historic lake elevations on June 15.[4] Under Alternative 1, the lake would have met the June 15 target elevation of 2,893' msl, 50 percent of the time, and would have met the Alternative 1 revised June 15 target lake elevation of 2,892.2' msl approximately 75 percent of the time. Figure 21 also indicates that the lake would have met the revised target lake elevation for the seven drought years since 1965 for approximately 65 percent of the time. Similarly, the revised June 15th target average lake elevation would have been met approximately 56 percent of the time for historic period of 1965 through 2004. Therefore, Alternative 1 improves upon the historic record for meeting the revised June 15 target lake elevation of 2,892.2' msl.

Figure 22 presents a comparison of the lake elevation frequency curves for modeled lake elevations (Alternative 1C) and historic lake elevations for the June 16 to September 15 period. Under Alternative 1,

[4] 1965 was selected as the beginning of the period of record because Article 43 was modified in 1965 to incorporate the MOU between MPC and the USACE, calling for certain lake levels at certain times of the year. Prior to 1965, there was a lack of consistency in managing lake levels from year to year. For that reason, using years prior to 1965 would introduce unnecessary variability in the data analysis. It is important to note that this applies to the use of historic data only for the purposes of establishing the affected environment. Modeling techniques were used to evaluate and mimic the entire period of record under current license requirements as modified by Alternatives 1 and 2.

during the seven drought years since 1965 the revised target average lake elevation of 2,892.2' msl would have been met approximately 65 percent of the time.

Figure 22 also indicates that historically for those same seven drought years, the lake met the revised average target lake elevation approximately 75 percent of the time. Therefore, it can be concluded from the comparison that Alternative 1 is worse than the post 1965- historic record for meeting the June 16 to September 15 target lake elevation.

Figure 19
Alternative 1 Model Results – WY 1973

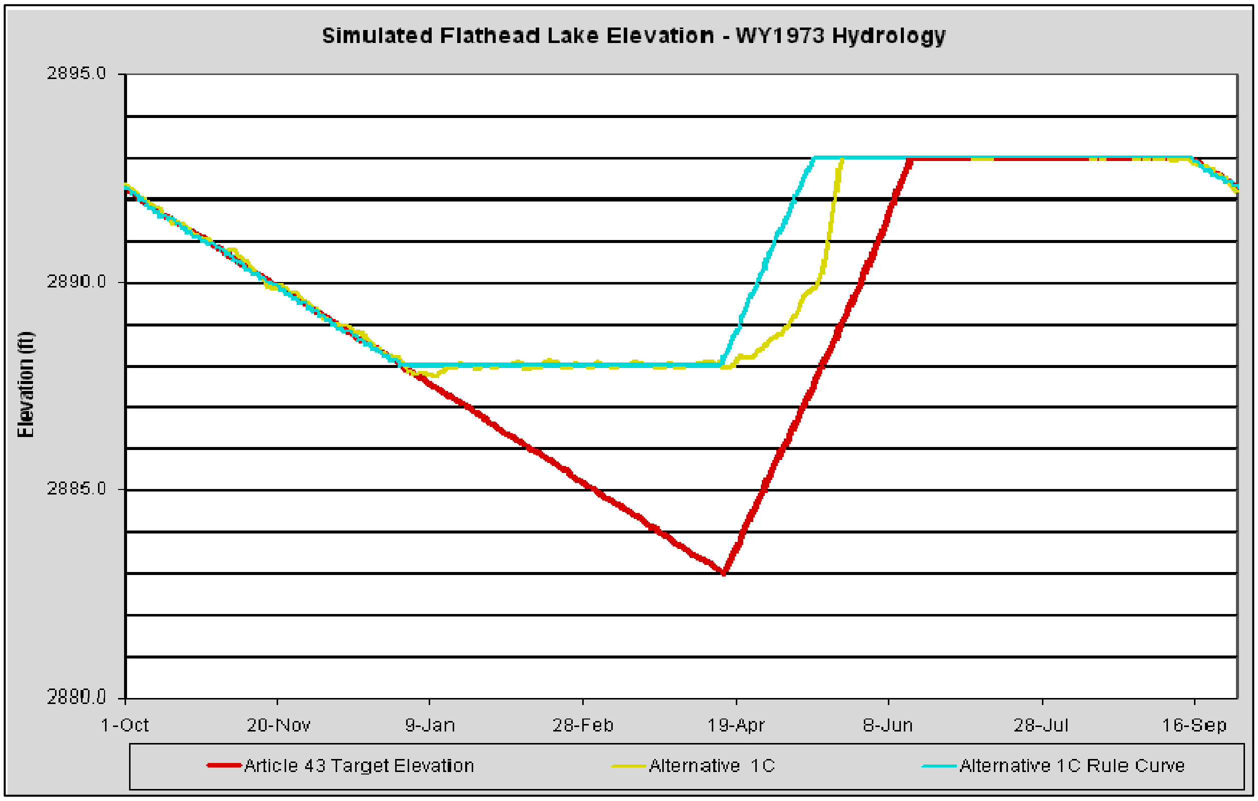


Figure 20
Alternative 1 Model Results – WY 1977 Lake Elevations

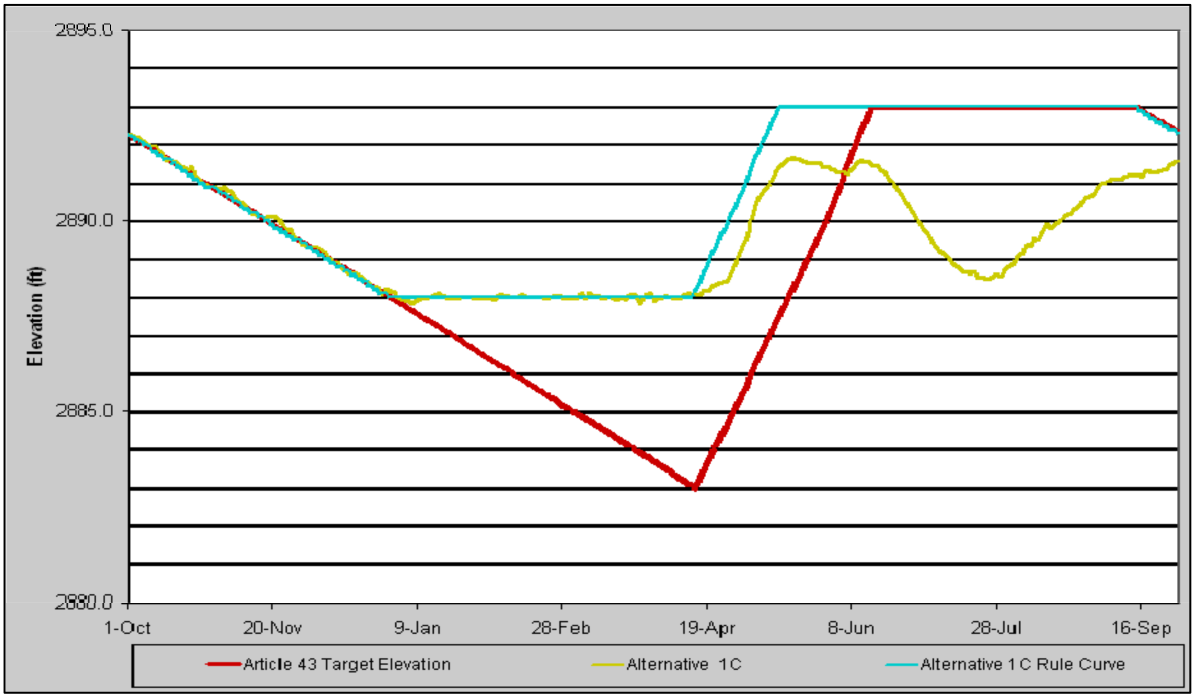
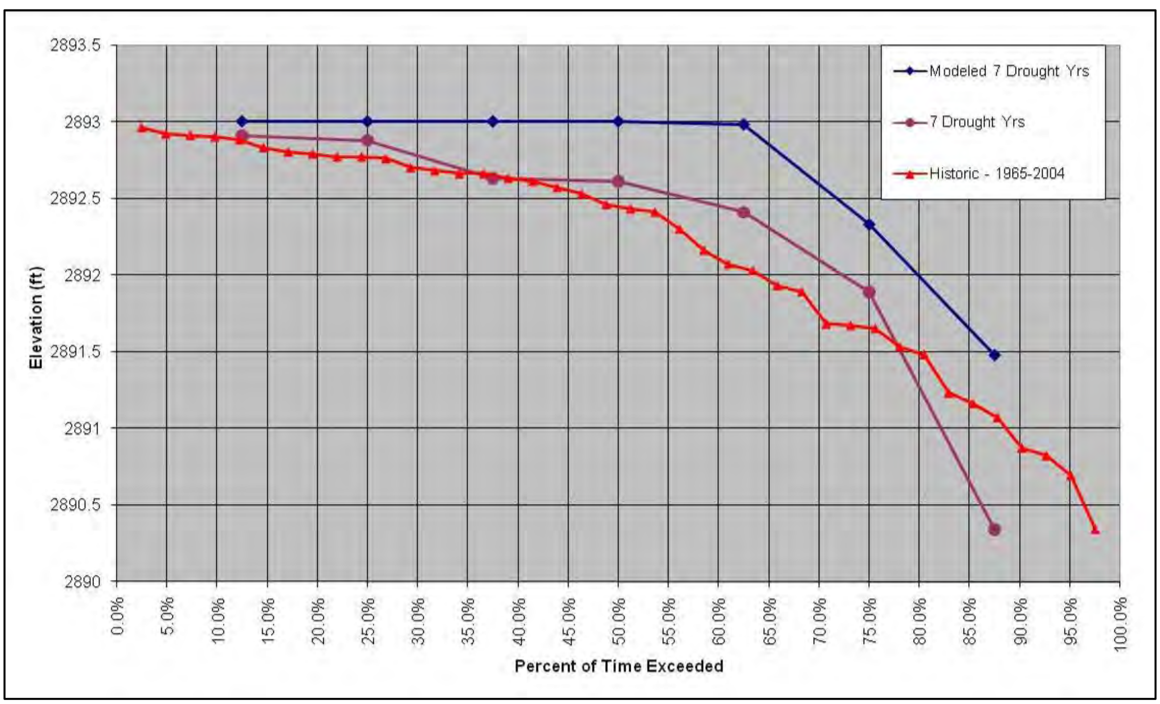


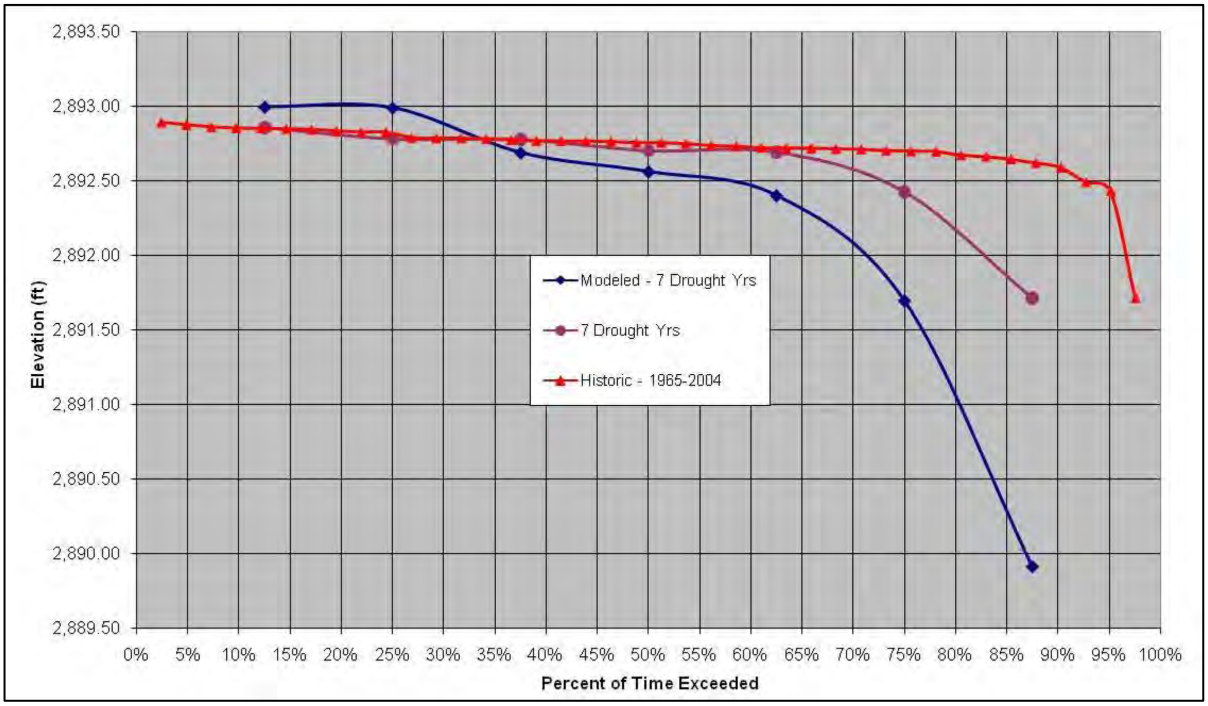
Figure 21
Comparison of Flathead Lake Historic (1965-2004), Seven Drought Years* and Modeled Alternative 1C June 15 Elevation Frequency Curves



* The seven drought years modeled are 1973, 1977, 1987, 1988, 1992, 1994, and 2001.

Figure 22

Comparison of Flathead Lake Historic (1965 – 2004), Seven Drought Years* and Modeled Alternative 1C June 16 – September 15 Elevation Frequency Curves



* The seven drought years modeled are 1973, 1977, 1987, 1988, 1992, 1994, and 2001.

2.1.2 MODELING APPROACH FOR ALTERNATIVE 2

The modeling approach for Alternative 2 was essentially the same as for Alternative 1 with the addition of minimum instream flow deviation decision logic. In general, the model logic operated Flathead Lake to meet lake level targets of 2,888' msl between January 1 and April 15, if the historic climate/FPRI indicators predicted drought. If at anytime during the January through April period the climate/FPRI indicators resulted in the deactivation of the drought management plan, the model would revert Flathead Lake operations to the requirements of Article 43.

In early April, if the lesser of the FRPI or the Official April Final runoff forecast from the National Weather Service – Northwest River Forecast Center is less than or equal to 65 percent of normal, a deviation from the minimum instream flow requirements was allowed in the model runs. Review of historic runoff forecasts and calculations of the FPRI based on historic precipitation data indicates that this would only occur for WYs 1944, 1977, and 2001. Therefore the Alternative 2 modeling results for all other years were identical to Alternative 1.[5]

[5] FRPI proxies were developed for water years 1930-1950 based on correlation with data available during 1951-2001 period.

Different variations of the Alternative 2 model were evaluated based on the minimum in-stream flow deviations and assumptions regarding lake re-fill. The standard minimum in-stream flow peak of 12,700 cfs was used to model Alternative 2. In addition, Alternative 2 was also modeled for two assumed minimum instream flow deviations with peaks of 10,500 cfs and 8,000 cfs. Like Alternative 1, the variations based on the lake refill were modeled for Alternative 2 and were classified as 2A, 2B, and 2C (with the same lake elevation operational modifications as 1A, 1B, and 1C, as shown in Figure 16, Figure 17, and Figure 18). Moreover, a two week shift in the peak was also applied to the Alternative 2C model variation and was classified as 2C Shift as shown in Table 6.

The analysis of modeling results revealed that the Alternative 2C shift-12,700 would have met the lake level targets for drought WYs 1973, 1987, 1988, 1992, and 1994 (five of the ten drought years - same as Alternative 1A and 1C). It was also found that if the minimum instream flow would be allowed to deviate to 10,500 cfs, the Alternative 2A, 2C, and 2C Shift modeling results could have met the lake level target for six of the ten drought WYs. However, lake level targets for drought WYs 1940, 1941, 1944, and 1977 were still not met by Alternative 2 with a minimum instream flow deviation of a 10,500 cfs peak. This led to the modeling approach of further decreasing the allowable minimum instream flow peak down to 8,000 cfs. It is interesting to note that by allowing the minimum instream flow deviation down to 8,000 cfs, the modeling results for Alternatives 2A, 2C, and 2C Shift improve. Specifically, revised lake level targets were met for eight of the ten drought WYs. (Simulation results for 1940 and 1941 are the two years where the revised lake elevation was not met; this appears to be due to the historic climate indicators not calling for a minimum instream flow deviation).[6] It appears that providing operational flexibility and looking closely at forecast runoff numbers can result in maintaining flows as high as possible, while at the same time minimizing lake level impacts. Therefore Alternative 2C was selected for detailed evaluation in the EIS.

A frequency analysis of modeled lake elevations was conducted to further evaluate the effectiveness of Alternative 2. The frequency analysis of Alternative 2 was conducted using the same assumptions as for Alternative 1.

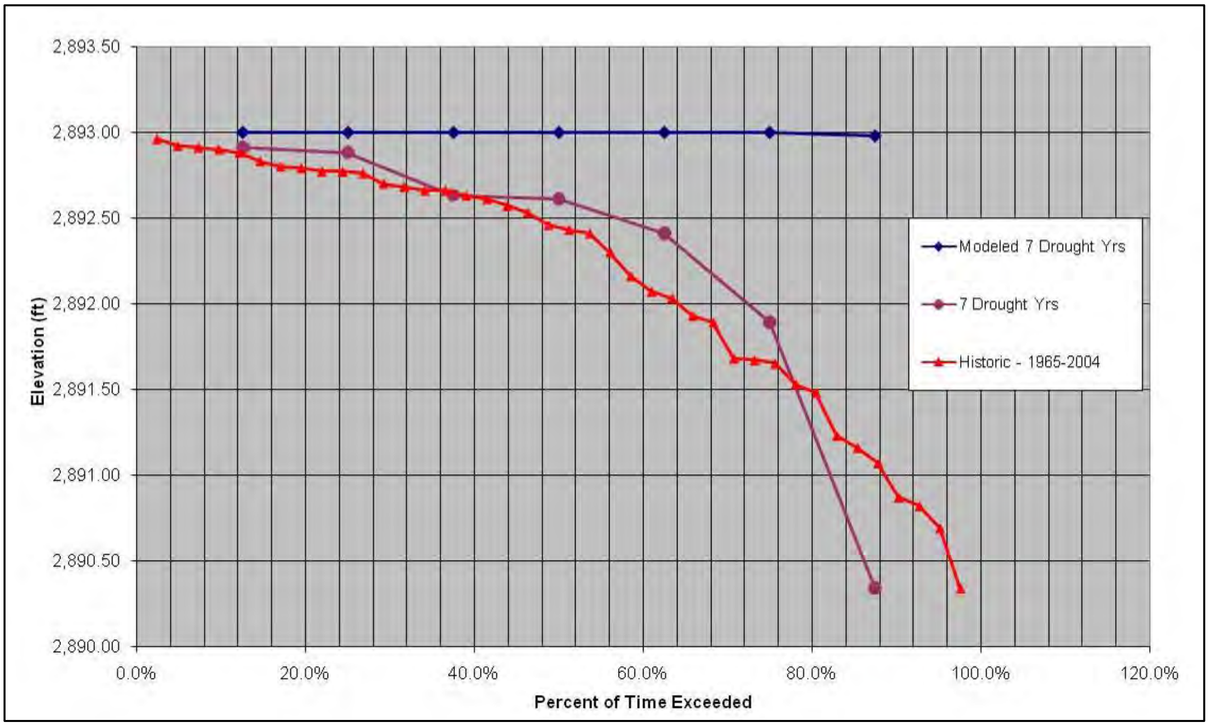
Figure 23 presents a comparison of the lake elevation frequency curves for modeled lake elevations (Alternative 2C-8000) and historic lake elevations on June 15. It is interesting to note that under Alternative 2C, with an allowed minimum instream flow peak deviation up to 8,000 cfs, the lake would have exceeded the revised June 15 target lake elevation of 2,892.2’ msl feet in all drought years since 1965. Historically, the lake has met the revised target lake elevation during the seven drought years since 1965 for only about 68 percent of the time as shown in Figure 23. Therefore, Alternative 2C-8,000 improves upon Alternative 1C and the historic record for meeting the revised June 15 target lake elevation of 2,892.2’ msl.

Figure 24 presents a comparison of the lake elevation frequency curves for modeled lake elevations for the seven drought years since 1965 (Alternative 2C-8000) and historic average lake elevations for the

[6] As stated before, the MEI value is not explicitly calculated prior to WY 1951, thus a proxy with the SOI was employed to attempt to the ENSO status.

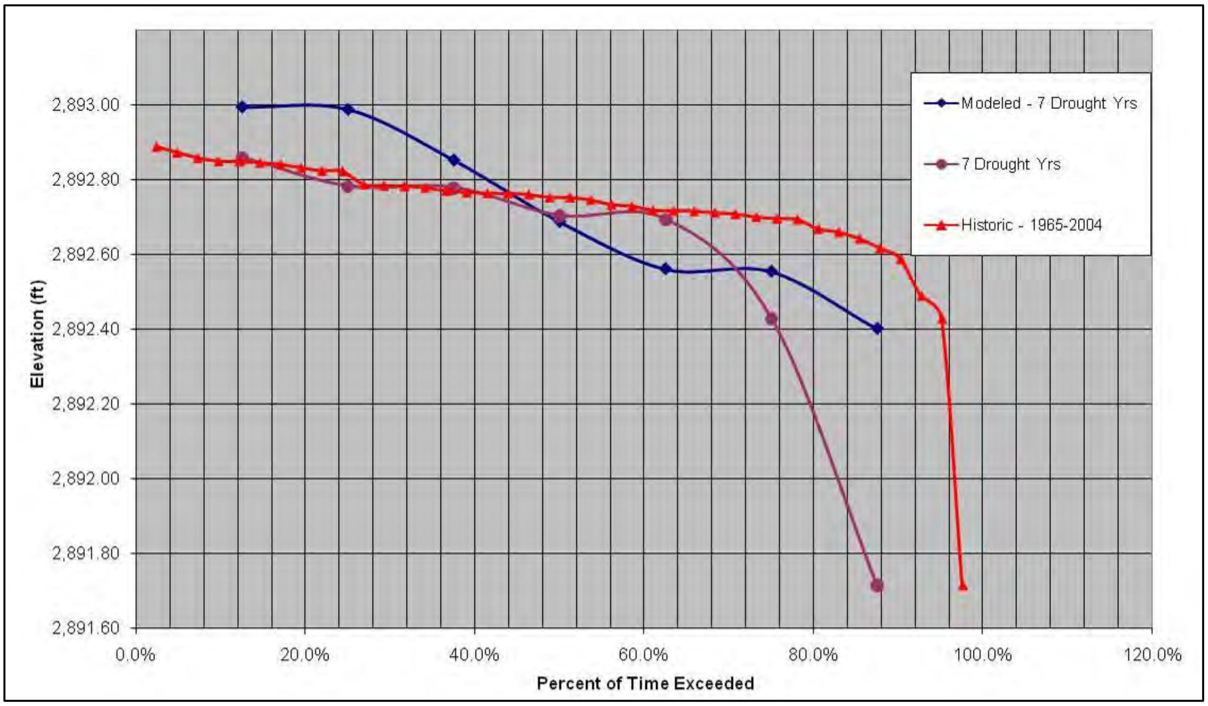
June 16 to September 15 period. It is noticed that in all drought years since 1965, under Alternative 2, the revised lake level target of 2,892.2' msl would have been exceeded from June 15 through September 15. Furthermore, under Alternative 2C-8,000, the lake elevation would have exceeded 2,892.5' msl approximately 80 percent of the time. Figure 24 indicates that historically the lake met the revised target lake elevation during the seven drought years only about 80 percent of the time. Therefore, Alternative 2C-8000 improves upon the post-1965 historic record of drought year lake elevations during the June 16 through September 15 period.

Figure 23
Comparison of Flathead Lake Historic (1965 – 2004), Seven Drought Years* and Modeled Alternative 2C-8000 June 15 Elevation Frequency Curves



* The seven drought years modeled are 1973, 1977, 1987, 1988, 1992, 1994, and 2001.

Figure 24
Comparison of Flathead Lake Historic (1965 – 2004), Seven Drought Years* and Modeled Alternative 2C-8000 June16 – September 15 Elevator Frequency Curves



* The seven drought years modeled are 1973, 1977, 1987, 1988, 1992, 1994, and 2001.

Chapter 3.0 FLATHEAD PRECIPITATION – RUNOFF INDEX

The utilization of Montana Climate Division 1 precipitation data in earlier phases of the project was deemed adequate in assessing the basin-wide snowpack that accrues during the October through March period. The preliminary correlation between these variables and the ensuing spring to summer runoff proved promising and was used in performing preliminary hydro-climatic index evaluations.

Since the Climate Division covers an area much larger than the Flathead Lake watershed, a refined set of precipitation stations located in the Flathead watershed was tested for predictive relevance. As a result, a "Flathead Precipitation-Runoff Index" (FPRI) was derived to reduce the uncertainty of the precipitation-runoff relationship and to help provide a more robust guideline in monitoring the precipitation of the winter/early spring. The R-squared of the October to March Climate Division precipitation to the following April to September naturalized runoff is calculated to be approximately 0.71 for the period 1951-2003. By comparison, the R-squared of the FPRI (given information available in early April) is approximately 0.83 when compared to the April to September runoff for the same period.

The FPRI is a combination of sites measuring precipitation in either liquid equivalent (LE) at cooperative observing sites or the snow water equivalent (SWE) at select snow course sites. One set of stations focuses on the status for the combined runoff of the South and Middle Forks of the Flathead River, along with the Swan River (SMS). The second set of stations is focused on gauging the status and potential runoff of the North Fork of the Flathead River (NF). The result of the FRPI computation is measured in units of thousand acre-feet (KAF). The computed values should be considered as an expression of the status of the hydro-meteorological condition of the basin at a specific point in time rather than as an explicit runoff forecast.

The stations used in the determination of the FPRI were derived from an extensive list of "candidate" stations in and around the Flathead Lake basin. The primary criterion for a station's inclusion was that it had an adequate period of record of data from the March/April standpoint, as well as, a reasonable historical record of early January observations. (The lack of an adequate number of January observations is primarily confined to the manually observed snow course sites).

Historical examples for calculating the FPRI, and contact information for acquiring the information needed to compute the FPRI, are listed in Chapter 3.5.

3.1 EARLY JANUARY FPRI

For this early estimate, the SWE values to be used as input would be the January 1 SWE measurement and the summation of the October, November, and December LE precipitation values.

FPRI (SMS) Jan = [SWE (Spotted Bear Mountain) * 70558] + [SWE (Marias Pass) * 47436] + [LE (West Glacier) * 44810] + [LE (Hungry Horse) * 31453] + [LE (Seeley Lake) * 36124] + 494570

FPRI (NF) Jan = [SWE (Hell Roaring Divide) * 15818] + [LE (West Glacier) * 29408] + [LE (Polebridge) * 29648] + [LE (Fortine) * 44547] + 110777

Final FPRI Jan = (FPRI (SMS) Jan + FPRI (NF) Jan) / 1000

Final FPRI Jan: This value should be utilized as input into the observation check in assessing potential DMP implementation.

3.2 EARLY FEBRUARY FPRI

For this early estimate, the SWE values to be used as input would be the February 1 SWE measurement and the summation of the October, November, December, and January LE precipitation values.

FPRI (SMS) Feb = [SWE (Spotted Bear Mountain) * 70558] + [SWE (Marias Pass) * 47436] + [LE (West Glacier) * 44810] + [LE (Hungry Horse) * 31453] + [LE (Seeley Lake) * 36124] + 703811

FPRI (NF) Feb = [SWE (Hell Roaring Divide) * 15818] + [LE (West Glacier) * 29408] + [LE (Polebridge) * 29648] + [LE (Fortine) * 44547] + 157644

Final FPRI Feb = (FPRI (SMS) Feb + FPRI (NF) Feb) / 1000

Final FPRI Feb: This value should be utilized as input into the observation check in assessing potential DMP implementation in early February.

3.3 EARLY MARCH FPRI

For this early estimate, the SWE values to be used as input would be the March 1 SWE measurement and the summation of the October, November, December, January, and February LE precipitation.

FPRI (SMS) Mar = [SWE (Spotted Bear Mountain) * 70558] + [SWE (Marias Pass) * 47436] + [LE (West Glacier) * 44810] + [LE (Hungry Horse) * 31453] + [LE (Seeley Lake) * 36124] + 857988

FPRI (NF) Mar = [SWE (Hell Roaring Divide) * 15818] + [LE (West Glacier) * 29408] + [LE (Polebridge) * 29648] + [LE (Fortine) * 44547] + 192178

Final FPRI Mar = (FPRI (SMS) Mar + FPRI (NF) Mar) / 1000

Final FPRI Mar: This value should be utilized as input into the observation check in assessing potential DMP implementation/revocation in early March.

3.4 EARLY APRIL FPRI

For this estimate, the SWE values to be used as input would be the April 1 SWE measurement and the summation of the October, November, December, January, February, and March LE precipitation.

FPI (SMS) Apr = [SWE (Spotted Bear Mountain) * 70558] + [SWE (Marias Pass) * 47436] + [LE (West Glacier) * 44810] + [LE (Hungry Horse) * 31453] + [LE (Seeley Lake) * 36124] + 1001153

FPI (NF) Apr = [SWE (Hell Roaring Divide) * 15818] + [LE (West Glacier) * 29408] + [LE (Polebridge) * 29648] + [LE (Fortine) * 44547] + 224245

Final FPRI Apr = (FPRI (SMS) Apr + FPRI (NF) Apr) / 1000

Final FPRI Apr: This final value should be utilized as input into the observation checkpoint in assessing potential DMP implementation/revocation in early April.

3.5 FPRI CALCULATION EXAMPLES

An example of calculations for the FPRI is below.

3.5.1 FPRI EXAMPLE #1 (JANUARY 1981)

Data: Snow course measured SWE

Spotted Bear Mountain = 3.3”

Marias Pass = 5.9”

Hell Roaring Divide = 11.0”

Data: Liquid Equivalent Precipitation Data (LE)

West Glacier

October 1980 = 0.86”

November 1980 = 2.89”

December 1980 = 7.72”

Oct-Dec Total = 11.47”

Hungry Horse

October 1980 = 1.32”

November 1980 = 2.82”

December 1980 = 7.11”

Oct-Dec Total = 11.25”

Seeley Lake

October 1980 = 0.81”

November 1980 = 1.13”

December 1980 = 4.70”

Oct-Dec Total = 6.64”

Fortine

October 1980 = 0.65”

November 1980 = 1.10”

December 1980 = 2.48”

Oct-Dec Total = 4.23”

Polebridge

October 1980 = 0.34”

November 1980 = 2.94”

December 1980 = 5.69”

Oct-Dec Total = 8.97”

The following is a summary example of the calculations used to derive the January 1981 FPRI from the precipitation data listed above. The equations are developed in accordance with the formulas presented in Section 3.1 above.

FPRI $(SMS)^{Jan}$ = (3.3 * 70558) + (5.9 * 47436) + (11.47 * 44810) + (11.25 * 31453) + (6.64 * 36124) + 494570

FPRI $(SMS)^{Jan}$ = (232841.4) + (279872.4) + (513970.7) + (353846.3) + (239836.4) + 494570 = 2114964.2

FPRI $(NF)^{Jan}$ = (11.0 * 15818) + (11.47 * 29408) + (8.97 * 29648) + (4.23 * 44547) + 110777

FPRI $(NF)^{Jan}$ = (173998) + (345249.9) + (265942.6) + (188433.8) + (110777)

FPRI $(NF)^{Jan}$ = 1084401.3

Final FPRI ^{Jan} = (2114964.2 + 1084401.3) / 1000 = 3191 KAF

3.5.2 FPRI EXAMPLE #2 (APRIL 1995)

Data: Snow course measured SWE

Spotted Bear Mountain = 8.0”

Marias Pass = 9.2”

Hell Roaring Divide = 29.7”

Data: Liquid Equivalent Precipitation Data (LE)

West Glacier

October 1994 = 4.16”

November 1994 = 2.66”

December 1994 = 3.09”

January 1995 = 3.82”

February 1995 = 2.53”

March 1995 = 1.85”

Oct.-Mar. Total = 18.11”

Hungry Horse

October 1994	=	4.31”
November 1994	=	4.01”
December 1994	=	4.50”
January 1995	=	3.57”
February 1995	=	1.98”
March 1995	=	3.83”
Oct-Mar Total	=	22.20”

Seeley Lake

October 1994	=	2.91”
November 1994	=	1.98”
December 1994	=	1.97”
January 1995	=	1.36”
February 1995	=	1.47”
March 1995	=	0.38”
Oct-Mar Total	=	10.39”

Fortine

October 1994	=	1.26”
November 1994	=	1.04”
December 1994	=	0.91”
January 1995	=	0.85”
February 1995	=	0.41”
March 1995	=	0.97”
Oct.-Mar. Total	=	5.44”

Polebridge

October 1994	=	2.49”
November 1994	=	2.37”
December 1994	=	1.36”
January 1995	=	1.71”

February 1995 = 1.91”

March 1995 = 1.70”

Oct-Mar Total = 11.54

The following is a summary example of the calculations used to derive the April 1995 FPRI from the precipitation data listed above. The equations are developed in accordance with the formulas presented in Section 3.4 above.

$FPRI\ (SMS)^{Apr}$ = (8.0 * 70558) + (9.2 * 47436) + (18.11 * 44810) + (22.20 * 31453) + (10.39 * 36124) + 1001153

$FPRI\ (SMS)^{Apr}$ = (564464) + (436411) + (811509) + (698257) + (375328) + 1001153 = 3887122

$FPRI\ (NF)^{Apr}$ = (29.7 * 15818) + (18.11 * 29408) + (11.54 * 29648) + (5.44 * 44547) + 224245

$FPRI\ (NF)^{Apr}$ = (469795) + (532579) + (342138) + (242336) + (224245)

$FPRI\ (NF)^{Apr}$ = 1811092

Final $FPRI^{Apr}$ = (3887122+ 1811092) / 1000 = 5698 KAF

3.5.3 Snow Course

The collection and dissemination of this information is primarily handled by the National Resources Conservation Service (NRCS). The format for the website at the NRCS to access the data is the following:

ftp://ftp.wcc.nrcs.usda.gov/data/snow/basin_reports/montana/wyYYYY/lostmtM.txt

Where, YYYY is the year (ex: 2003), and the M is for the month (ex: 1 = January, 2 = February, 3 = March, 4 = April).

Example: The link to the snow course data for early February 2003 is:

ftp://ftp.wcc.nrcs.usda.gov/data/snow/basin_reports/montana/wy2003/lostmt2.txt

Notes

- One should briefly check the date of the observation in the column listed ‘DATE,’ typically the snow course data is taken within a few days of the top of the month not always on the first of the month.
- The pertinent data to be used for each Snow Course site should be under the column “Water Content.
- See data replacement procedure for methods if monthly LE snow data is not available.

Any questions for the Snow Course data could be directed to either the NRCS state office in Montana (406) 587-6813 or the NRCS National Climate and Water Center in Portland, Oregon at (503) 414-3031.

3.5.4 LIQUID EQUIVALENT PRECIPITATION DATA

The actual LE data for the FPRI is collected by a variety of sources, but the actual dissemination of this data is handled by both the NRCS and the National Weather Service (NWS).

The internet-based links (as of December, 2003) for this information can be found in the following links.

NRCS:

The format for the website at the NRCS to access the liquid equivalent precipitation data is the following:

ftp://ftp.wcc.nrcs.usda.gov/data/climate/basin_reports/montana/wyYYYY/bsprmtMM.txt

Where YYYY (ex: 2003) is the WY for information and MM is for the month of the data (10 = Oct., 11 = Nov., 12 = Dec., 1 = Jan., 2 = Feb., etc.). Note: for October, November, and December this data is identified by WY in this format. For example, the data for November 2003 is associated with WY 2004 at the following address:

ftp://ftp.wcc.nrcs.usda.gov/data/climate/basin_reports/montana/wy2004/bsprmt11.txt

NWS:

Most of the LE Precipitation stations are classified as Cooperative Stations (Coop). As of May 2009, the following addresses at the NWS website contain regular updates of the monthly precipitation values beginning about two to three days after the end of the month.

http://forecast.weather.gov/product.php?site=NWS&product=RRM&issuedby=MSO

and/or

http://www.srh.noaa.gov/data/MSO/RRMMSO

Please note the first link may not contain information if checked late in the month, data should be available in the early-to-middle portions of the month

The phone number for the NWS-Missoula office is (406) 329-4840.

Multivariate ENSO Index (MEI):

The MEI is computed by the NOAA-Climate Diagnostics Center, the current internet address for the monthly values is the following:

http://www.cdc.noaa.gov/people/klaus.wolter/MEI/table.html

or

http://www.cdc.noaa.gov/data/correlation/mei.data

Phone number for the Climate Diagnostics Center: (303) 497-7200.

3.5.5 DATA REPLACEMENT PROCEDURE

Summary: The availability of precipitation information utilized in the monthly calculation of the FPRI is generally reliable; however, there are occasions where the data for a particular station is missing for a given month in the October to March period. This guideline instructs how to utilize the information at other stations in the vicinity of the site to generate an estimate of any missing data.

The data for all of the following stations are available from the same sources (National Resource Conservation Service – NRCS and the National Weather Service – NWS) as listed in Section 3.5.4.

3.5.6 LE STATIONS

Seeley Lake (SL)

October:
SL = [0.411 * St. Ignatius (LE)] + [0.592 * Lindbergh Lake (LE)] – 0.229

November:
SL = [0.441 * Lindbergh Lake (LE)] + [0.669 * Missoula 2 NE (LE)] + 0.105

December:
SL = [0.380 * Lindbergh Lake (LE)] + [0.769 * Missoula 2 NE (LE)] + 0.226

January:
SL = [0.635 * Lindberg Lake (LE)] + [0.669 * Missoula 2 NE (LE)] – 0.348

February:
SL = [0.523 * Ovando 9SSE (LE)] + [0.428 * Lindbergh Lake (LE)] + 0.316

March:
SL = [0.283 * St. Ignatius (LE)] + [0.551 * Lindbergh Lake (LE)] – 0.105

Polebridge (PB)

October:
PB = [0.473 * Whitefish (LE)] + [0.448 * Fortine 1N (LE)] + [0.145 * West Glacier (LE)] + 0.119

November:
PB = [0.437 * Whitefish (LE)] + [0.395 * West Glacier (LE)] + 0.275

December:
SL = [0.505 * West Glacier (LE)] + [0.449 * Olney (LE)] - 0.02

January:
PB = [0.227 * Olney (LE)] + [0.799 * Fortine 1N (LE)] + [0.474 * West Glacier (LE)] - 0.634

February:
PB = [0.988 * Fortine 1N (LE)] + [0.501 * West Glacier (LE)] - 0.12

March:
SL = [0.187 * Olney (LE)] + [0.394 * Fortine 1N (LE)] + [0.4 * West Glacier (LE)] + 0.176

Fortine 1N (FT)

October:
FT = [0.392 * Polebridge (LE)] + [0.256 * Eureka (LE)] + 0.147

November:
FT = [0.198 * Olney (LE)] + [0.661 * Eureka (LE)] + 0.053

December:
FT = [0.208 * Olney (LE)] + [0.636 * Eureka (LE)] + 0.066

January:
FT = [0.196 * Olney (LE)] + [0.624 * Eureka (LE)] - 0.091

February:
FT = [0.12 * Olney (LE)] + [0.613 * Eureka (LE)]

March:
SL = [0.271 * Olney (LE)] + [0.239 * Eureka (LE)] + 0.349

Hungry Horse (HH)

October:
HH = [0.919 * West Glacier (LE)] + [0.498 * Creston (LE)] + 0.213

November:
HH = [0.782 * West Glacier (LE)] + [0.847 * Creston (LE)] + 0.068

December:
HH = [0.657 * West Glacier (LE)] + [0.729 * Creston (LE)] + 0.38

January:
HH = [0.835 * West Glacier (LE)] + [0.817 * Creston (LE)] - 0.444

February:
HH = [0.666 * West Glacier (LE)] + [0.805 * Creston (LE)] + 0.031

March:
HH = [0.814 * West Glacier (LE)] + [0.716 * Creston (LE)] + 0.586

West Glacier (WG)

October:
WG = [0.732 * Hungry Horse (LE)] + 0.109

November:
WG = [0.637 * Hungry Horse (LE)] + 0.706

December:

WG = [0.702 * Hungry Horse (LE)] + 0.688

January:

WG = [0.729 * Hungry Horse (LE)] + 0.785

February:

WG = [0.765 * Hungry Horse (LE)] + 0.414

March:

WG = [0.619 * Hungry Horse (LE)] + 0.455

Chapter 4.0 FLATHEAD LAKE DROUGHT MANAGEMENT PLAN HYDRO-CLIMATIC INDICES

This document is a step-by-step procedure for implementing the Drought Management Plan (DMP).

- Step 1: From October to December the DMP activation decision is based on a calculation of the MEI index only.
- Step 2: In January and February combinations of the MEI and the FPRI are used to determine the status of the DMP.
- Step 3: In March and April the DMP decision is based only on a calculation of the FPRI and the current status of the DMP.

In effect, the DMP decision process is based on the climatic state of the atmosphere from October to December as measured by the MEI. In January and February, a combination of the climate (MEI) and the observed precipitation (FPRI) are used. By March and in April, the observed precipitation index (FPRI) is used.

Although deactivating the Plan in November or December is possible based on MEI data alone, at this time, the DMP will remain activated until at least January when FPRI data and current conditions are better understood. This process may be reconsidered in the future, based on review of DMP implementation. If the DMP is activated from January through April, the Licensee shall reduce outflows at the Project in an effort to increase the pool elevation to 2,888' msl, or to the maximum extent possible in consideration of potential high water events, while continuing to comply with article 56 minimum stream flow requirements.

The following are detailed procedures for implementing the Drought Management Plan:

4.1 STEP 1: OCTOBER-DECEMBER (MEI INDEX ONLY)

A set of instructions is provided for each month.

4.1.1 EARLY OCTOBER

On or about October 8, the operator shall examine the values associated with the MEI (Multivariate ENSO Index) derived by the NOAA-CDC.

The first step is to acquire the most recent values of the April/May, May/June, June/July, July/August, and August/September MEI values. The numerical average of these five values (MEI AVG^{Oct}) will determine if the ENSO phenomenon is either in a 'La Niña,' 'Neutral,' or an 'El Niño' phase based on the values below:

- MEI AVG^{Oct} < - 0.50 ENSO phase is "La Niña"
- - 0.50 < MEI AVG^{Oct} > + 0.50 ENSO phase is "Neutral"
- MEI AVG^{Oct} > + 0.50 ENSO phase is "El Niño"

4.1.1.1 DMP Decision

- If ENSO Phase is in an El Niño mode, then activate DMP.
- If ENSO Phase is either a Neutral or La Niña mode, then do not activate DMP .
- Monthly calculations of the MEI will continue.

4.1.2 EARLY NOVEMBER

Repeat the process described in the section above with the following exception:

Determine the ENSO Phase by computing the 5-month average of MEI (MEI AVG^{Nov}) from the values of May/June, June/July, July/August, August/September, and September/October as derived by the CDC. The MEI average value should be compared to the criteria listed below:

- MEI $AVG^{Nov} \leq -0.50$ — ENSO phase is "La Niña"
- $-0.50 <$ MEI $AVG^{Nov} > +0.50$ — ENSO phase is "Neutral"
- MEI $AVG^{Nov} \geq +0.50$ — ENSO phase is "El Niño"

4.1.2.1 DMP Decision

- If ENSO Phase is in an **El Niño** mode, then **activate DMP**.
- If ENSO Phase is either a **Neutral** or **La Niña** mode, then do **not activate DMP**.
- Monthly calculations of the MEI will continue.

4.1.3 EARLY DECEMBER

Repeat the process described in the section above with the following exception:

Determine the ENSO Phase by computing the 5-month average of MEI (MEI AVG^{Dec}) from the values of June/July, July/August, August/September, September/October, and October/November as derived by the CDC. The MEI average value should be compared to the criteria listed below:

- MEI $AVG^{Dec} \leq -0.50$ — ENSO phase is "La Niña"
- $-0.50 <$ MEI $AVG^{Dec} > +0.50$ — ENSO phase is "Neutral"
- MEI $AVG^{Dec} \geq +0.50$ — ENSO phase is "El Niño"

4.1.3.1 DMP Decision

- If ENSO Phase is in an El Niño mode, then activate DMP.
- If ENSO Phase is either a Neutral or La Niña mode, then do not activate DMP.
- Monthly calculations of the MEI and FPRI will continue in January.

4.2 STEP 2: JANUARY THROUGH FEBRUARY (COMBINATION OF MEI AND FPRI INDICES)

4.2.1 EARLY JANUARY

By January 8, a majority of the input data needed for the early January assessment should be available from its various sources. There are two indices necessary for the early January assessment.

- Calculation of the Flathead Precipitation-Runoff Index (FPRI) for early January, the process on how to calculate the index, can be found in Chapter 3.0.
- Calculation of the MEI AVG^{Jan}, calculated using MEI values from July/August, August/September, September/October, October/November, and November/December, is carried forward through the rest of the decision process. Use the calculated FPRI values and refer to Table 7 below to identify the related DMP action.

Table 7
January DMP Decision Making Process

FPRI Value	MEI Value	Action
FPRI < 2300	MEI < - 0.50	No DMP[1] – Monitor
	MEI > - 0.50	Activate DMP
2300 < FPRI < 3000	MEI < + 0.50	No DMP – Monitor
	MEI > + 0.50	Activate DMP
FPRI > 3000	N/A	No DMP – Monitor

1 No DMP means either no DMP activated if none in place, or DMP deactivated if DMP was previously activated.

- Based on the values of FPRI and MEI, take the appropriate DMP action.
- Continue monthly calculations of FPRI and MEI.

4.2.2 EARLY FEBRUARY

By February 8, a majority of the input data needed for the early February assessment should be available from its various sources. If data is not available by February 8, a contact list is provided in Chapter 3.0 to aid in gathering data. There are three pieces of information necessary for the early February assessment.

- Calculation of the Flathead Precipitation-Runoff Index ($FPRI^{Feb}$) for early February, the process on how to calculate the index, can be found in Chapter 3.0.
- Use the existing MEI AVG^{Jan} (this value is carried forward through the rest of the decision-making process.)
- Note whether or not the DMP has already been activated.

4.2.2.1 Option 1: DMP in Place

If the DMP has already been activated, compare the values calculated for the $FPRI^{Feb}$ to the values in Table 8 below and follow the described DMP action.

Table 8
February Decision Process if the DMP is Already in Place

FPRI Value	Action
FPRI ≤ 4300	Maintain DMP
FPRI > 4300	No DMP – Monitor

- Based on the values of FPRI, take the appropriate DMP action.
- Continue monthly calculations of FPRI and MEI.

4.2.2.2 Option 2: DMP not in Place

If the DMP has not already been activated, compare the values calculated for the MEI AVG^{Jan} and the $FPRI^{Feb}$, to the values in Table 9 below and follow the described DMP action.

Table 9
February Decision Process if the DMP is NOT in Place

FPRI Value	MEI Value	Action
FPRI < 3700	MEI > - 0.50	Activate DMP
	MEI < - 0.50	No DMP – Monitor
3700 < FPRI < 4300	MEI > + 0.50	Activate DMP
	MEI < + 0.50	No DMP – Monitor
FPRI > 4300	N/A	No DMP – Monitor

- Based on the values of FPRI and MEI, take the appropriate DMP action.
- Continue monthly calculations of FPRI.

4.3 STEP 3: MARCH AND APRIL (FPRI INDEX ONLY)

4.3.1 EARLY MARCH

By March 8, a majority of the input data needed for the early March assessment should be available from its various sources. There are two pieces of information necessary for the early March assessment.

- Calculation of the Flathead Precipitation-Runoff Index ($FPRI^{Mar.}$) for early March. The process on how to calculate the index can be found in Chapter 3.0.
- Note whether or not the DMP has already been activated.

4.3.1.1 Option 1: DMP in Place

Note the calculated $FPRI^{Mar}$ value and refer to Table 10 below:

Table 10
March Decision Process if the DMP is already in Place

FPRI Value	Action
FPRI $\leq$ 4800	Maintain DMP
FPRI > 4800	No DMP – Monitor

- Follow the DMP decision noted in the table above.
- Continue monthly calculations of FPRI.

4.3.1.2 Option 2: DMP not in Place

Note the calculated $FPRI^{Mar}$ value and refer to Table 11 below if the DMP is not in place March 1:

Table 11
March Decision Process if the DMP is NOT Already in Place

FPRI Value	Action
FPRI $\leq$ 4800	Activate DMP
FPRI > 4800	No DMP – Monitor

- Follow the DMP decision noted in the table above.
- Continue monthly calculations of FPRI.

4.3.2 Early April

By April 8, a majority of the input data needed for the early April assessment should be available from its various sources. Calculate FPRI for early April ($FPRI^{Apr}$). There is only one criterion needed to determine if DMP invocation, DMP revocation, or no action is required. Refer to Table 12 for the final DMP decision for April.

Table 12
Final April Decision Process

FPRI Value	Action
FPRI $\leq$ 5100	Activate DMP
FPRI > 5100	No DMP – Monitor

The April forecast will hold through the remainder of the WY.

APPENDIX C

Public and Agency Comments / Responses

Appendix C
Responses to Summary Comments on the DEIS

Appendix C contains summaries of all comments received on the DEIS during the comment period between July 26 and September 29, 2006 and the BIA responses to these comments. Individual comments are contained in letters submitted to the BIA during the comment period and verbal comments received at the public hearings on August 29 and August 30, 2006. The BIA received 16 comment letters on the DEIS from agencies, community organizations, and individuals; many of these letters contained multiple comments on various items in the DEIS. Approximately 70 people attended the two public hearings where verbal comments were transcribed by a court reporter. The written comment letters and public transcript comments combined for a total of 248 individual comments on the DEIS.

This summary is organized in two ways: Summary Report 1 provides all comments **organized by DEIS section or comment category**, such as alternatives, drought management plan, or environmental consequences. Summary Report 2 organizes all comments **by commenter or commenting organization** such as USACE, the CSKT, or the public hearing transcripts. All comments are coded according to commenter and are consecutively numbered. The following table provides a list of the organizations and individuals who provided comments on the DEIS and the code assigned to each.

Table C-1
Commenters on the DEIS

Commenter	Category	Commenter Code
Montana Water Trust	Companies and Organizations Letter	CO1
Northwest Power and Conservation Council – Letter 1	Companies and Organizations Letter (Dated Sept 28, 2006)	CO2
Northwest Power and Conservation Council – Letter 2	Companies and Organizations Letter (Dated October 25, 2006)	CO3
National Organization To Save Flathead Lake	Companies and Organizations Letter	CO4
Flathead Lakers	Companies and Organizations Letter	CO5
PPL Montana, LLC	Companies and Organizations Letter	CO6
Flathead Lakers	Companies and Organizations Letter	CO7
USEPA	Federal Agency Comment Letter	FA1
USACE	Federal Agency Comment Letter	FA2
USDI-BOR	Federal Agency Comment Letter	FA3
Clinton Whitney	Individual Letter	IND1
Henry Oldenburg	Individual Letter	IND2
Flathead County Board Of Commissioners	Local Agency Comment Letter	LA1
Confederated Salish and Kootenai Tribes of the Flathead Nation	Native American Tribes Comment Letter	NAT1
Public Meeting August 29, 2006	Public Meeting Transcript	PM1
Public Meeting August 30, 2006	Public Meeting Transcript	PM2
Montana Fish, Wildlife, and Parks – Letter 1	State Agency Comment Letter (Dated Sept 29, 2006	SA1
Montana Fish, Wildlife, and Parks – Letter 2	State Agency Comment Letter (Dated October 30, 2006	SA2

Final Environmental Impact Statement for a Drought Management Plan for Operation of the Kerr Hydroelectric Project on Flathead Lake, Montana

Responses to Summary Comments on the DEIS

Summary Report 1: Sorted by Category or DEIS Section

Comment Code	Comment	Response
Affected Environment		
NAT1-4	Figure 3.1 - study area boundaries do not lead to appropriate level of analysis.	Figure 3-1 has been revised to increase the primary study area for the Drought Management Plan (DMP).
NAT1-5	Big Fork and Lakeside DO have community water and wastewater.	Section 3.1.2.4 has been revised to reflect this information.
NAT1-7	Section needs to include tribal ordinances and programs relating to lakeshore activities.	Section 3.2.10 was added to the FEIS to discuss the CSKT administered programs.
NAT1-9	At request, tribe will forward list of species of concern. List may not exactly correspond with state list.	The list of species of concern that was received from the tribe has been included in the discussion in Section 3.4.5.
PM2-7	Question whether the existing docks have been built at 2,893.	Our information indicates that docks have been built to accommodate full pool, which means that that docks would be usable (not flooded) at a lake elevation of 2,893' msl.
PM2-26	At what lake level will damage to docks and other property occur?	Winter damage to docks and other shoreline property will occur at varying lake levels depending on the elevation of the dock and the materials out of which the dock is constructed. During the scoping process, comments were received that some docks may experience ice-related damage at over-winter lake elevations that exceed 2,885' to 2,886' msl.
PM2-27	What summer lake levels will significantly affect shoreline property owners, businesses, and boaters?	Section 4.8 of the FEIS discusses the impact of summer lake levels on shorline properties.

Responses to Summary Comments on the DEIS

Summary Report 1: Sorted by Category or DEIS Section

Comment Code	Comment	Response
Alternatives		
CO1-2	MWT opposes No-Action Alternative	Comment noted.
CO1-3	MWT opposes Proposed Action because of impacts to Bull trout populations	Please refer to response to comment CO1-1.
CO1-4	MWT supports Alternative 1	Comment noted.
CO1-5	MWT does not support alternative plan 2 without additional information to evaluate bull trout effects.	Please refer to response to comment CO1-1.
CO4-1	Request to Modify the Lake Level Priority Alternative and reevaluate in the FEIS.	The lake level priority alternative does not satisfactorily address license Article 56 (minimum instream flows) nor does it address impacts on the lower Flathead River during drought conditions. Therefore, it does not meet the requirements of Article 60 or the purpose and need of this EIS.
CO4-2	Recommends rejection of the No-Action alternative.	Comment noted.
CO4-4	Identified several concerns with Alternative 1.	Additional details and discussions have been added to the FEIS relative to impacts on wetlands, waterfowl, and water quality of Flathead Lake. Please see appropriate sections of Chapter 4.

Comment Code	Comment	Response
CO4-5	Identified several concerns with Alternative 2; suggests deleting the "Notice of Intent to Deviate from Article 56;" recommends forming a coordinating committee to better utilize Hungry Horse flows; identified concerns associated with high winter pool elevation; does not understand water management features at Kerr or how they relate to system operations; notes insensitivity of fish habitat below Kerr as identified in Table 4.2 under alternatives 1 and 2.	In 7 of the 10 low water years modeled, the average summer lake elevation was 2,892.7' msl. Additional discussion of the 8,000 cfs MIF deviation has been included in the EIS. Key environmental impacts associated with Alternative 2, as identified in the commenter's letter, would be acceptable in the relative rare occurrence of a severe drought. The commenter refers to an alternative that would match outflows to inflows in order to preserve lake elevations. Passing all inflows as outflows would actually increase the outflow in excess of 8,000 cfs. The 8,000 cfs value was arrived at after considering impacts of evaporation, irrigation water withdrawls, and other losses of water from Flathead Lake. The idea suggested in the comment would lower Flathead Lake water levels and lead to greater impacts than those reported in Alternative 2.
CO5-1	Support consideration of additional alternative that analyzes the ecosystem approach.	During the alternatives development process, we examined possible alternatives that minimize ecosystem impacts and make the following observations: 1) To mimic pre-Kerr Dam conditions would be to operate the project as a run-of-the river facility, which would allow for more natural fluctuations of the lake level and river flows, and help alleviate the ecosystem alterations caused by the construction and operation of Kerr Dam, and; 2) the section 4(e) conditions placed on the license were designed to protect Trust resources and more closely mimic natural runoff curves. We modeled a run-of-the river alternative, and found that lake levels were below those elevations suitable for lake operations for most of the summer in drought years. Furthermore, running Kerr Dam as a run-of-the river facility in wet years does not take advantage of the lake as a flood control reservoir, and would allow for notable flooding downstream in the Columbia system. We also note that ongoing studies of ramping rates within the framework of the existing license will continue to minimize impacts to Trust resources.
CO5-3	The DEIS does not adequately describe how elevations were determined for Alternatives 1 and 2.	Please refer to response to comment FA1-12.
CO5-4	The DEIS does not fully describe variables within control of the licensee to attain June 15 lake elevation target.	The options available to the licensees to achieve certain lake level targets include two primary actions: 1) coordinate with the operators at Hungry Horse Dam, and 2) vary the timing and amount of water passed through the turbines and spill gates at Kerr Dam, in accordance with the license requirements as outlined in Section 3.1.3. Additional details regarding the alternatives are described in Section 2.3 of the FEIS.

Comment Code	Comment	Response
CO6-3	In Alternatives 1 and 2, Final DMP must contain specific instructions regarding activation and deactivation of drought plan.	Please refer to Sections 2.3.2 and 2.3.3 of the FEIS for notification and consultation with BOR regarding activation and deactivation of DMP.
CO6-4	Alternatives 1 and 2 should include analysis based on 2006 operations modifications at the Hungry Horse Dam.	The operational changes are included in the model used to evaluate the alternatives and are documented in Appendix B of the FEIS.
CO6-5	Alternatives 1 and 2 should clarify the deviation notification requirements.	Comment noted. Additional clarification regarding notification procedures is included in Section 2.3.3 of the FEIS.
CO6-6	Request clarification of modeling assumptions. Does modeling demonstrate that Flathead Lake will fill to 2,892.2 when elevation is 2,890 on May 30?	During drought conditions, holding Flathead Lake at 2,890' msl on May 30th will result in lake levels below 2892.2' msl on June 15th. The Preferred Alternative deviates from the May 30th requirement of Article 43 and achieves refill through early filling, and in more severe droughts, through minimum flow deviations such that elevation 2,892.2' msl is achieved.
CO6-8	Define "strive" as used to describe how to achieve desired lake elevation levels.	This language was removed from the FEIS. Refer to Section 2.3.3 for clarification on efforts to achieve lake desired lake elevations.
CO7-1	Include an analysis of a "third alternative" that amends Article 56 to allow an adjustment to the minimum Kerr Dam discharge requirement during drought years that could be shaped to mimic a natural spring freshet followed by a gradual decline toward minimum flow.	Article 56 was designed to approximate an average runoff year. In general, the minimum instream flows are an attempt to biologically provide the lower river with a natural hydrograph. Please refer to response to comment CO5-1. Run-of-the river operations would provide more of a spring freshet-like runoff curve although at a potentially greater cost to power production. These types of changes would need to be negotiated with all of the parties through the FERC process, which is not the intent of our efforts under Article 60.
CO7-5	Coordination between Hungry Horse and Kerr Dam should be analyzed for low-water years.	Hungry Horse operations have been incorportated into modeling of Kerr Dam operations and described in the Kerr Project Simulations section of the FEIS, Section 2.2.3.

Comment Code	Comment	Response
FA1-6	Provide more detailed analysis of alternatives. Add an alternative that avoids/minimizes summer lake levels below pool as much as possible.	We have added more detailed discussion of the No-Action and PPL Montana (Proposed Action) alternatives, and have included statistical summaries of the models of Alternatives 1 and 2. The analyses conducted show that the Preferred Alternative minimizes impacts to summer pool as much as possible. See Table 2-2 in the FEIS for a summary of impacts by alternative.
FA1-7	Add monitoring and adaptive management elements to assess effects associated with operations during drought periods.	Please refer to response to comment CO2-3.
FA1-8	Agree with dismissal of Lake Level Priority Alternative.	Comment noted.
FA1-12	Explain basis for using 2,892 and 2,892.2 for post June 15 elevation.	The 2,892' msl lake elevation in the proposed action was selected by PPL Montana. The 2,982.2' msl lake elevation in Alternatives 1 and 2 was selected after review of elevation duration curves for drought and wet conditions. An elevation of 2,892.2' msl or greater was achieved 100% of the time in all of the ten wettest years, and was achieved approximately 80% of the time for the seven drought years since 1965. The additional 0.2 feet in elevation is important to lake level interests and can be provided under most drought conditions. Therefore, 2,892.2' msl was selected as the preferred summer lake elevation under drought conditions.
FA2- pg 1,	Each of the alternatives should address the impacts to system flood control and flood control points downstream of Kerr Dam.	Please refer to Sections 4.6.2.2 and 4.6.2.3 of the FEIS for a discussion on the effects on flood control from Alternatives 1 and 2.
FA2-4	Additional modeling necessary for No-Action and Proposed Action Alternatives.	We have included additional discussion of the Proposed Action and the No-Action Alternative, including why it was not possible to create meaningful models of these alternatives.
FA2-5	Proposed action has same deficiencies as identified in comment FA2-1, FA2-1a, FA2-1b, and FA2-1c.	Please refer to response to comment FA2-1.

Comment Code	Comment	Response
FA2-7	Incorporate language on NRCS and RFC forecasts from DMP into Alternatives 1 and 2.	The NWS NWRFC forecasts are included in the Preferred Alternative. Please refer to the response to comment FA2-28.
FA2-8	Please confirm "runoff volume, runoff forecasts, and runoff volume forecasts" all refer to the NWS/NWRFC official water supply forecast.	This language was included in PPL Montana's proposed action which was evaluated as presented. We presume they refer to the official forecast developed as part of their plan.
FA2-9	Explain how the Proposed Action DMP Tier 2 Response differs from current operating procedures; explain language changes; specify who the parties are, how agreement is to be reached, and alternatives if no agreement.	In this situation the Proposed Action has been proposed by the Kerr Project operator, PPL Montana. The BIA is not altering the Proposed Action and concurs that there are definciencies in the Proposed Action, some of which have been identified in this comment. The BIA is evaluating the Proposed Action as presented and is also evaluating alternative drought management plans.
FA2-10	Remove language "when the system is declared to be in drought" or similar from Tier 3 and Tier 4 responses. It is redundant.	While we recognize the inconsistencies, this language was included in PPL Montana's proposed action which was evaluated as presented.
FA2-11	Revise Tier 4 initial response to read "matching outflows to inflows." As stated it implies a level of control that is erroneous.	While we recognize the inconsistencies, this language was included in PPL Montana's proposed action. We assumed that PPL Montana meant that outflows (which are controllable via Kerr operations) would be matched to inflows, and modified the text accordingly.
FA2-12	Tier 4 initial response is implausible and ineffectual. Tier 4 secondary action is the only effective action.	Please refer to the response to comment FA2-10.
FA2-13	Tier 4 response in DEIS does not correspond to action stated in 2002 DMP.	The term "Tier" does not appear in the DEIS or the original PPL Montana DMP. The original PPL Montana DMP discusses a series of activities using bullet points and paragraphs. The EIS uses numbers to identify the sequence of activities. The description of the PPL Montana DMP in the FEIS has been revised to more closely match the original.
FA2-14	Revise text to clearly state how early detection system was determined during scoping; thus making the 2002 DMP fall short of scoping criteria. Also, more prominent mention of operation details of Alternatives 1 and 2 in DMP resulting in no modeling of No-Action and Proposed Action alternatives.	We have modified the text of the FEIS in Section 2.2.2 to include information from the scoping process that specifically identifies the desire for early prediction of drought. In Section 4.2.1, additional discussion of each of the alternatives has also been included to explain why the Proposed Action and No-Action alternative could not be modeled.

Comment Code	Comment	Response
FA2-15	Renumber activities under Alternative 1 to match activities in Summary (S-3).	The activity numbers in Section 2.3.2 have been revised in the FEIS Summary.
FA2-16	Clarify potentially conflicting April 15 lake elevation target under Alternative 1. Which has precedence if in conflict?	Activity 4 under Section 2.3.2 has been revised to state that the lake refill deviation would occur "beginning April 15 and through June 15…."
FA2-17	Clarify potentially conflicting June 15 lake elevation target under Alternative 1. Which has precedence if in conflict?	It is theoretically possible that the drought management plan could call for an elevation of 2,892.2' msl on June 15 while at the same time the USACE would have flooding concerns and would prefer the lake level be kept lower. In such a situation, the requirements of the DMP would be superseded by the flood control requirements of the USACE. The Preferred Alternative has been modified to clarify how these issues are resolved.
FA2-18	Clarify potentially conflicting April 15 lake elevation target under Alternative 2. Which has precedence if in conflict?	Please see the response to comment FA2-16.
FA2-19	Clarify potentially conflicting June 15 lake elevation target under Alternative 2. Which has precedence if in conflict? Clarify how Alternatives 1 and 2 Lake Refill Deviation differ from the status quo per FERC Article 43.	Please see the response to comment FA2-16. The difference is that Article 43 has been modified to allow higher lake elevations.
FA2-20	Explain difference in 2,892.2 feet in Alternatives 1 and 2 and the 2,892 feet summer elevation in Proposed Action.	See response to FA1-12.
FA2-21	Explain why NWS Official April Final Forecast is acceptable in activity 6.	While we are confident in the validity and applicability of the MEI and FPRI as drought predictors, the official forecast provides a valuable comparison and check when making a critical decision regarding a deviation from the MIFs. In addition, the NWS forecast is relied upon by the USACE when making flood control decisions.
FA2-22	Under Activity 6, USACE would defer to expertise of NWS/NRCS for determining if a drought condition exists or is expected.	Comment noted.

Responses to Summary Comments on the DEIS

Summary Report 1: Sorted by Category or DEIS Section

Comment Code	Comment	Response
FA2-23	Explain when the 8,000 cfs peak minimum flow time period is under Activity 7.	Article 56 of the Kerr License requires the operator to increase flows from 5,000 cfs to 12,700 cfs at 510 cfs per day from May 1 to May 15. If a deviation to a minimum flow of 8,000 cfs were approved, the peak would arrive early (on May 6). Similarly, Article 56 requires the operator to decrease flows from 12,700 cfs to 6,400 cfs at 420 cfs per day from July 1 to July 15. If a deviation to a minimum flow of 8,000 cfs were approved, the peak would not need to begin dropping until July 9, but would end at 6,400 cfs pursuant to Article 56 on July 15.
FA2-40	Indicate that the proponent should identify the agency's preferred alternative.	The FEIS has been revised to state that Alternative 2 is the preferred project alternative.
FA2-41	Explain and justify the use of the drought indicator methodology proposed in the alternatives.	The Principle Components Analysis (PCA) and logistic regression analysis contained in Appendix B of the FEIS verified the effectiveness of the drought indicators. The process of using drought indicators is necessary in order to retain enough water in Flathead Lake to accommodate both license Articles 43 and 56 to the extent possible. Foregoing this valuable tool limits in-season flexibility and increases the potential impacts associated with low pool elevations and/or substantially reduced instream flows.
FA2-42	Explain how increasing flows from Hungry Horse reservoir would be achieved; also, clarify the statement that 6-8kcfs may be the lower limit for minimum in stream flows.	While we recognize the inconsistencies, this language was included in PPL Montana's proposed action which was evaluated as presented. We assumed that PPL Montana meant that outflows (which are controllable via Kerr operations) would be matched to inflows and modified the text accordingly. For Alternative 2, we provide additional language regarding the use of Hungry Horse flows.
FA2-44	DEIS should state the U.S. Army Corps of Engineers (USACE) authority to approve/deny fixed elevation 2,888.0 requests and identify timeline for MEI calculation.	Section 2.3.2 has been revised to include the actions that would be taken by the USACE. Detailed information regarding Multi-variant El Niño and Southern Oscillation Index (MEI) calculations can be found in Section 1 of Appendix B.
FA2-45	Comment on three target elevations in PPL Montana's License. DEIS should analyze impacts of 2,888.0 feet operation thorough April 15 when DMP is in effect.	Section 2.1 of the FEIS has been revised to include additional discussion of the lake refill deviations. Additional discussion of the effects of 2,888.0' msl is in Section 4.6.2.2.
FA2-48	The DMP should be a plan that can be implemented and this DMP does not provide any decision making criteria to determine an annual operating curve.	This is part of PPL Montana's proposed action and was evaluated as presented.

Responses to Summary Comments on the DEIS

Summary Report 1: Sorted by Category or DEIS Section

Comment Code	Comment	Response
FA2-54	Clarify differences in definition of drought between page S-1 4th paragraph and page 2-3.	The drought definition on page S-1 has been modified to match page 2-3.
FA2-55	Editorial. Correct "as indicated in 0" at bottom of page.	Editorial change made in FEIS.
FA2-56	Need to include more than 10 driest years in modeling.	A full range of water years was evaluated in the FEIS. Section 3.1.3.5 provides a discussion of the various periods of record analyzed.
FA2-57	CSKT cannot assume deviation is approved without written approval from USACE.	We have modified the appropriate portion of Alternatives 1 and 2 to include additional coordination with the USACE for approval of a lake refill deviation.
FA2-59	Editorial. Change the end of the sentence "… as high as flood control elevations, as determined by the Corps of Engineers, are allowed."	Editorial change to Activity 4 in the FEIS.
FA3-6	Alternative 1 needs better description.	Revisions and clarification of Alternative 1 have been provided in Section 2.3.2 of the FEIS.
FA3-7	Add impact line to table 2.2 for Lake Levels of Hungry Horse Reservoir.	The Proposed Action has no impact on the water levels of Hungry Horse Lake, therefore, effects to Hungry Horse Lake were not evaluated in this EIS.
IND1-1	Request that the Hungry Horse alternative be given full analysis in the FEIS.	Increasing flow from the Hungry Horse reservoir is only one aspect of PPL's Proposed Action, not a separate and distinct alternative. This aspect of the proposed action has been analyzed throughout the EIS. In addition, Hungry Horse operations have been incorporated into the modeling of Alternatives 1 and 2 and a provision to coordinate operations with Hungry Horse was added to Alternative 2.

Comment Code	Comment	Response
IND2-5	Prefers No-Action alternative.	Comment noted.
LA1-2	DEIS does not explore a full range of alternatives. Drop in lake levels endangers boaters, affects lake environment and economy; winter lake levels 5' higher every year are unacceptable.	The alternatives development and analysis is included in Chapter 2.0 of the FEIS. Discussions and analysis of the effects of lower lake levels on boat access, the environment, and the economy are included in Chapters 3.0 and 4.0. The Preferred Alternative minimizes the number of years that winter lake levels are held high.
LA1-3	Prefer Alternatives 1 or 2 with additional flow provided by Hungry Horse.	Alternative 2 has been modified to include a provision to coordinate operations with Hungry Horse Dam consistent with the operating limitations of that project.
PM1-4	Why is use of water from Hungry Horse to help maintain lake levels absent from other alternatives?	Please see response to comment PM1-39.
PM1-6	The EIS needs additional discussion to justify why water from Hungry Horse cannot be used to maintain lake levels; the justification in the document that it would be "difficult" to make the water available is not adequate.	The Preferred Alternative includes coordination with Hungry Horse operations. Please see response to comment PM1-39 and Section 4.2.2.2, Increasing Hungry Horse Flows, of the FEIS.
PM1-8	EIS is inadequate because it does not fully explain reasons for eliminating the Hungry Horse option as an alternative.	Comment noted. The Preferred Alternative includes coordination with Hungry Horse operations. Please see response to comment PM1-39 and Section 4.2.2.2, Increasing Hungry Horse Flows, of the FEIS.
PM1-9	Hungry Horse operations should be pursued as an option.	Comment noted. The Preferred Alternative includes coordination with Hungry Horse operations. Please see response to comment PM1-39 and Section 4.2.2.2, Increasing Hungry Horse Flows, of the FEIS.
PM1-11	None of the alternatives in the EIS mandate a reduction in the lake level or downstream flows.	Alternative 2 includes a provision that allows the operator to deviate from the minimum instream flow rates that are in the current license. The proposed action and Alternatives 1 and 2 all call for a deviation from summer lake levels.

Responses to Summary Comments on the DEIS

Summary Report 1: Sorted by Category or DEIS Section

Comment Code	Comment	Response
PM1-12	Request for a mediator between the BIA and the US to address conflicts between the proposed project and Articles 56 and 43 (for instance, the Army Corps of Engineers).	The commenter is in effect referring to the No Action Alternative, in which a number of government (both state and federal) agencies, the Confederated Salish and Kootenai Tribes (CSKT), PPL Montana, and other interested parties participate in a conference call to determine appropriate actions in drought situations. This approach is discussed in Section 4.2.2.1.
PM1-18	The alternatives don't have a balance of keeping the water level up in the summer to protect docks and businesses and sending water down river to protect fish.	Based on the information developed and presented in the EIS, Alternative 2 demonstrates a reasonable balance between lake levels and flows that minimize the effects of a drought on all users to the greatest extent possible.
PM1-19	All of the alternatives include a drop in lake levels.	Comment noted.
PM1-21	A lake level of 2,892.6 would be great; try and maintain that.	Comment noted. As shown in Figure 4.13 in the FEIS, modeling for Preferred Alternative 2 indicates that an average lake elevation of 2892.7' msl would be obtained in summer months for 8 out of 10 drought years.
PM1-24	How were the various lake level numbers chosen (e.g., 2,892.2, 2,892.5, 2,892.6) and why were other numbers not chosen?	See response to comment FA1-12.
PM1-25	How was the flow rate of 8,000 cfs chosen instead of some other rates higher or lower than that?	See response to FA2-35.
PM1-35	Mitigation efforts should not undermine the other important attributes of the lake that the people of Montana cherish and depend upon.	Comment noted. The Preferred Alternative is intended to reduce the severity and duration of drought impacts to the lake while providing minimal flow levels to the Flathead River as necessary to maintain those important resources.
PM1-39	Recommendation that a hybrid of the alternatives would be good.	Comment noted. Based on input received on the DEIS, modifications were made to the Preferred Alternative and presented in the Summary section of the FEIS. Modification included addition of an adaptive management plan, coordination with Hungry Horse operations, Article 56 deviation request, and a five-year update of the drought indicators.

Comment Code	Comment	Response
PM1-40	Agree that the lake level minimum of 2892.2 is good because the 3 inches makes a difference in the ease of getting in and out of certain boats.	Comment noted.
PM1-41	The lake level priority alternative (Alternative 1) should have been considered, just as Alternative 2 was considered, because Alternative 1 emphasizes lake level over stream level, and Alternative 2 emphasizes stream level over lake level; a hybrid of these two alternatives should be considered.	See response to comment PM1-39. The Preferred Alternative includes deviations from lake levels and stream flows among other provisions.
PM1-43	Comment disagreeing that Alternative 2 and the proposed action are less likely to mitigate economic impacts in case of severe drought than Alternative 1.	The EIS states that Alternative 2 is more likely to mitigate economic impacts since it results in a higher lake elevation for 8 out of 10 modeled low water years. Alternative 1 would prioritize stream flows, which would result in lower lake levels.
PM1-44	Under the PPL alternative and Alternative 2, reducing the level of water downstream would mimic natural drought conditions.	Comment noted. Under natural conditions during a drought, two things would occur; 1) Flathead Lake water levels would approach 2,883' feet in the summer, and 2) Lower Flathead River flows would be reduced due to the dwindling water supply. The Preferred Alternative attempts to mitigate the effects of drought to protect both resources.
PM1-48	There would be significant adverse impacts on homeowners, business owners, marinas and charter boats, and related businesses and multiple effects on the valley if the lake level is down. Comment to keep the lake at full pool.	Comment noted. The Preferred Alternative is intended to mitigate this effect.
PM2-4	How was 2,892 determined to be full pool instead of 2,893.	This elevation was included in PPL Montana's proposed action which was evaluated as presented. Please also see the response to comments FA1-12 and PM2-3.
PM2-6	Reasoning for picking 2,892.	Please see the response to comment PM2-3.
PM2-8	By requiring a target pool level of 2892.2, the Project operator will stay below that level at all times so not to accidentally exceed this target - even if stream flows would permit a higher pool.	The pool level of 2,892.2' msl is a target elevation and may be exceeded if instream flows are being met.

Comment Code	Comment	Response
PM2-11(a)	Could ESA Issues affect implementation?	Alternatives 1 and 2 have been developed within the constraints identified in existing biological opinions. As such, there should not be additional requirements under the Endangered Species Act. However, all biological opinions include four general conditions that may require additional formal consideration of endangered species issues at some point in the future, they include: (1) exceeding the amount or extent of incidental take; (2) new information not considered previously; (3) a modification of existing actions not previously considered; or (4) a new species is listed or critical habitat designated.
PM2-17	Why wasn't drawing water out of Hungry Horse Dam studied as part of Alternatives 1 or 2?	Please refer to response to comment PM1-39.
PM2-20	Analysis of potential impacts of various lake levels (2,892.2, 2,892.0, 2,892.5).	Please see response to comment FA1-12.
PM2-21	Analysis of using water stored in Hungry Horse and moving it for storage in Flathead Lake.	Please see response to comment PM1-39.
PM2-22	Evaluate the impacts of reducing Flathead River flows during the spring runoff period.	Chapter 4 of the FEIS discusses the impacts associated with this scenario.
PM2-23	What variables can the licensee control to obtain a lake elevation no lower or higher than 2,892.2 during the recreational season?	The licensee can control both water levels and release rates consistent with the FERC license for the project.
PM2-24	How was the lake elevation of 2,888 selected for the end of December elevation in Alternatives 1 and 2?	This elevation was included in PPL Montana's proposed action. We assumed that PPL Montana indicated that a higher late season elevation provided more efficient and economic water use and alleviated some of the concerns identified for higher lake elevations, namely potential spring flooding. Our modeling confirmed that a 2,888' msl winter lake elevation would be necessary in a drought year to allow the lake to refill in the spring. Therefore, 2,888' msl was incorporated into Alternatives 1 and 2.

Comment Code	Comment	Response
PM2-25	Consideration of the Army Corps of Engineer's option of 2,890 feet at the end of December.	Please refer to response to comment PM2-24.
SA1-1	Recommend incorporating an additional alternative that includes an amendment to Article 56 and mimics the natural hydrograph. (see letter for specifics)	The intent of the minimimum instream flows in the Preferred Alternative are intended to mimic natural conditions in the lower Flathead River to the extent appropriate for existing conditions. Please refer to response to comment PM1-44.
SA2-1	Errata to first letter (SA-1)	Comment noted.

Appendix B Technical Support Document

Comment Code	Comment	Response
FA2-2	Include DMP in Appendix.	The 2002 DMP has been added as Appendix D.
FA2-25	Disagree with the "correct and false prediction" statistic.	The BIA understands that the commentor desired a rigorous statistical analysis of the proposed drought indicators to determine their validity. For the FEIS, the BIA conducted a statistical analysis of the indicators, including a principal components analysis of the FPRI to eliminate the potential for multicollinearity, and logistic regression models of the combined application of the MEI and FPRI as proposed in the DEIS. These analyses concluded that the proposed drought indicators were statistically valid. However, the BIA will continue to use the correct and false prediction information as presented in Appendix B of the DEIS and FEIS to provide a relatively simple graphical representation of the results of the application of the drought indicators to the historic record. In addition, the BIA stresses the need to understand the equal importance of over- and under-prediction of drought (under-prediction resulting in undesirable drought impacts, and over-prediction resulting in undesirable flood impacts). The BIA believes that the correct/false prediction figures as shown in Appendix B are an effective way of presenting this information, given that the statistical analysis has verified the validity of using the indicators for drought prediction.

Comment Code	Comment	Response
FA2-27	Disagree with analysis of Figures 4, 5, and 6	We have supplemented this analysis with a logistic regression and principal components analysis as requested by the USACE.
FA2-28	USACE supports use of NRCS/NWRFC water supply forecasts. Objects to WY outlook. Clarify WY outlook.	We have concerns using the water supply forecasts because they combine existing data with future predictions based on average runoff and/or precipitation values. In drought years, this skews the forecast to be wetter than would be expected in a drought year. We have included this discussion in Section 2.3.1 of the FEIS.
FA2-29	Document appears to fail NEPA regulations requiring analysis of impacts associated with no-action alternative.	Subsequent discussions with the BOR, EPA, and USACE resulted in an understanding of the inability to model the Proposed Action and No-Action Alternatives. Additional discussion of the characteristics of the Proposed Action and No-Action alternatives and why they cannot be modeled has been added to the EIS in Section 2 of Appendix B.
FA2-30	FPRI equations should be redone using appropriate statistical techniques to accommodate intercorrelated predictor variables.	We have conducted a principle components analysis (PCA) of the FPRI and included the information in Appendix B of the FEIS.
FA2-31	Each monthly subsection should clarify deactivation procedures.	Text has been modified to include specific deactivation procedures.
FA2-32	Verify correct FPRI March trigger value, if and why trigger value changed from February 2006 draft DMP, and confirm use of March FPRI trigger values used in modeling.	We have reviewed the FPRI trigger values and revised Chapter 4.0 in Appendix B to reflect the March FPRI trigger value of 4,800.
FA3-27	Second paragraph needs revision for clarity.	This paragraph has been expanded to explain the use of climate indicators in more detail.

Comment Code	Comment	Response
FA3-28	Second paragraph needs additional explanation of drought indicators and snowpack.	The FPRI uses snowpack measurements to calculate a proxy for the snow available in the Flathead basin to generate runoff during the spring melt. An evaluation of all water years indicated that the drought indicators, specifically the FPRI, successfully deactivated the drought management plan at least one to two months prior to the start of the runoff. Figures 9-12 in Appendix B demonstrate that in April, the highest runoff that occurred when the FPRI would have called for the drought management plan to be activated was 80% of normal. In addition, it was noted that observed floods have occurred in years with runoff at 120% of normal or greater; this observation was verified by a separate flood analysis.
FA3-29	Explain rationale for refill by May 15.	Under rule curve 1A, the system is driven to achieve lake refill as soon as possible. To achieve this, the rule curve used in the model includes an instantaneous increase from 2,888' to 2,893' msl on April 16, as shown in Figure 16 in Appendix B. This rule curve was created so that the model logic would not place any artificial constraints to refill. The model would allocate the incoming flows to satisfy ramping and minimum instream flow requirements and place the rest of the water into storage in Flathead Lake thereby raising the water level. The model cannot mimic potential real time operations which would be anticipating future rain or runoff events based upon weather forecasts. The point of this analysis was to demonstrate the effectiveness of relaxing the May 30, target elevation for Flathead Lake during periods of low precipitation and runoff. Under rule curve 1B, the model uses a relaxed approach to lake refill, and the rule curve increases linearly from 2,888' to 2,893' msl during periods of April 16 to June 15 shown in Figure 17 in Appendix B. For rule curve 1C, shown in Figure 18 in Appendix B, the model strikes a balance between the instantaneous and relaxed approaches, calling for a linear lake level target increase from 2,888' to 2,893' msl during period of April 16 to May 15.
FA3-30	Discharge flows should be determined before the season-confer with fish experts.	Releases will be managed in accordance with the Kerr license (i.e. in accordance with Articles 55 through 59). The only adjustment would be to the minimum instream flows under Alternative 2 if runoff is anticipated to be <65% of normal. We have consulted with fisheries experts regarding potential flow deviations, and have determined that the infrequency of the event would make it acceptable.

Comment Code	Comment	Response
FA3-31	Equations must be updated regularly because constants will change with new data.	The Flathead Precipitation Runoff Index (FPRI) calculations use weighting constants for each precipitation measurement station that are in general accordance with the area that each precipitation measurement station represents. Additional statistical analysis has evaluated medium and long-term trends in precipitation and runoff, and does indicate that periodic review of the indicator equations is an appropriate action. Therefore the stations and associated constants should be reviewed on a five-year basis.
Biological Opinion		
FA1-2	Climate change may impact runoff and water resource changes. See suggested website.	We acknowledge that climate change may impact runoff and water resource changes. The effects of global warming on a project-specific level cannot be reliably evaluated at this time. However, we have revised the Preferred Alternative to include a re-examination of the climate indicators on a five-year basis to address this issue. Please also refer to response to comment FA3-31.
FA2-43	Discuss status and implications of the remanded 2004 BO.	Additional discussion of this issue has been included in Sections 1.5.3 and 3.1.4 of the FEIS.
Cumulative Impacts		
CO5-2	The DEIS does not adequately evaluate the cumulative operations of the Kerr and Hungry Horse projects. Proposes 2 scenarios for consideration to address coordinated operations.	We have considered Hungry Horse operations in modeling various Kerr Dam operational scenarios under drought conditions. Additional discussion is included in Section 4.10.2.2 of the FEIS. We have also added a request for Hungry Horse flows to the Preferred Alternative in an effort to fully utilize any excess water in the Hungry Horse reservoir. A notification and BOR consultation requirement, prior to deviation from flows, is discussed in Section 2.3.3 of the FEIS.
CO7-2	Cumulative Impacts Analysis for the Hungry Horse Dam Flood Control and Fish Operations is limited and may incorrectly rely on other documents without adequate analysis.	The FEIS analysis incorporates the new operational changes at Hungry Horse and the Preferred Alternative requires coordination with the BOR. The effects of changes in Hungry Horse operations are described in a separate EIS prepared by USACE in cooperation with BOR. A link to this EIS is provided in Section 1.5.7.

Comment Code	Comment	Response
CO7-4	The Final EIS should analyze cumulative impacts on the Flathead River below Hungry Horse Dam resulting from the reshaping of the augmented flows released from Hungry Horse.	Comment noted. Please refer to response to comment CO7-2 and Section 3.1 of the FEIS.
PM1-49	Members of the irrigation project of the Flathead Reservation have a right to take water from the lake for irrigation; it's an insignificant impact with the lake levels or river flows because they rarely take the quantity that is set aside for the project, and it's a small amount of water.	Section 3.5 and Chapter 4 of the FEIS include a discussion of tribal uses of water from Flathead Lake, including irrigation.
PM2-14	Impacts of the drought management plan on the lower river, specifically in drought years.	Additional discussion regarding potential impacts on the lower river have been added throughout Sections 3 and 4 of the FEIS.
DEIS Distribution and Comment Period		
CO2-1	Request to extend comment period, hold another public meeting and make documents more readily available.	As discussed in Section 1.6 of the FEIS, agency and public scoping meetings and public workshops were held prior to issuance of the DEIS and a 60-day comment period was provided. Although the DEIS was not received by all interested parties, it was made available at local public libraries and online. The DEIS and the location of public comment meetings were included in the Notice of Availability that was published in the Federal Register and made available on the official project website. Approximately 70 people attended the public hearings and approximately 250 individual comments were submitted on the DEIS.
CO3-1	Extension of public process/comment period requested by Montana. What was reply?	Please refer to response to comment CO2-1.
CO3-2	Will comments be posted to BIA website and how will BIA respond?	All comments that were received on the DEIS will be part of the administrative record, and summaries of comments and responses are included in the FEIS. Copies of the Draft and Final EIS are provided on the project website.
CO6-1	The DEIS appears appropriate, but needs a couple clarifications.	Comment noted.

Comment Code	Comment	Response
LA1-1	Did not receive DEIS, please accept our comments after deadline.	The comments were accepted.
PM1-10	Comment regarding the limited availability of the document and that a document was requested and not provided.	Please refer to the response to comment CO2-1.
PM1-34	The meeting was not adequately publicized.	Comment noted. Meeting notices were placed in the Federal Register, advertised in the Lake County Leader and the Daily Interlake, and publicized on the project website. Please also refer to response to comment CO2-1.
PM2-13	Distribution of materials to Native American tribes.	See response to comment CO2-1. A copy of the DEIS was distributed to the Confederated Salish and Kootenai Tribes.

DEIS Introduction

Comment Code	Comment	Response
FA1-1	Improve discussion of previous natural fluctuations of water levels in Flathead Lake.	Section 1.1.1 of the FEIS has been revised to include additional discussion of the historic fluctuations in the level of Flathead Lake prior to construction of the Kerr Dam in 1938.
FA2-46	DEIS must list all permits required. Identify how DMP would be approved by FERC. Identify if Article 43 would change in any way.	The adoption of a drought management plan does not require any additional permits. It is an action mandated by the FERC operating license for the Kerr project. The FERC has been provided a copy of the DEIS and afforded the opportunity to comment. No changes are proposed to any of the other license articles; the drought management plan notes when a deviation from the existing articles would be necessary to mitigate impacts of drought on lake levels and minimum instream flows. The DMP will be filed with FERC pursuant to Article 60 once completed.
FA2-47	Clarify roles of Department of Interior and FERC.	Chapter 1 has been modified to include more information about the roles of these respective agencies and how the DMP will be provided to FERC.

Comment Code	Comment	Response
Drought Indicators		
FA2-24	Conclusions drawn that MEI results in 70% correct prediction is misleading.	The BIA conducted supplemental statistical analysis of the climate indicators to determine whether or not the indicators were an effective tool for predicting drought. Section 2.2.2 and Appendix B of the FEIS have been modified to refer to the statistical analysis as evidence that the use of climate indicators as identified in Alternatives 1 and 2 is an effective drought prediction tool.
NAT1-3	Definition of drought should be specific and consistent throughout document.	Section 1.3 of the FEIS has been added to include a discussion of drought indicators and the definition of droughts. Drought has been defined as less than 72.6% of normal April through September runoff; and severe drought has been defined as less than 65% of normal April through September runoff.
PM1-16	If the lake elevation were maintained during the summer tourist season and dropped in the fall and then in the spring to protect farmers and property owners and owners of septic tanks, the only conflict would be PPL not making as much money from the Kerr Dam, and the Confederated Tribes because they are 50 percent owners.	Please refer to response to comment PM1-15.
PM1-20	Since 1973, there has been a drought every 4.7 or 4.8 years, which is more frequent than the 17- or 18-year average presented in the EIS. Droughts do not happen with regularity, they happen in cycles. Because they do not happen with regularity, lowering the lake levels is a concern.	Comment noted. The Preferred Alternative includes the use of climate indicators to mitigate the effects of drought on water levels. Refer to Section 2.3.3 of the FEIS.
PM2-1	What constitutes a drought?	A drought is defined as a situation where runoff entering Flathead Lake in the April-September period is < 72.6 % of normal.
PM2-2	Mixed use of the terms "drought" and "severe drought."	These terms have been more clearly defined in the EIS.
PM2-15	Are there triggers from January through March in the DMP to reassess implementation?	Section 2.3.3 of the FEIS describes the Preferred Alternative which includes monthly assessment of climate indicators.

Responses to Summary Comments on the DEIS

Summary Report 1: Sorted by Category or DEIS Section

Comment Code	Comment	Response
Economic and Social Impacts		
CO4-6	Identified concern over social/economic analysis section of the EIS and recommended 11 specific impacts be quantified and evaluated.	The FEIS involves a systematic evaluation of potential effects from the proposed action on property and business owners. Additional discussion regarding docks, marinas, and lake access points have been added to Chapter 4 of the FEIS by identifying areas of the lake that are likely to be most affected. Elevation data was included where it was available. Information regarding boat landings, and the elevation at which they would not be usable, is included. In addition, areas where seasonal damage would occur are identified. The proposed action would mitigate the many concerns identified by the commenter by maintaining summer lake elevation within the historical normal range and by using climate indicators to minimize the occurrence of high winter lake levels.
FA1-5	Provide more detailed analysis of impacts under each alternative. Focus on fishery impacts.	Table 2-2 of the FEIS, Summary of Impacts, has been revised to include more specific differences among the alternatives. Section 4.6.2.1 has been revised to include additional discussion of the fisheries habitat data shown in Table 4-2.
FA3-16	Improve discussion of power generation -- especially if PPL Proposed Action is the preferred alternative.	The overall impact to power generation would be limited under all alternatives. The discussion related to these effects is provided in the impact sections in Chapter 4.0.
PM1-28	The document provides no information about what lake level significantly impacts shoreline area, area businesses, or boaters.	Section 4.8 of the EIS discusses such impacts; this section has been modified to include updated economic information.
PM1-29	The document does not have the most recent economic data; the data stopped at the year 2000. The commenter's research showed that Flathead County is the second fastest growing county in Montana, not the fourth as the document says; the local paper had a headline that the Interlake Flathead "Tax Base Soars."	Much of the socioeconomic data included in Section 3.6 was obtained from the 2000 Census. Economic data used is from the 2002 Economic Census and was updated in the FEIS, with data from the 2006 Economic Census. Changes to the EIS text were made as appropriate.
PM1-31	Economic impacts to the land use or water quality have not been addressed.	Please see response to comments PM1-28 and PM1-29.

Comment Code	Comment	Response
PM2-5	Did an economist provide the required EIS assessment and was it sufficient?	See revised section 4.8 of the EIS for information regarding economic impacts. This section was developed under the supervision of an economist.
Editorial		
CO6-7	Correct references. Letter identifies several incorrect or missing weblinks.	Weblinks have been checked and updated as appropriate.
FA2-3	Report lake elevation to the nearest tenth (e.g., 2,990.1 feet).	Lake elevations that do not include a decimal indicator are assumed to be whole numbers (e.g., 2,892' msl in the document should be considered 2,892.0' msl). Otherwise, all elevations have been reported to the nearest tenth of a foot.
FA2-6	Last sentence of page 2-3 needs to match Appendix B 1.3.1.	The description on page 2-3 is a brief summary of the MEI; Appendix B provides additional technical information.
FA2-26	Editorial. Delete "(Figure 9 and Figure 16)" at end of first sentence, last paragraph on page.	This text has been deleted.
FA2-37	Curves are improperly labeled. Should be elevation-duration curves	These figures have been revised in the FEIS.
FA3-5	Change to "match outflows to inflows."	The phrase "match inflows to outflows" has been changed to "match outflows to inflows" throughout the document.
FA3-9	Define drought conditions.	Text has been added to the FEIS to define drought and severe drought.

Comment Code	Comment	Response
FA3-10	Revise sentence.	The referenced sentence in Section 2.2.3 has been revised to read: "As indicated in Chapter 1.0, the Kerr Project currently operates under a joint license issued by FERC in 1985 which has been subsequently amended several times."
FA3-12	Define runoff volume as referring to the April to Sept period.	Section 2.3.3 has been revised to indicate that the runoff volume would be measured between April and September.
FA3-13	Hungry Horse -- not Kerr is most notable.	Section 3.1.2.3 has been revised to include the appropriate reference to the Hungry Horse Dam.
FA3-14	Hungry Horse does not do daily peaking.	Section 3.1.4 has been revised to clarify that Hungry Horse has adopted ramping rates and eliminated daily peaking in response to the requirements of the USFWS Biological Opinion (BiOp).
FA3-15	Table 3-9 not adequately explained.	The flood section of the FEIS has been modified to include the Somers datum.
IND2-2	Define the "datums" used. Is the Somers datum used?	The Polson datum is used in the analysis. The USGS regional datum is set at Polson. Please refer to Table 3-9 of the FEIS for further clarification.
PM1-30	The use of the phrase "we will strive to attain" is ambiguous and should be more precise.	This language was removed from the FEIS. Refer to Section 2.3.3 for clarification on efforts to achieve desired lake elevations.

Environmental Consequences

Comment Code	Comment	Response
FA2-36	Need modeling results to discuss impacts to flood control.	Section 4.2.2.3 of the FEIS provides additional analysis regarding use of climate indicators on flood control operations. This section examines a scenario from 1964 when indicators went from drought to no-drought and a subsequent flood occurred. The analysis shows that flood control operations would remain consistent with Article 43 of the license.

Comment Code	Comment	Response
FA2-62	Include information about when drought year is indicated then became a non-drought year.	The discussion of the use of climate indicators has been expanded. Section 4.2.2.3 provides a discussion of the 1964-65 flood.
FA2-63	The Pacific Northwest Coordinating Agency (PNCA) is not to govern release of stored water. Change wording to "purpose is to coordinate the release of stored water…"	Section 4.10.2.3 has been revised to include the suggested text.
FA3-17	Not clear what years were used and how selected. Improve discussion.	An improved discussion of the periods of record has been included in Sections 2.2.1 and 3.1.3.5 of the FEIS. The year 1965 was selected as the beginning of the period of record because Article 43 was modified that year to incorporate the MOU between MPC and USACE. Prior to 1965 there was a lack of consistency in manageing lake levels from year to year.
FA3-18	Disagree with flood control by committee.	The Proposed Action includes this "committee" approach to flood control. The Proposed Action is not the preferred alternative. Alternatives 1 and 2 were developed to provide more concrete direction on how to manage lake levels during drought events.
FA3-19	Editorial. Conflict with proposed action. Match description with description of proposed action.	Text modified.
FA3-20	BOR states objection to coordination to keep Flathead Lake full.	The description of the Preferred Alternative in Section 2.3.3 was modified in the FEIS to include consultation with BOR.
FA3-21	Explain assumptions used for Alternative 1 Rule Curves.	Three rule curves were modeled for Alternative 1 which began refill of Flathead Lake one, two, and three weeks earlier than the license requires. The three-week refill rule curve was used in the EIS as likely being the most representative of what would actually be attempted during a drought year.
FA3-22	Would like to see modeling include data prior to 1965 (see FA3-3).	The discussion of the periods of record demonstrates how data prior to 1965 was used in the analysis. Please refer to response to comment FA3-17.

Comment Code	Comment	Response
FA3-23	Include drought years in the 40s in figure 4.5.	The purpose of the figures in this section of the EIS are to compare historic post-1965 operations with modeled operations. The modeled results of pre-1965 give information as to how the lake would react under alternative operating scenarios using the current license articles as a baseline. Historic data prior to 1965 would not be useful since Article 43 did not apply at that time.
FA3-24	Suggest adjusting Flathead Lake Discharges by co-licenses.	Comment noted.
FA3-25	PPL Montana Proposed Action insufficient. Need additional analysis.	The PPL Montana's Proposed Action was evaluated as presented. A qualitative discussion of the components of the Proposed Action was developed to provide insights into the impacts of this alternative.
FA3-26	Need discussion of salmonids downstream, on the Columbia River.	As noted in Section 4.6.1.5, none of the alternatives would affect flow augmentation water released from Hungry Horse as required by the NMFS. All such water would eventually pass through Kerr Dam for the benefit of salmonids further downstream on the Columbia River System. Some reshaping of the augmentation release, which benefits water levels on Flathead Lake, is inevitable due to the storage effects and operating requirements of Flathead Lake but these actions cannot affect downstream salmonids pursuant to NMFS BiOps.
PM1-15	Continually lowering and raising the lake has elevated the water table in the lower valley, which has affected farmland and has the potential to affect septic tanks.	This comment addresses operational levels during nondrought operations which are under jurisdicition of FERC. Normal operating issues should be addressed through the FERC procedures.
Environmental Justice		
FA1-17	Conduct more in-depth analysis of environmental justice; recommend using referenced environmental justice (see web links).	The environmental justice analysis was conducted using standard methodologies which evaluate census data at the census block and block group levels. The FEIS acknowledges that impacts of a minimum instream flow deviation would fall on the minority population of the Flathead Reservation whose tribal resources would be impacted. However, effects would be borne equally on all users and residents of Flathead Lake, and would not disproportionately affect minority populations. The resources recommended by the commenter were among the agency guidance documents consulted in the environmental justice analysis.

Responses to Summary Comments on the DEIS

Summary Report 1: Sorted by Category or DEIS Section

Comment Code	Comment	Response
PM1-42	The statement in the EIS that "if minimum instream flow deviations were approved, the impact would fall disproportionately on the minority population of the Flathead Reservation" only looks at the downstream users of the river and leaves out the impact on the Tribes and the people on the south half of the lake, specifically their business KwaTaqNuk and other businesses they have that are dependent on full pool.	Environmental justice analysis needs to determine two things: 1) there is an adverse effect, and; 2) the adverse effect falls disproportionately on minority or low income populations. In this specific case, the analysis is discussing Alternative 2 (the preferred alternative), and acknowledges that if flow deviations were approved to keep lake levels high, it would favor people on the south end of the lake, but have a negative effect on those populations for which the lower Flathead River is an important resource, most notably the CSKT.
Executive Summary		
FA2-33	Feature 4 needs further clarification (see comment 11).	The text in the FEIS Summary and Section 2.1 has been modified to clarify PPL Montana's Proposed Action. See also the response to comment FA2-11.
FA2-34	Under item 7 please discuss significance of 2,892.2 feet.	Sections 2.3.2 and 2.3.3 in the FEIS include discussions of how the 2,892.2' msl lake elevation was chosen. During the NEPA process for this DMP, a number of comments were received regarding lake elevation with varying opinions regarding the proper summer lake level during a drought. The BIA evaluated the effects of various lake level targets under drought conditions through modeling, data analysis, and qualitative reviews of recreational and economic impacts. As a result of this analysis, the target lake elevation of 2,892.2' msl as seen in Alternatives 1 and 2 was selected as being a reasonable value that is both achievable and minimizes recreational and economic impacts. See also response to FA1-12.
FA2-35	Explain decision to use minimum instream flow of 8kcfs.	The 8,000 cfs was chosen because it maintains the aquatic habitat in the main bed of the Flathead River, so the rare deviation preserves fisheries habitat and balances lake level concerns.
FA2-38	Provide a discussion of increased flooding potential downstream of the project on Flathead and Clark Fork Rivers and downstream of Albeni Falls Dam on Pend Oreille River.	Sections 4.2.2.3 and 4.6.2 of the FEIS has been revised to include a discussion on the effect of flooding.
FA2-39	Expressed agreement that neither the DMP or EIS process is intended to develop a water management plan for Flathead Lake.	Comment noted.

Comment Code	Comment	Response
FA2-49	Proposed Action and No-Action should be modeled to same level of detail as the Alternatives 1 and 2 and all alternatives compared or ranked.	This is part of PPL Montana's proposed action and was evaluated as presented. Additional discussion of this issue is included in Appendix B.
FA2-50	Table S-1; Flood Protection should have its own line. Differences in Alternatives need to be stated.	Tables S-1 and 2-2 have been revised in the FEIS to include potential impacts on flood protection.
FA2-51	Table S-1 uses severe drought; explain how this compares with drought condition.	In the FEIS, Drought has been defined as less than 72.6% of normal April through September runoff; and severe drought has been defined as less than 65% of normal April through September runoff.
NAT1-2	Reference of recreation, tourism, and associated activities in 1962 MOU and amendments is erroneous. Delete.	The Summary and Section 1.1.2 have been revised to remove the reference to the MOU supporting recreation, tourism, and associated activities on Flathead Lake by refilling the lake in time for the summer season.
General Comment		
CO2-2	Express support for VARQ at Hungry Horse.	Comment noted.
CO2-3	Recommend all agencies and organizations coordinate operations at the Kerr and Hungry Horse projects.	As discussed in Section 2.1, consultation with various agencies during implementation of the DMP would occur given each agency's varying land management responsibilities in the area. In response to comments regarding Hungry Horse Dam operations, an adaptive management planning component was added to the Preferred Alternative. This is discussed in Section 2.3.3 of the FEIS, which outlines the process for notification when deviating from flows.
CO2-4	DMP must be flexible to unanticipated issues.	Please refer to response to comment CO2-3.

Comment Code	Comment	Response
CO7-3	The Final EIS should undertake a thorough analysis of a DMP with the new Hungry Horse Dam discharge strategy.	The FEIS analysis incorporates the new operational changes at Hungry Horse and the Preferred Alternative requires coordination with the BOR. Please refer to Section 2.3.3 of the FEIS.
NAT1-10	CSKT recommends Alternative 2 as the preferred alternative.	Comment noted.
PM1-1	Question about what agency provides the final decision: the DOI or the FERC. Is this a FERC document or a DOI document? Is the lead agency the DOI or the BIA?	As discussed in Section 1.3, the Secretary of the Department of Interior will issue a Record of Decision selecting an alternative regarding the DMP. The U.S. Department of the Interior (DOI), through the Bureau of Indian Affairs (BIA), prepared the Environmental Impact Statement (EIS). The Federal Energy Regulatory Commission (FERC) is participating as a cooperating agency for the preparation of this EIS.
PM1-3	Comment that the 2001 full lake level was only achieved for a short time and then dropped by opening the Kerr Dam, so the full lake level should not be considered as being achieved.	Comment noted.
PM1-13	Recommendation to require the government to provide means for creating extra snow fall to the area in the winter so that parceling water in the summer won't be necessary.	The EIS is specifically focused on operation of the Kerr Dam and resolution of conflicts between license articles. The purpose and need of the project is not to eliminate drought, which is currently beyond our control.
PM1-17	The lake should be dropped to 2883 to protect farm land and septic systems.	During most years, the drought management plan would not be implemented and the issues raised by the commenter would not be affected. Please refer to response to comment PM1-15.
PM1-23	Comment on the document; certain parts of the document are not up to standard and need some attention.	Comment noted.

Comment Code	Comment	Response
PM1-33	The BOR and the BIA are under the same agency, and the BOR website says that Hungry Horse was built to help with flood control on Flathead Lake, so they should be able to help with the 6 inches Flathead Lake might need in those years.	Although both Bureaus are within the same Department, the laws and mandates governing each Bureau are substantially different. In this case, BIA is charged with developing a drought management plan that provides for minimum instream flows below the Kerr Project while reducing the effects of these flows on pool elevations above the Kerr Project. In order to minimize potential conflicts with other Project demands, our efforts need to be accomplished within the framework of the existing Kerr Project license without jeopardizing BOR's ability to address the myriad requirements of the Hungry Horse Project -- where BIA has no authority. However, both BIA and BOR recognize that some relief during drought years may be possible within the existing Hungry Horse operational framework and have added a coordination process under Alternative 2.
PM1-38	Comment that the government agencies are not looking out for the citizens.	Comment noted.
PM1-46	Consultation should occur more than once per month to conduct reviews of drought conditions.	Comment noted. Coordination issues have been addressed in modifications to the Preferred Alternative as shown in the FEIS. Please refer to response to comment PM1-39.
PM2-11	What conditions could trump the drought management plan?	Generally, under any of the alternatives or any conditions where flood concerns were significant as determined by the USACE.
PM2-18	Does the Kerr Project have authority to release from Hungry Horse Dam?	No. However, coordination with Hungry Horse operations has been added to the Preferred Alternative.
PM2-19	What results if PPL Montana disagrees with the BIA's proposal?	We would first try to resolve any differences with PPL. However, in the event that we approve an alternative that PPL opposes, they would have the opportunity to dispute our approval before FERC and then through the courts.

Responses to Summary Comments on the DEIS

Summary Report 1: Sorted by Category or DEIS Section

Comment Code	Comment	Response
Instream Flows		
FA1-9	Provide additional discussion of difference between Article 56 minimum levels and instream flows used by PPL Montana.	The drought management plan proposed by PPL Montana would follow the Article 56 requirements up until the point where a revised summer lake level target of 2,892' msl cannot be maintained. In this situation, the PPL Montana plan proposes to reduce flows released from Kerr Dam to match the total inflows to Flathead Lake; these reduced flows may be larger or smaller than the Article 56 minimum requirements, depending on the availability of water. Please refer to Section 2.1 of the FEIS.
PM1-2	Where will the inflow be measured, based on it coming from multiple sources (Hungry Horse, Swan, and other places) and other factors such as evaporation?	We believe the commenter is referring to the Proposed Action by PPL Montana. There was no information in the description presented that shows where inflow will be measured.
Land Use		
IND2-1	DEIS does not address failure to draft the lake every year and associated impacts on farmland.	Additional discussion regarding impacts to land use has been added to the FEIS in Sections 3.2 and 4.4. The Preferred Alternative allows for more frequent drafting of Flathead Lake during winter months, reducing impacts on farmland upstream of the lake.
IND2-3	Question about full pool impacts, especially raising water levels on his property.	We appreciate the concerns expressed by the landowner, however the issue of managing the lake to a full pool elevation of 2,893' msl is a licensing issue that should be addressed through applicable FERC processes.
IND2-4	Raised question about flood events during normal and drought years.	The FEIS has been modified to include additional discussion of these occurrences. Please refer to response to comments FA2-36 and FA2-38.
NAT1-6	Flathead Lake and History should include discussion before Kerr Hydroelectric dam was built.	Sections 1.1.1 and 3.1 of the FEIS have been modified to include additional discussion of the conditions at Flathead Lake and in the lower Flathead River prior to the construction of Kerr Dam.

Responses to Summary Comments on the DEIS

Summary Report 1: Sorted by Category or DEIS Section

Comment Code	Comment	Response
Modeling and Water Forecasts		
FA1-3	Compare/contrast MEI/FPRI and NWRFC system.	Although the comment refers to Section 2.6 of the DEIS, we have modified Appendix B to include this information. Sections 2.3.2 and 2.3.3 of the FEIS discuss the use of MEI/FPRI and NWRFC data in activating the DMP.
FA1-14	Modeling data supports Alternative 2 to resolve instream flow vs. lake level conflicts better than Alt 1 and Proposed Action although information on effects is minimal.	Comment noted. See Table S-1, Summary of Impacts, and Chapter 4 of the FEIS which better clarify the difference among the alternatives.
FA1-15	Unclear why modeling does not indicate need for instream flow deviation in 1941.	The data used to develop the climate indicators was not fully available prior to 1950. Therefore, there is significant uncertainty in the pre-1950 analysis.
FA1-16	Concerned that Proposed Action does not have similar/same level of analysis/objective evaluation as Alternative 1 and 2. Add information and discussion regarding estimated elevations and flows for the Proposed Action during drought years.	Please refer to Section 4.2 of the FEIS for the methods used to assess the operational effects of the alternatives. We have added additional discussion of the Proposed Action and No-Action alternatives to clarify this issue. Data does not exist to model the proposed action and the No-Action alternative. Continued adjustment of the rule curve could only be modeled if PPL Montana and the USACE provided specific rule curves for various water management scenarios. This information is not available.
FA2-60	Comment that "Percent Time Exceeded Curves" including the results of the period of record would be helpful.	Please see Figures 21, 22, 23, and 24 in Appendix B of the FEIS for additional information.
FA2-64	Article 43 guidance for moderate or major flood year -- was this included in plan and modeling?	In general, there are no operational changes in moderate or major floodyear. The DMP is not activated in such years, but we believe the climate indicators may be useful for flood predictions.
FA2-65	Further hydrologic modeling to characterize alternatives. Clarify the rationale for modeling period and add text to explain what was done.	Based on discussions with the USACE, BOR, and EPA, this issue was resolved. Section 3.1.3.5 was added to the FEIS to address water discharge and lake elevation.

Responses to Summary Comments on the DEIS

Summary Report 1: Sorted by Category or DEIS Section

Comment Code	Comment	Response
FA3-1	Include modeling data: tables which reflects important hydrologic information and statistics.	Statistics of the model run results have been included in the Technical Support Document in Appendix B of the FEIS.
FA3-3	Clarify period of record used in each major element of study.	Additional language has been included in Section 2.2.1 of the FEIS that discusses the periods of record.
FA3-11	Were climatic indicators tested for 1931-1934 and 2001-2004 (lowest years) and did the conclusions hold up?	Data is not available for the years 1931 to 1934. Climate indicators were tested for 2002-2004 and confirmed. Please refer to Appendix B of the FEIS.
NAT1-1	Clarify modeling discussion with simple explanation of data periods and license 4e conditions.	An explanation of the Secretary's 4e conditions is provided in Section 1.1.2. The period of record discussion is provided in Sections 2.2.1 and 3.1.3.5 of the FEIS.
PM1-7	Other studies have indicated that a draw down of 5 feet from Hungry Horse would result in a 1-foot increase to Flathead Lake. Hungry Horse has previously been drawndown by more that 100 feet without significant disruption to recreational users of that reservoir; therefore, a 5-foot draw down from the Hungry Horse would provide enough water to Flathead Lake in severe circumstances without affecting Hungry Horse.	Comment noted. The Preferred Alternative includes coordination with Hungry Horse operations. Please see response to comment PM1-39 and Section 4.2.2.2, Increasing Hungry Horse Flows, of the FEIS.
PM1-14	Comment that the Hungry Horse Dam was not present during example years of 1940 and 1941, so all available water was entering Flathead Lake at the time. Therefore, the analysis of drought before the Hungry Horse Dam was built is erroneous.	The modeling was designed to determine what would happen in any year under current operations and modified current operations, using runoff values as inputs. In effect, the model can simulate that Hungry Horse is actually present even when it had not yet been constructed.
PM1-22	Winter lake levels are important, with the problem of ice damage to public and private property.	Comment noted. See also response to comment PM 1-15. The Preferred Alternative requires the use of climate indicators which minimizes the frequency of high water levels during winter months.

Comment Code	Comment	Response
PM1-26	Need additional clarification of the real/actual effects of lower lake levels on the old, young, and handicapped.	The FEIS recognizes comments regarding the impact of lower lake levels on the old, young, and handicapped. The Preferred Alternative maintains summer lake levels within normal ranges of those experienced on Flathead Lake which should minimize impacts to these groups.
PM1-32	The document needs to identify the specific numbers of docks that are going to be affected; how many marinas are going to be affected; how many docks will be sheared off in the winter.	Additional detail has been added to the discussion of land use impacts in Section 4.4 of the FEIS.
PM1-36	The water level has been adequately filled in the past, and the commenter does not understand why the lake level figures need to change.	It has been demonstrated that under drought conditions there is insufficient water to both fill the lake and maintain river flow requirements (e.g., conditions that occurred in 2001 with considerable hardship to lake residents). Modification of both lake level elevations and lower Flathead River stream flows is necessary to manage the inevitable conflicts under drought conditions.
PM1-37	How many people in Flathead and Lake County get their potable water from Flathead Lake? If they can't service those lines within an adequate period of time in the spring when the lake bed/riverbed is dry enough to access them, they can lose out.	A discussion of Flathead Lake as a source of potable water was added to section 3.1.2.4. The Preferred Alternative minimizes impacts of high spring water levels to occur only during drought years.
PM1-47	Figure 3.3 shows that the lake level does fill on an average and actual basis to 2,892 at all times, and there wasn't a problem keeping the lake filled prior to the development and implementation of BIA's 4(e) conditions.	Figure 3-3 represents average lake elevations for many years. Figure 3-4 shows that the elevation of Flathead Lake on June 15 is actually higher during drought years than the long term average. In average and wet years Flathead Lake water levels are kept lower on June 15 due to concerns over flooding. Figure 3-5 illustrates average Flathead Lake water levels from June 16 throught September 15 for both the average and the seven drought years. Since 1965, approximately 65% of the time the drought year summer average lake elevation is the same as the long term average. The one of the two years that did not meet the long term average was WY2001 which was caused by a conflict between the Article 43 water levels and Article 56 instream flows. The Preferred Alternative is intended to resolve that conflict.
PM2-16	Frequency that the lake level will drop more than expected (e.g., 3 to 5 inches).	Analysis of the historic lake elevations data indicate that droughts occur once every 18 years.

Comment Code	Comment	Response
PPL Drought Management Plan		
FA1-13	Good data for purpose/goal of drought management plan.	Comment noted.
FA2-1a	Tier 1 response occurs before the triggering indicator of a drought.	Please refer to the response to comment FA2-1.
FA2-1c	Need to define start and end point for Tier 4 response.	Please refer to the response to comment FA2-1.
FA2-1	The 2002 DMP does not provide process or direction for what constitutes a drought or drought conditions.	We concur. The PPL Montana's Proposed Action was evaluated as presented. A qualitative discussion of the components of the Proposed Action was developed to provide insights into the impacts of this alternative.
FA2-1b	Tier 2 response should be SOP regardless of drought condition.	Please refer to the response to comment FA2-1.
FA2-52	Request inclusion of information regarding development of Minimum Volume Runoff Curves	This is part of PPL Montana's proposed action and was evaluated as presented.
FA2-53	Text needs to include the USACE's responsibility and authority in regard to Columbia River System Flooding.	Section 1.1.2 has been modified to include additional information about the USACE's role and responsibilities with regard to flooding within the Columbia River system.

Comment Code	Comment	Response
FA2-58	Drought Management Plan should be included in the water management plan with sufficient details and analysis so that deviation is not necessary.	Extensive modeling of Flathead Lake operations under a variety of scenarios indicates that resolving the conflicts between Article 43 and Article 56 cannot be accomplished under severe drought conditions (runoff <65% of normal) unless a deviation from minimum flows is allowable. In all cases, a deviation from lake drawdown is necessary to preserve water in years where runoff is <72.6%. Close coordination with the USACE between January and June will help address flooding concerns.
Proposed Action		
CO4-3	Identified several concerns with the Proposed Action.	Comments noted. The proposed action was prepared by PPL Montana and it has been utilized in the EIS as is.
CO6-2	PPL's Proposed Action described incorrectly. Correct description in section 2-2.	The Summary and Section 2.1 have been revised in the FEIS to clarify that under PPL Montana's Proposed Action, minimum instream flows would be modified, and/or the flow from Hungry Horse Dam would be increased to maintain the 2,892' msl lake level.
FA3-2	Change Proposed Action to PPL's Proposed Action.	The headings for Sections 2.0 and 2.1 have been revised to read "PPL's Proposed Action."
FA3-4	Objection to the Proposed Action Alternative as unacceptable.	The FEIS has been modified to include BOR's position on the use of Hungry Horse flows and revised to state that Alternative 2 is the preferred project alternative.
FA3-8	Change last bullet of proposed action.	The Summary and Section 2.1 have been revised to clarify that minimum instream flow would be modified at the same time that the flow from Hungry Horse Dam would be increased to achieve and maintain the 2,892' msl foot lake level.
PM1-27	How was the level of 2,888 chosen for the end of December level? The Army Corps of Engineers and DMT Plan Number 1 draft the lake to an elevation of 2,890 by the end of December; why was 2,888 chosen for this project?	The elevation 2,888' msl was first presented in the proposed action and was subjected to significant analysis in the alternatives development. It was found to be the lowest elevation through modeling and analysis that balanced the needs of flood control, lake levels, and minimum instream flows. Appendix B contains a descriptive analysis of the modeling conducted for the Preferred Alternative.

Comment Code	Comment	Response
PM2-3	Reasoning for picking 2,892. [NOTE: The transcripts show the numbers 2,392 and 2,393 in comments PM2-3 and PM2-4; assume the commenter meant the numbers as they appear in the document.]	This is part of PPL Montana's proposed action and was evaluated as presented. The PPL Montana DMP indicates that a lake elevation of 2,892' msl would minimize effects on recreation and other summer lake use activities, and be a more realistic lake elevation goal under drought conditions. Please also refer to response to comment FA1-12.
Study Area		
FA1-10	Include lower portion of Flathead River down to its confluence with the Clark Fork River in the analysis.	Section 3.1 and Figure 3-1 have been revised to include the lower portion of the Flathead River within the primary study area for the DMP.
FA1-11	Recommend incorporating Hungry Horse flows into analysis of all alternatives.	We coordinated with the BOR to ensure that Hungry Horse operations were incorporated into updated model runs for Alternatives 1 and 2. Under VARQ operations, spring water releases from Hungry Horse Dam are delayed; releases are reduced in April and increased in May and June. The analyses completed by the BOR indicate that, during drought years, under VARQ, Flathead Lake has a slightly better likelihood of achieving full pool while meeting minimum instream flow requirements. Please refer to Section 3.1.4 of the FEIS.
Threatened and Endangered Species		
CO1-1	A majority of the plans in the EIS do not adequately protect needs of threatened bull trout in the Flathead River	Although we concur that bull trout habitat may be impacted under alternatives that result in reduced Flathead River flows, our information suggests that these impacts will be limited under the Preferred Alternative. For certain lifestages in certain locations, we may even see a slight increase in available habitat. Please refer to Sections 4.6.2.3 and 4.6.2.4 of the FEIS for further discussion.
Water Flow		
FA1-4	Expressed appreciation for table 2.1, 3.2, 3.3, 3.4, and figures 3.3 to 3.10.	Comment noted.
FA2-61	Extend the graph to show the level that the high flows reach.	Figures 4-6, 4-9, and 4-10 have been revised.

Responses to Summary Comments on the DEIS

Summary Report 1: Sorted by Category or DEIS Section

Comment Code	Comment	Response
PM1-5	Status of previous assurances that the Army Corps of Engineers MOU states that Hungry Horse and the Kerr Dam will continue flow to maintain the levels in Flathead Lake.	See Section 3.1.3.5 for a discussion on the Memorandum of Understanding. The Preferred Alternative includes coordination with Hungry Horse operations.
PM1-45	There is evidence that fisheries downstream would not be affected by a reduction in flow to 6,000 cfs.	Generally, fisheries impacts are directly related to the availability of water. As water is reduced, fisheries impacts increase. Our analysis demonstrates that flows of 8,000 cfs result in higher lake levels with limited effects on downstream fisheries.
PM2-12	Potential impacts on the lower river, specifically in drought years, have not been sufficiently discussed in the EIS.	Additional discussion regarding potential impacts on the lower river have been added throughout Sections 3 and 4 of the FEIS.
Water Quality		
NAT1-8	Water quality discussion should include downstream conditions in the lower river, specifically water temperature.	The discussion of water quality has been modified in Section 3.3.3 of the FEIS to include discussion of temperature concerns related to low flows.
PM2-10	Impacts of the lake level on water quality as a result of point source discharges from municipal waste water treatment plants has not been fully considered in the EIS.	Section 3.3 discusses point source discharges, and we have added additional analysis in Section 4.5 (Water Quality).

Final Environmental Impact Statement for a Drought Management Plan for Operation of the Kerr Hydroelectric Project on Flathead Lake, Montana

Responses to Summary Comments on the DEIS

Summary Report 2: Sorted by Commenter

Comment Code	Comment	Response
Montana Water Trust		
CO1-1	A majority of the plans in the EIS do not adequately protect needs of threatened bull trout in the Flathead River	Although we concur that bull trout habitat may be impacted under alternatives that result in reduced Flathead River flows, our information suggests that these impacts will be limited under the Preferred Alternative. For certain lifestages in certain locations, we may even see a slight increase in available habitat. Please refer to Sections 4.6.2.3 and 4.6.2.4 of the FEIS for further discussion.
CO1-2	MWT opposes No-Action Alternative	Comment noted.
CO1-3	MWT opposes Proposed Action because of impacts to Bull trout populations	Please refer to response to comment CO1-1.
CO1-4	MWT supports Alternative 1	Comment noted.
CO1-5	MWT does not support alternative plan 2 without additional information to evaluate bull trout effects.	Please refer to response to comment CO1-1.
Northwest Power and Conservation Council		
CO2-1	Request to extend comment period, hold another public meeting and make documents more readily available.	As discussed in Section 1.6 of the FEIS, agency and public scoping meetings and public workshops were held prior to issuance of the DEIS and a 60-day comment period was provided. Although the DEIS was not received by all interested parties, it was made available at local public libraries and online. The DEIS and the location of public comment meetings were included in the Notice of Availability that was published in the Federal Register and made available on the official project website. Approximately 70 people attended the public hearings and approximately 250 individual comments were submitted on the DEIS.

Comment Code	Comment	Response
CO2-2	Express support for VARQ at Hungry Horse.	Comment noted.
CO2-3	Recommend all agencies and organizations coordinate operations at the Kerr and Hungry Horse projects.	As discussed in Section 2.1, consultation with various agencies during implementation of the DMP would occur given each agency's varying land management responsibilities in the area. In response to comments regarding Hungry Horse Dam operations, an adaptive management planning component was added to the Preferred Alternative. This is discussed in Section 2.3.3 of the FEIS, which outlines the process for notification when deviating from flows.
CO2-4	DMP must be flexible to unanticipated issues.	Please refer to response to comment CO2-3.
Northwest Power and Conservation Council		
CO3-1	Extension of public process/comment period requested by Montana. What was reply?	Please refer to response to comment CO2-1.
CO3-2	Will comments be posted to BIA website and how will BIA respond?	All comments that were received on the DEIS will be part of the administrative record, and summaries of comments and responses are included in the FEIS. Copies of the Draft and Final EIS are provided on the project website.
National Organization To Save Flathead Lake		
CO4-1	Request to Modify the Lake Level Priority Alternative and reevaluate in the FEIS.	The lake level priority alternative does not satisfactorily address license Article 56 (minimum instream flows) nor does it address impacts on the lower Flathead River during drought conditions. Therefore, it does not meet the requirements of Article 60 or the purpose and need of this EIS.
CO4-2	Recommends rejection of the No-Action alternative.	Comment noted.

Responses to Summary Comments on the DEIS

Summary Report 2: Sorted by Commenter

Comment Code	Comment	Response
CO4-3	Identified several concerns with the Proposed Action.	Comments noted. The proposed action was prepared by PPL Montana and it has been utilized in the EIS as is.
CO4-4	Identified several concerns with Alternative 1.	Additional details and discussions have been added to the FEIS relative to impacts on wetlands, waterfowl, and water quality of Flathead Lake. Please see appropriate sections of Chapter 4.
CO4-5	Identified several concerns with Alternative 2; suggests deleting the "Notice of Intent to Deviate from Article 56;" recommends forming a coordinating committee to better utilize Hungry Horse flows; identified concerns associated with high winter pool elevation; does not understand water management features at Kerr or how they relate to system operations; notes insensitivity of fish habitat below Kerr as identified in Table 4.2 under alternatives 1 and 2.	In 7 of the 10 low water years modeled, the average summer lake elevation was 2,892.7' msl. Additional discussion of the 8,000 cfs MIF deviation has been included in the EIS. Key environmental impacts associated with Alternative 2, as identified in the commenter's letter, would be acceptable in the relative rare occurrence of a severe drought. The commenter refers to an alternative that would match outflows to inflows in order to preserve lake elevations. Passing all inflows as outflows would actually increase the outflow in excess of 8,000 cfs. The 8,000 cfs value was arrived at after considering impacts of evaporation, irrigation water withdrawls, and other losses of water from Flathead Lake. The idea suggested in the comment would lower Flathead Lake water levels and lead to greater impacts than those reported in Alternative 2.
CO4-6	Identified concern over social/economic analysis section of the EIS and recommended 11 specific impacts be quantified and evaluated.	The FEIS involves a systematic evaluation of potential effects from the proposed action on property and business owners. Additional discussion regarding docks, marinas, and lake access points have been added to Chapter 4 of the FEIS by identifying areas of the lake that are likely to be most affected. Elevation data was included where it was available. Information regarding boat landings, and the elevation at which they would not be usable, is included. In addition, areas where seasonal damage would occur are identified. The proposed action would mitigate the many concerns identified by the commenter by maintaining summer lake elevation within the historical normal range and by using climate indicators to minimize the occurrence of high winter lake levels.

Responses to Summary Comments on the DEIS

Summary Report 2: Sorted by Commenter

Comment Code	Comment	Response
Flathead Lakers		
CO5-1	Support consideration of additional alternative that analyzes the ecosystem approach.	During the alternatives development process, we examined possible alternatives that minimize ecosystem impacts and make the following observations: 1) To mimic pre-Kerr Dam conditions would be to operate the project as a run-of-the river facility, which would allow for more natural fluctuations of the lake level and river flows, and help alleviate the ecosystem alterations caused by the construction and operation of Kerr Dam, and; 2) the section 4(e) conditions placed on the license were designed to protect Trust resources and more closely mimic natural runoff curves. We modeled a run-of-the river alternative, and found that lake levels were below those elevations suitable for lake operations for most of the summer in drought years. Furthermore, running Kerr Dam as a run-of-the river facility in wet years does not take advantage of the lake as a flood control reservoir, and would allow for notable flooding downstream in the Columbia system. We also note that ongoing studies of ramping rates within the framework of the existing license will continue to minimize impacts to Trust resources.
CO5-2	The DEIS does not adequately evaluate the cumulative operations of the Kerr and Hungry Horse projects. Proposes 2 scenarios for consideration to address coordinated operations.	We have considered Hungry Horse operations in modeling various Kerr Dam operational scenarios under drought conditions. Additional discussion is included in Section 4.10.2.2 of the FEIS. We have also added a request for Hungry Horse flows to the Preferred Alternative in an effort to fully utilize any excess water in the Hungry Horse reservoir. A notification and BOR consultation requirement, prior to deviation from flows, is discussed in Section 2.3.3 of the FEIS.
CO5-3	The DEIS does not adequately describe how elevations were determined for Alternatives 1 and 2.	Please refer to response to comment FA1-12.
CO5-4	The DEIS does not fully describe variables within control of the licensee to attain June 15 lake elevation target.	The options available to the licensees to achieve certain lake level targets include two primary actions: 1) coordinate with the operators at Hungry Horse Dam, and 2) vary the timing and amount of water passed through the turbines and spill gates at Kerr Dam, in accordance with the license requirements as outlined in Section 3.1.3. Additional details regarding the alternatives are described in Section 2.3 of the FEIS.

Comment Code	Comment	Response
PPL Montana, LLC		
CO6-1	The DEIS appears appropriate, but needs a couple clarifications.	Comment noted.
CO6-2	PPL's Proposed Action described incorrectly. Correct description in section 2-2.	The Summary and Section 2.1 have been revised in the FEIS to clarify that under PPL Montana's Proposed Action, minimum instream flows would be modified, and/or the flow from Hungry Horse Dam would be increased to maintain the 2,892' msl lake level.
CO6-3	In Alternatives 1 and 2, Final DMP must contain specific instructions regarding activation and deactivation of drought plan.	Please refer to Sections 2.3.2 and 2.3.3 of the FEIS for notification and consultation with BOR regarding activation and deactivation of DMP.
CO6-4	Alternatives 1 and 2 should include analysis based on 2006 operations modifications at the Hungry Horse Dam.	The operational changes are included in the model used to evaluate the alternatives and are documented in Appendix B of the FEIS.
CO6-5	Alternatives 1 and 2 should clarify the deviation notification requirements.	Comment noted. Additional clarification regarding notification procedures is included in Section 2.3.3 of the FEIS.
CO6-6	Request clarification of modeling assumptions. Does modeling demonstrate that Flathead Lake will fill to 2,892.2 when elevation is 2,890 on May 30?	During drought conditions, holding Flathead Lake at 2,890' msl on May 30th will result in lake levels below 2892.2' msl on June 15th. The Preferred Alternative deviates from the May 30th requirement of Article 43 and achieves refill through early filling, and in more severe droughts, through minimum flow deviations such that elevation 2,892.2' msl is achieved.
CO6-7	Correct references. Letter identifies several incorrect or missing weblinks.	Weblinks have been checked and updated as appropriate.
CO6-8	Define "strive" as used to describe how to achieve desired lake elevation levels.	This language was removed from the FEIS. Refer to Section 2.3.3 for clarification on efforts to achieve lake desired lake elevations.

Responses to Summary Comments on the DEIS

Summary Report 2: Sorted by Commenter

Comment Code	Comment	Response
Flathead Lakers		
CO7-1	Include an analysis of a "third alternative" that amends Article 56 to allow an adjustment to the minimum Kerr Dam discharge requirement during drought years that could be shaped to mimic a natural spring freshet followed by a gradual decline toward minimum flow.	Article 56 was designed to approximate an average runoff year. In general, the minimum instream flows are an attempt to biologically provide the lower river with a natural hydrograph. Please refer to response to comment CO5-1. Run-of-the river operations would provide more of a spring freshet-like runoff curve although at a potentially greater cost to power production. These types of changes would need to be negotiated with all of the parties through the FERC process, which is not the intent of our efforts under Article 60.
CO7-2	Cumulative Impacts Analysis for the Hungry Horse Dam Flood Control and Fish Operations is limited and may incorrectly rely on other documents without adequate analysis.	The FEIS analysis incorporates the new operational changes at Hungry Horse and the Preferred Alternative requires coordination with the BOR. The effects of changes in Hungry Horse operations are described in a separate EIS prepared by USACE in cooperation with BOR. A link to this EIS is provided in Section 1.5.7.
CO7-3	The Final EIS should undertake a thorough analysis of a DMP with the new Hungry Horse Dam discharge strategy.	The FEIS analysis incorporates the new operational changes at Hungry Horse and the Preferred Alternative requires coordination with the BOR. Please refer to Section 2.3.3 of the FEIS.
CO7-4	The Final EIS should analyze cumulative impacts on the Flathead River below Hungry Horse Dam resulting from the reshaping of the augmented flows released from Hungry Horse.	Comment noted. Please refer to response to comment CO7-2 and Section 3.1 of the FEIS.
CO7-5	Coordination between Hungry Horse and Kerr Dam should be analyzed for low-water years.	Hungry Horse operations have been incorportated into modeling of Kerr Dam operations and described in the Kerr Project Simulations section of the FEIS, Section 2.2.3.
US Environmental Protection Agency		
FA1-1	Improve discussion of previous natural fluctuations of water levels in Flathead Lake.	Section 1.1.1 of the FEIS has been revised to include additional discussion of the historic fluctuations in the level of Flathead Lake prior to construction of the Kerr Dam in 1938.

Responses to Summary Comments on the DEIS

Summary Report 2: Sorted by Commenter

Comment Code	Comment	Response
FA1-2	Climate change may impact runoff and water resource changes. See suggested website.	We acknowledge that climate change may impact runoff and water resource changes. The effects of global warming on a project-specific level cannot be reliably evaluated at this time. However, we have revised the Preferred Alternative to include a re-examination of the climate indicators on a five-year basis to address this issue. Please also refer to response to comment FA3-31.
FA1-3	Compare/contrast MEI/FPRI and NWRFC system.	Although the comment refers to Section 2.6 of the DEIS, we have modified Appendix B to include this information. Sections 2.3.2 and 2.3.3 of the FEIS discuss the use of MEI/FPRI and NWRFC data in activating the DMP.
FA1-4	Expressed appreciation for table 2.1, 3.2, 3.3, 3.4, and figures 3.3 to 3.10.	Comment noted.
FA1-5	Provide more detailed analysis of impacts under each alternative. Focus on fishery impacts.	Table 2-2 of the FEIS, Summary of Impacts, has been revised to include more specific differences among the alternatives. Section 4.6.2.1 has been revised to include additional discussion of the fisheries habitat data shown in Table 4-2.
FA1-6	Provide more detailed analysis of alternatives. Add an alternative that avoids/minimizes summer lake levels below pool as much as possible.	We have added more detailed discussion of the No-Action and PPL Montana (Proposed Action) alternatives, and have included statistical summaries of the models of Alternatives 1 and 2. The analyses conducted show that the Preferred Alternative minimizes impacts to summer pool as much as possible. See Table 2-2 in the FEIS for a summary of impacts by alternative.
FA1-7	Add monitoring and adaptive management elements to assess effects associated with operations during drought periods.	Please refer to response to comment CO2-3.
FA1-8	Agree with dismissal of Lake Level Priority Alternative.	Comment noted.

Responses to Summary Comments on the DEIS

Summary Report 2: Sorted by Commenter

Comment Code	Comment	Response
FA1-9	Provide additional discussion of difference between Article 56 minimum levels and instream flows used by PPL Montana.	The drought management plan proposed by PPL Montana would follow the Article 56 requirements up until the point where a revised summer lake level target of 2,892' msl cannot be maintained. In this situation, the PPL Montana plan proposes to reduce flows released from Kerr Dam to match the total inflows to Flathead Lake; these reduced flows may be larger or smaller than the Article 56 minimum requirements, depending on the availability of water. Please refer to Section 2.1 of the FEIS.
FA1-10	Include lower portion of Flathead River down to its confluence with the Clark Fork River in the analysis.	Section 3.1 and Figure 3-1 have been revised to include the lower portion of the Flathead River within the primary study area for the DMP.
FA1-11	Recommend incorporating Hungry Horse flows into analysis of all alternatives.	We coordinated with the BOR to ensure that Hungry Horse operations were incorporated into updated model runs for Alternatives 1 and 2. Under VARQ operations, spring water releases from Hungry Horse Dam are delayed; releases are reduced in April and increased in May and June. The analyses completed by the BOR indicate that, during drought years, under VARQ, Flathead Lake has a slightly better likelihood of achieving full pool while meeting minimum instream flow requirements. Please refer to Section 3.1.4 of the FEIS.
FA1-12	Explain basis for using 2,892 and 2,892.2 for post June 15 elevation.	The 2,892' msl lake elevation in the proposed action was selected by PPL Montana. The 2,982.2' msl lake elevation in Alternatives 1 and 2 was selected after review of elevation duration curves for drought and wet conditions. An elevation of 2,892.2' msl or greater was achieved 100% of the time in all of the ten wettest years, and was achieved approximately 80% of the time for the seven drought years since 1965. The additional 0.2 feet in elevation is important to lake level interests and can be provided under most drought conditions. Therefore, 2,892.2' msl was selected as the preferred summer lake elevation under drought conditions.
FA1-13	Good data for purpose/goal of drought management plan.	Comment noted.
FA1-14	Modeling data supports Alternative 2 to resolve instream flow vs. lake level conflicts better than Alt 1 and Proposed Action although information on effects is minimal.	Comment noted. See Table S-1, Summary of Impacts, and Chapter 4 of the FEIS which better clarify the difference among the alternatives.

Comment Code	Comment	Response
FA1-15	Unclear why modeling does not indicate need for instream flow deviation in 1941.	The data used to develop the climate indicators was not fully available prior to 1950. Therefore, there is significant uncertainty in the pre-1950 analysis.
FA1-16	Concerned that Proposed Action does not have similar/same level of analysis/objective evaluation as Alternative 1 and 2. Add information and discussion regarding estimated elevations and flows for the Proposed Action during drought years.	Please refer to Section 4.2 of the FEIS for the methods used to assess the operational effects of the alternatives. We have added additional discussion of the Proposed Action and No-Action alternatives to clarify this issue. Data does not exist to model the proposed action and the No-Action alternative. Continued adjustment of the rule curve could only be modeled if PPL Montana and the USACE provided specific rule curves for various water management scenarios. This information is not available.
FA1-17	Conduct more in-depth analysis of environmental justice; recommend using referenced environmental justice (see web links).	The environmental justice analysis was conducted using standard methodologies which evaluate census data at the census block and block group levels. The FEIS acknowledges that impacts of a minimum instream flow deviation would fall on the minority population of the Flathead Reservation whose tribal resources would be impacted. However, effects would be borne equally on all users and residents of Flathead Lake, and would not disproportionately affect minority populations. The resources recommended by the commenter were among the agency guidance documents consulted in the environmental justice analysis.
US Army Corps of Engineers		
FA2- pg 1,	Each of the alternatives should address the impacts to system flood control and flood control points downstream of Kerr Dam.	Please refer to Sections 4.6.2.2 and 4.6.2.3 of the FEIS for a discussion on the effects on flood control from Alternatives 1 and 2.
FA2-1	The 2002 DMP does not provide process or direction for what constitutes a drought or drought conditions.	We concur. The PPL Montana's Proposed Action was evaluated as presented. A qualitative discussion of the components of the Proposed Action was developed to provide insights into the impacts of this alternative.
FA2-1a	Tier 1 response occurs before the triggering indicator of a drought.	Please refer to the response to comment FA2-1.

Responses to Summary Comments on the DEIS

Summary Report 2: Sorted by Commenter

Comment Code	Comment	Response
FA2-1b	Tier 2 response should be SOP regardless of drought condition.	Please refer to the response to comment FA2-1.
FA2-1c	Need to define start and end point for Tier 4 response.	Please refer to the response to comment FA2-1.
FA2-2	Include DMP in Appendix.	The 2002 DMP has been added as Appendix D.
FA2-3	Report lake elevation to the nearest tenth (e.g., 2,990.1 feet).	Lake elevations that do not include a decimal indicator are assumed to be whole numbers (e.g., 2,892' msl in the document should be considered 2,892.0' msl). Otherwise, all elevations have been reported to the nearest tenth of a foot.
FA2-4	Additional modeling necessary for No-Action and Proposed Action Alternatives.	We have included additional discussion of the Proposed Action and the No-Action Alternative, including why it was not possible to create meaningful models of these alternatives.
FA2-5	Proposed action has same deficiencies as identified in comment FA2-1, FA2-1a, FA2-1b, and FA2-1c.	Please refer to response to comment FA2-1.
FA2-6	Last sentence of page 2-3 needs to match Appendix B 1.3.1.	The description on page 2-3 is a brief summary of the MEI; Appendix B provides additional technical information.
FA2-7	Incorporate language on NRCS and RFC forecasts from DMP into Alternatives 1 and 2.	The NWS NWRFC forecasts are included in the Preferred Alternative. Please refer to the response to comment FA2-28.

Comment Code	Comment	Response
FA2-8	Please confirm "runoff volume, runoff forecasts, and runoff volume forecasts" all refer to the NWS/NWRFC official water supply forecast.	This language was included in PPL Montana's proposed action which was evaluated as presented. We presume they refer to the official forecast developed as part of their plan.
FA2-9	Explain how the Proposed Action DMP Tier 2 Response differs from current operating procedures; explain language changes; specify who the parties are, how agreement is to be reached, and alternatives if no agreement.	In this situation the Proposed Action has been proposed by the Kerr Project operator, PPL Montana. The BIA is not altering the Proposed Action and concurs that there are definciencies in the Proposed Action, some of which have been identified in this comment. The BIA is evaluating the Proposed Action as presented and is also evaluating alternative drought management plans.
FA2-10	Remove language "when the system is declared to be in drought" or similar from Tier 3 and Tier 4 responses. It is redundant.	While we recognize the inconsistencies, this language was included in PPL Montana's proposed action which was evaluated as presented.
FA2-11	Revise Tier 4 initial response to read "matching outflows to inflows." As stated it implies a level of control that is erroneous.	While we recognize the inconsistencies, this language was included in PPL Montana's proposed action. We assumed that PPL Montana meant that outflows (which are controllable via Kerr operations) would be matched to inflows, and modified the text accordingly.
FA2-12	Tier 4 initial response is implausible and ineffectual. Tier 4 secondary action is the only effective action.	Please refer to the response to comment FA2-10.
FA2-13	Tier 4 response in DEIS does not correspond to action stated in 2002 DMP.	The term "Tier" does not appear in the DEIS or the original PPL Montana DMP. The original PPL Montana DMP discusses a series of activities using bullet points and paragraphs. The EIS uses numbers to identify the sequence of activities. The description of the PPL Montana DMP in the FEIS has been revised to more closely match the original.
FA2-14	Revise text to clearly state how early detection system was determined during scoping; thus making the 2002 DMP fall short of scoping criteria. Also, more prominent mention of operation details of Alternatives 1 and 2 in DMP resulting in no modeling of No-Action and Proposed Action alternatives.	We have modified the text of the FEIS in Section 2.2.2 to include information from the scoping process that specifically identifies the desire for early prediction of drought. In Section 4.2.1, additional discussion of each of the alternatives has also been included to explain why the Proposed Action and No-Action alternative could not be modeled.
FA2-15	Renumber activities under Alternative 1 to match activities in Summary (S-3).	The activity numbers in Section 2.3.2 have been revised in the FEIS Summary.

Responses to Summary Comments on the DEIS

Summary Report 2: Sorted by Commenter

Comment Code	Comment	Response
FA2-16	Clarify potentially conflicting April 15 lake elevation target under Alternative 1. Which has precedence if in conflict?	Activity 4 under Section 2.3.2 has been revised to state that the lake refill deviation would occur "beginning April 15 and through June 15…."
FA2-17	Clarify potentially conflicting June 15 lake elevation target under Alternative 1. Which has precedence if in conflict?	It is theoretically possible that the drought management plan could call for an elevation of 2,892.2' msl on June 15 while at the same time the USACE would have flooding concerns and would prefer the lake level be kept lower. In such a situation, the requirements of the DMP would be superseded by the flood control requirements of the USACE. The Preferred Alternative has been modified to clarify how these issues are resolved.
FA2-18	Clarify potentially conflicting April 15 lake elevation target under Alternative 2. Which has precedence if in conflict?	Please see the response to comment FA2-16.
FA2-19	Clarify potentially conflicting June 15 lake elevation target under Alternative 2. Which has precedence if in conflict? Clarify how Alternatives 1 and 2 Lake Refill Deviation differ from the status quo per FERC Article 43.	Please see the response to comment FA2-16. The difference is that Article 43 has been modified to allow higher lake elevations.
FA2-20	Explain difference in 2,892.2 feet in Alternatives 1 and 2 and the 2,892 feet summer elevation in Proposed Action.	See response to FA1-12.
FA2-21	Explain why NWS Official April Final Forecast is acceptable in activity 6.	While we are confident in the validity and applicability of the MEI and FPRI as drought predictors, the official forecast provides a valuable comparison and check when making a critical decision regarding a deviation from the MIFs. In addition, the NWS forecast is relied upon by the USACE when making flood control decisions.
FA2-22	Under Activity 6, USACE would defer to expertise of NWS/NRCS for determining if a drought condition exists or is expected.	Comment noted.

Comment Code	Comment	Response
FA2-23	Explain when the 8,000 cfs peak minimum flow time period is under Activity 7.	Article 56 of the Kerr License requires the operator to increase flows from 5,000 cfs to 12,700 cfs at 510 cfs per day from May 1 to May 15. If a deviation to a minimum flow of 8,000 cfs were approved, the peak would arrive early (on May 6). Similarly, Article 56 requires the operator to decrease flows from 12,700 cfs to 6,400 cfs at 420 cfs per day from July 1 to July 15. If a deviation to a minimum flow of 8,000 cfs were approved, the peak would not need to begin dropping until July 9, but would end at 6,400 cfs pursuant to Article 56 on July 15.
FA2-24	Conclusions drawn that MEI results in 70% correct prediction is misleading.	The BIA conducted supplemental statistical analysis of the climate indicators to determine whether or not the indicators were an effective tool for predicting drought. Section 2.2.2 and Appendix B of the FEIS have been modified to refer to the statistical analysis as evidence that the use of climate indicators as identified in Alternatives 1 and 2 is an effective drought prediction tool.
FA2-25	Disagree with the "correct and false prediction" statistic.	The BIA understands that the commentor desired a rigorous statistical analysis of the proposed drought indicators to determine their validity. For the FEIS, the BIA conducted a statistical analysis of the indicators, including a principal components analysis of the FPRI to eliminate the potential for multicollinearity, and logistic regression models of the combined application of the MEI and FPRI as proposed in the DEIS. These analyses concluded that the proposed drought indicators were statistically valid. However, the BIA will continue to use the correct and false prediction information as presented in Appendix B of the DEIS and FEIS to provide a relatively simple graphical representation of the results of the application of the drought indicators to the historic record. In addition, the BIA stresses the need to understand the equal importance of over- and under-prediction of drought (under-prediction resulting in undesirable drought impacts, and over-prediction resulting in undesirable flood impacts). The BIA believes that the correct/false prediction figures as shown in Appendix B are an effective way of presenting this information, given that the statistical analysis has verified the validity of using the indicators for drought prediction.
FA2-26	Editorial. Delete "(Figure 9 and Figure 16)" at end of first sentence, last paragraph on page.	This text has been deleted.

Responses to Summary Comments on the DEIS

Summary Report 2: Sorted by Commenter

Comment Code	Comment	Response
FA2-27	Disagree with analysis of Figures 4, 5, and 6	We have supplemented this analysis with a logistic regression and principal components analysis as requested by the USACE.
FA2-28	USACE supports use of NRCS/NWRFC water supply forecasts. Objects to WY outlook. Clarify WY outlook.	We have concerns using the water supply forecasts because they combine existing data with future predictions based on average runoff and/or precipitation values. In drought years, this skews the forecast to be wetter than would be expected in a drought year. We have included this discussion in Section 2.3.1 of the FEIS.
FA2-29	Document appears to fail NEPA regulations requiring analysis of impacts associated with no-action alternative.	Subsequent discussions with the BOR, EPA, and USACE resulted in an understanding of the inability to model the Proposed Action and No-Action Alternatives. Additional discussion of the characteristics of the Proposed Action and No-Action alternatives and why they cannot be modeled has been added to the EIS in Section 2 of Appendix B.
FA2-30	FPRI equations should be redone using appropriate statistical techniques to accommodate intercorrelated predictor variables.	We have conducted a principle components analysis (PCA) of the FPRI and included the information in Appendix B of the FEIS.
FA2-31	Each monthly subsection should clarify deactivation procedures.	Text has been modified to include specific deactivation procedures.
FA2-32	Verify correct FPRI March trigger value, if and why trigger value changed from February 2006 draft DMP, and confirm use of March FPRI trigger values used in modeling.	We have reviewed the FPRI trigger values and revised Chapter 4.0 in Appendix B to reflect the March FPRI trigger value of 4,800.
FA2-33	Feature 4 needs further clarification (see comment 11).	The text in the FEIS Summary and Section 2.1 has been modified to clarify PPL Montana's Proposed Action. See also the response to comment FA2-11.

Comment Code	Comment	Response
FA2-34	Under item 7 please discuss significance of 2,892.2 feet.	Sections 2.3.2 and 2.3.3 in the FEIS include discussions of how the 2,892.2' msl lake elevation was chosen. During the NEPA process for this DMP, a number of comments were received regarding lake elevation with varying opinions regarding the proper summer lake level during a drought. The BIA evaluated the effects of various lake level targets under drought conditions through modeling, data analysis, and qualitative reviews of recreational and economic impacts. As a result of this analysis, the target lake elevation of 2,892.2' msl as seen in Alternatives 1 and 2 was selected as being a reasonable value that is both achievable and minimizes recreational and economic impacts. See also response to FA1-12.
FA2-35	Explain decision to use minimum instream flow of 8kcfs.	The 8,000 cfs was chosen because it maintains the aquatic habitat in the main bed of the Flathead River, so the rare deviation preserves fisheries habitat and balances lake level concerns.
FA2-36	Need modeling results to discuss impacts to flood control.	Section 4.2.2.3 of the FEIS provides additional analysis regarding use of climate indicators on flood control operations. This section examines a scenario from 1964 when indicators went from drought to no-drought and a subsequent flood occurred. The analysis shows that flood control operations would remain consistent with Article 43 of the license.
FA2-37	Curves are improperly labeled. Should be elevation-duration curves	These figures have been revised in the FEIS.
FA2-38	Provide a discussion of increased flooding potential downstream of the project on Flathead and Clark Fork Rivers and downstream of Albeni Falls Dam on Pend Oreille River.	Sections 4.2.2.3 and 4.6.2 of the FEIS has been revised to include a discussion on the effect of flooding.
FA2-39	Expressed agreement that neither the DMP or EIS process is intended to develop a water management plan for Flathead Lake.	Comment noted.
FA2-40	Indicate that the proponent should identify the agency's preferred alternative.	The FEIS has been revised to state that Alternative 2 is the preferred project alternative.

Responses to Summary Comments on the DEIS

Summary Report 2: Sorted by Commenter

Comment Code	Comment	Response
FA2-41	Explain and justify the use of the drought indicator methodology proposed in the alternatives.	The Principle Components Analysis (PCA) and logistic regression analysis contained in Appendix B of the FEIS verified the effectiveness of the drought indicators. The process of using drought indicators is necessary in order to retain enough water in Flathead Lake to accommodate both license Articles 43 and 56 to the extent possible. Foregoing this valuable tool limits in-season flexibility and increases the potential impacts associated with low pool elevations and/or substantially reduced instream flows.
FA2-42	Explain how increasing flows from Hungry Horse reservoir would be achieved; also, clarify the statement that 6-8kcfs may be the lower limit for minimum in stream flows.	While we recognize the inconsistencies, this language was included in PPL Montana's proposed action which was evaluated as presented. We assumed that PPL Montana meant that outflows (which are controllable via Kerr operations) would be matched to inflows and modified the text accordingly. For Alternative 2, we provide additional language regarding the use of Hungry Horse flows.
FA2-43	Discuss status and implications of the remanded 2004 BO.	Additional discussion of this issue has been included in Sections 1.5.3 and 3.1.4 of the FEIS.
FA2-44	DEIS should state the U.S. Army Corps of Engineers (USACE) authority to approve/deny fixed elevation 2,888.0 requests and identify timeline for MEI calculation.	Section 2.3.2 has been revised to include the actions that would be taken by the USACE. Detailed information regarding Multi-variant El Niño and Southern Oscillation Index (MEI) calculations can be found in Section 1 of Appendix B.
FA2-45	Comment on three target elevations in PPL Montana's License. DEIS should analyze impacts of 2,888.0 feet operation thorough April 15 when DMP is in effect.	Section 2.1 of the FEIS has been revised to include additional discussion of the lake refill deviations. Additional discussion of the effects of 2,888.0' msl is in Section 4.6.2.2.
FA2-46	DEIS must list all permits required. Identify how DMP would be approved by FERC. Identify if Article 43 would change in any way.	The adoption of a drought management plan does not require any additional permits. It is an action mandated by the FERC operating license for the Kerr project. The FERC has been provided a copy of the DEIS and afforded the opportunity to comment. No changes are proposed to any of the other license articles; the drought management plan notes when a deviation from the existing articles would be necessary to mitigate impacts of drought on lake levels and minimum instream flows. The DMP will be filed with FERC pursuant to Article 60 once completed.

Comment Code	Comment	Response
FA2-47	Clarify roles of Department of Interior and FERC.	Chapter 1 has been modified to include more information about the roles of these respective agencies and how the DMP will be provided to FERC.
FA2-48	The DMP should be a plan that can be implemented and this DMP does not provide any decision making criteria to determine an annual operating curve.	This is part of PPL Montana's proposed action and was evaluated as presented.
FA2-49	Proposed Action and No-Action should be modeled to same level of detail as the Alternatives 1 and 2 and all alternatives compared or ranked.	This is part of PPL Montana's proposed action and was evaluated as presented. Additional discussion of this issue is included in Appendix B.
FA2-50	Table S-1; Flood Protection should have its own line. Differences in Alternatives need to be stated.	Tables S-1 and 2-2 have been revised in the FEIS to include potential impacts on flood protection.
FA2-51	Table S-1 uses severe drought; explain how this compares with drought condition.	In the FEIS, Drought has been defined as less than 72.6% of normal April through September runoff; and severe drought has been defined as less than 65% of normal April through September runoff.
FA2-52	Request inclusion of information regarding development of Minimum Volume Runoff Curves	This is part of PPL Montana's proposed action and was evaluated as presented.
FA2-53	Text needs to include the USACE's responsibility and authority in regard to Columbia River System Flooding.	Section 1.1.2 has been modified to include additional information about the USACE's role and responsibilities with regard to flooding within the Columbia River system.
FA2-54	Clarify differences in definition of drought between page S-1 4th paragraph and page 2-3.	The drought definition on page S-1 has been modified to match page 2-3.

Comment Code	Comment	Response
FA2-55	Editorial. Correct "as indicated in 0" at bottom of page.	Editorial change made in FEIS.
FA2-56	Need to include more than 10 driest years in modeling.	A full range of water years was evaluated in the FEIS. Section 3.1.3.5 provides a discussion of the various periods of record analyzed.
FA2-57	CSKT cannot assume deviation is approved without written approval from USACE.	We have modified the appropriate portion of Alternatives 1 and 2 to include additional coordination with the USACE for approval of a lake refill deviation.
FA2-58	Drought Management Plan should be included in the water management plan with sufficient details and analysis so that deviation is not necessary.	Extensive modeling of Flathead Lake operations under a variety of scenarios indicates that resolving the conflicts between Article 43 and Article 56 cannot be accomplished under severe drought conditions (runoff <65% of normal) unless a deviation from minimum flows is allowable. In all cases, a deviation from lake drawdown is necessary to preserve water in years where runoff is <72.6%. Close coordination with the USACE between January and June will help address flooding concerns.
FA2-59	Editorial. Change the end of the sentence "… as high as flood control elevations, as determined by the Corps of Engineers, are allowed."	Editorial change to Activity 4 in the FEIS.
FA2-60	Comment that "Percent Time Exceeded Curves" including the results of the period of record would be helpful.	Please see Figures 21, 22, 23, and 24 in Appendix B of the FEIS for additional information.
FA2-61	Extend the graph to show the level that the high flows reach.	Figures 4-6, 4-9, and 4-10 have been revised.
FA2-62	Include information about when drought year is indicated then became a non-drought year.	The discussion of the use of climate indicators has been expanded. Section 4.2.2.3 provides a discussion of the 1964-65 flood.

Comment Code	Comment	Response
FA2-63	The Pacific Northwest Coordinating Agency (PNCA) is not to govern release of stored water. Change wording to "purpose is to coordinate the release of stored water…"	Section 4.10.2.3 has been revised to include the suggested text.
FA2-64	Article 43 guidance for moderate or major flood year -- was this included in plan and modeling?	In general, there are no operational changes in moderate or major floodyear. The DMP is not activated in such years, but we believe the climate indicators may be useful for flood predictions.
FA2-65	Further hydrologic modeling to characterize alternatives. Clarify the rationale for modeling period and add text to explain what was done.	Based on discussions with the USACE, BOR, and EPA, this issue was resolved. Section 3.1.3.5 was added to the FEIS to address water discharge and lake elevation.
US Department of Interior, Bureau of Reclamation		
FA3-1	Include modeling data: tables which reflects important hydrologic information and statistics.	Statistics of the model run results have been included in the Technical Support Document in Appendix B of the FEIS.
FA3-2	Change Proposed Action to PPL's Proposed Action.	The headings for Sections 2.0 and 2.1 have been revised to read "PPL's Proposed Action."
FA3-3	Clarify period of record used in each major element of study.	Additional language has been included in Section 2.2.1 of the FEIS that discusses the periods of record.
FA3-4	Objection to the Proposed Action Alternative as unacceptable.	The FEIS has been modified to include BOR's position on the use of Hungry Horse flows and revised to state that Alternative 2 is the preferred project alternative.
FA3-5	Change to "match outflows to inflows."	The phrase "match inflows to outflows" has been changed to "match outflows to inflows" throughout the document.

Comment Code	Comment	Response
FA3-6	Alternative 1 needs better description.	Revisions and clarification of Alternative 1 have been provided in Section 2.3.2 of the FEIS.
FA3-7	Add impact line to table 2.2 for Lake Levels of Hungry Horse Reservoir.	The Proposed Action has no impact on the water levels of Hungry Horse Lake, therefore, effects to Hungry Horse Lake were not evaluated in this EIS.
FA3-8	Change last bullet of proposed action.	The Summary and Section 2.1 have been revised to clarify that minimum instream flow would be modified at the same time that the flow from Hungry Horse Dam would be increased to achieve and maintain the 2,892' msl foot lake level.
FA3-9	Define drought conditions.	Text has been added to the FEIS to define drought and severe drought.
FA3-10	Revise sentence.	The referenced sentence in Section 2.2.3 has been revised to read: "As indicated in Chapter 1.0, the Kerr Project currently operates under a joint license issued by FERC in 1985 which has been subsequently amended several times."
FA3-11	Were climatic indicators tested for 1931-1934 and 2001-2004 (lowest years) and did the conclusions hold up?	Data is not available for the years 1931 to 1934. Climate indicators were tested for 2002-2004 and confirmed. Please refer to Appendix B of the FEIS.
FA3-12	Define runoff volume as referring to the April to Sept period.	Section 2.3.3 has been revised to indicate that the runoff volume would be measured between April and September.
FA3-13	Hungry Horse -- not Kerr is most notable.	Section 3.1.2.3 has been revised to include the appropriate reference to the Hungry Horse Dam.

Comment Code	Comment	Response
FA3-14	Hungry Horse does not do daily peaking.	Section 3.1.4 has been revised to clarify that Hungry Horse has adopted ramping rates and eliminated daily peaking in response to the requirements of the USFWS Biological Opinion (BiOp).
FA3-15	Table 3-9 not adequately explained.	The flood section of the FEIS has been modified to include the Somers datum.
FA3-16	Improve discussion of power generation -- especially if PPL Proposed Action is the preferred alternative.	The overall impact to power generation would be limited under all alternatives. The discussion related to these effects is provided in the impact sections in Chapter 4.0.
FA3-17	Not clear what years were used and how selected. Improve discussion.	An improved discussion of the periods of record has been included in Sections 2.2.1 and 3.1.3.5 of the FEIS. The year 1965 was selected as the beginning of the period of record because Article 43 was modified that year to incorporate the MOU between MPC and USACE. Prior to 1965 there was a lack of consistency in manageing lake levels from year to year.
FA3-18	Disagree with flood control by committee.	The Proposed Action includes this "committee" approach to flood control. The Proposed Action is not the preferred alternative. Alternatives 1 and 2 were developed to provide more concrete direction on how to manage lake levels during drought events.
FA3-19	Editorial. Conflict with proposed action. Match description with description of proposed action.	Text modified.
FA3-20	BOR states objection to coordination to keep Flathead Lake full.	The description of the Preferred Alternative in Section 2.3.3 was modified in the FEIS to include consultation with BOR.
FA3-21	Explain assumptions used for Alternative 1 Rule Curves.	Three rule curves were modeled for Alternative 1 which began refill of Flathead Lake one, two, and three weeks earlier than the license requires. The three-week refill rule curve was used in the EIS as likely being the most representative of what would actually be attempted during a drought year.

Comment Code	Comment	Response
FA3-22	Would like to see modeling include data prior to 1965 (see FA3-3).	The discussion of the periods of record demonstrates how data prior to 1965 was used in the analysis. Please refer to response to comment FA3-17.
FA3-23	Include drought years in the 40s in figure 4.5.	The purpose of the figures in this section of the EIS are to compare historic post-1965 operations with modeled operations. The modeled results of pre-1965 give information as to how the lake would react under alternative operating scenarios using the current license articles as a baseline. Historic data prior to 1965 would not be useful since Article 43 did not apply at that time.
FA3-24	Suggest adjusting Flathead Lake Discharges by co-licenses.	Comment noted.
FA3-25	PPL Montana Proposed Action insufficient. Need additional analysis.	The PPL Montana's Proposed Action was evaluated as presented. A qualitative discussion of the components of the Proposed Action was developed to provide insights into the impacts of this alternative.
FA3-26	Need discussion of salmonids downstream, on the Columbia River.	As noted in Section 4.6.1.5, none of the alternatives would affect flow augmentation water released from Hungry Horse as required by the NMFS. All such water would eventually pass through Kerr Dam for the benefit of salmonids further downstream on the Columbia River System. Some reshaping of the augmentation release, which benefits water levels on Flathead Lake, is inevitable due to the storage effects and operating requirements of Flathead Lake but these actions cannot affect downstream salmonids pursuant to NMFS BiOps.
FA3-27	Second paragraph needs revision for clarity.	This paragraph has been expanded to explain the use of climate indicators in more detail.

Comment Code	Comment	Response
FA3-28	Second paragraph needs additional explanation of drought indicators and snowpack.	The FPRI uses snowpack measurements to calculate a proxy for the snow available in the Flathead basin to generate runoff during the spring melt. An evaluation of all water years indicated that the drought indicators, specifically the FPRI, successfully deactivated the drought management plan at least one to two months prior to the start of the runoff. Figures 9-12 in Appendix B demonstrate that in April, the highest runoff that occurred when the FPRI would have called for the drought management plan to be activated was 80% of normal. In addition, it was noted that observed floods have occurred in years with runoff at 120% of normal or greater; this observation was verified by a separate flood analysis.
FA3-29	Explain rationale for refill by May 15.	Under rule curve 1A, the system is driven to achieve lake refill as soon as possible. To achieve this, the rule curve used in the model includes an instantaneous increase from 2,888' to 2,893' msl on April 16, as shown in Figure 16 in Appendix B. This rule curve was created so that the model logic would not place any artificial constraints to refill. The model would allocate the incoming flows to satisfy ramping and minimum instream flow requirements and place the rest of the water into storage in Flathead Lake thereby raising the water level. The model cannot mimic potential real time operations which would be anticipating future rain or runoff events based upon weather forecasts. The point of this analysis was to demonstrate the effectiveness of relaxing the May 30, target elevation for Flathead Lake during periods of low precipitation and runoff. Under rule curve 1B, the model uses a relaxed approach to lake refill, and the rule curve increases linearly from 2,888' to 2,893' msl during periods of April 16 to June 15 shown in Figure 17 in Appendix B. For rule curve 1C, shown in Figure 18 in Appendix B, the model strikes a balance between the instantaneous and relaxed approaches, calling for a linear lake level target increase from 2,888' to 2,893' msl during period of April 16 to May 15.
FA3-30	Discharge flows should be determined before the season-confer with fish experts.	Releases will be managed in accordance with the Kerr license (i.e. in accordance with Articles 55 through 59). The only adjustment would be to the minimum instream flows under Alternative 2 if runoff is anticipated to be <65% of normal. We have consulted with fisheries experts regarding potential flow deviations, and have determined that the infrequency of the event would make it acceptable.

Comment Code	Comment	Response
FA3-31	Equations must be updated regularly because constants will change with new data.	The Flathead Precipitation Runoff Index (FPRI) calculations use weighting constants for each precipitation measurement station that are in general accordance with the area that each precipitation measurement station represents. Additional statistical analysis has evaluated medium and long-term trends in precipitation and runoff, and does indicate that periodic review of the indicator equations is an appropriate action. Therefore the stations and associated constants should be reviewed on a five-year basis.
Clinton Whitney		
IND1-1	Request that the Hungry Horse alternative be given full analysis in the FEIS.	Increasing flow from the Hungry Horse reservoir is only one aspect of PPL's Proposed Action, not a separate and distinct alternative. This aspect of the proposed action has been analyzed throughout the EIS. In addition, Hungry Horse operations have been incorporated into the modeling of Alternatives 1 and 2 and a provision to coordinate operations with Hungry Horse was added to Alternative 2.
Henry Oldenburg		
IND2-1	DEIS does not address failure to draft the lake every year and associated impacts on farmland.	Additional discussion regarding impacts to land use has been added to the FEIS in Sections 3.2 and 4.4. The Preferred Alternative allows for more frequent drafting of Flathead Lake during winter months, reducing impacts on farmland upstream of the lake.
IND2-2	Define the "datums" used. Is the Somers datum used?	The Polson datum is used in the analysis. The USGS regional datum is set at Polson. Please refer to Table 3-9 of the FEIS for further clarification.
IND2-3	Question about full pool impacts, especially raising water levels on his property.	We appreciate the concerns expressed by the landowner, however the issue of managing the lake to a full pool elevation of 2,893' msl is a licensing issue that should be addressed through applicable FERC processes.
IND2-4	Raised question about flood events during normal and drought years.	The FEIS has been modified to include additional discussion of these occurrences. Please refer to response to comments FA2-36 and FA2-38.

Comment Code	Comment	Response
IND2-5	Prefers No-Action alternative.	Comment noted.
Flathead County Board of Commissioners		
LA1-1	Did not receive DEIS, please accept our comments after deadline.	The comments were accepted.
LA1-2	DEIS does not explore a full range of alternatives. Drop in lake levels endangers boaters, affects lake environment and economy; winter lake levels 5' higher every year are unacceptable.	The alternatives development and analysis is included in Chapter 2.0 of the FEIS. Discussions and analysis of the effects of lower lake levels on boat access, the environment, and the economy are included in Chapters 3.0 and 4.0. The Preferred Alternative minimizes the number of years that winter lake levels are held high.
LA1-3	Prefer Alternatives 1 or 2 with additional flow provided by Hungry Horse.	Alternative 2 has been modified to include a provision to coordinate operations with Hungry Horse Dam consistent with the operating limitations of that project.
Confederated Salish and Kootenai Tribes (of the Flathead Nation)		
NAT1-1	Clarify modeling discussion with simple explanation of data periods and license 4e conditions.	An explanation of the Secretary's 4e conditions is provided in Section 1.1.2. The period of record discussion is provided in Sections 2.2.1 and 3.1.3.5 of the FEIS.
NAT1-2	Reference of recreation, tourism, and associated activities in 1962 MOU and amendments is erroneous. Delete.	The Summary and Section 1.1.2 have been revised to remove the reference to the MOU supporting recreation, tourism, and associated activities on Flathead Lake by refilling the lake in time for the summer season.
NAT1-3	Definition of drought should be specific and consistent throughout document.	Section 1.3 of the FEIS has been added to include a discussion of drought indicators and the definition of droughts. Drought has been defined as less than 72.6% of normal April through September runoff; and severe drought has been defined as less than 65% of normal April through September runoff.

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Comment Code	Comment	Response
NAT1-4	Figure 3.1 - study area boundaries do not lead to appropriate level of analysis.	Figure 3-1 has been revised to increase the primary study area for the Drought Management Plan (DMP).
NAT1-5	Big Fork and Lakeside DO have community water and wastewater.	Section 3.1.2.4 has been revised to reflect this information.
NAT1-6	Flathead Lake and History should include discussion before Kerr Hydroelectric dam was built.	Sections 1.1.1 and 3.1 of the FEIS have been modified to include additional discussion of the conditions at Flathead Lake and in the lower Flathead River prior to the construction of Kerr Dam.
NAT1-7	Section needs to include tribal ordinances and programs relating to lakeshore activities.	Section 3.2.10 was added to the FEIS to discuss the CSKT administered programs.
NAT1-8	Water quality discussion should include downstream conditions in the lower river, specifically water temperature.	The discussion of water quality has been modified in Section 3.3.3 of the FEIS to include discussion of temperature concerns related to low flows.
NAT1-9	At request, tribe will forward list of species of concern. List may not exactly correspond with state list.	The list of species of concern that was received from the tribe has been included in the discussion in Section 3.4.5.
NAT1-10	CSKT recommends Alternative 2 as the preferred alternative.	Comment noted.

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Comment Code	Comment	Response
Public Meeting August 29, 2006		
PM1-1	Question about what agency provides the final decision: the DOI or the FERC. Is this a FERC document or a DOI document? Is the lead agency the DOI or the BIA?	As discussed in Section 1.3, the Secretary of the Department of Interior will issue a Record of Decision selecting an alternative regarding the DMP. The U.S. Department of the Interior (DOI), through the Bureau of Indian Affairs (BIA), prepared the Environmental Impact Statement (EIS). The Federal Energy Regulatory Commission (FERC) is participating as a cooperating agency for the preparation of this EIS.
PM1-2	Where will the inflow be measured, based on it coming from multiple sources (Hungry Horse, Swan, and other places) and other factors such as evaporation?	We believe the commenter is referring to the Proposed Action by PPL Montana. There was no information in the description presented that shows where inflow will be measured.
PM1-3	Comment that the 2001 full lake level was only achieved for a short time and then dropped by opening the Kerr Dam, so the full lake level should not be considered as being achieved.	Comment noted.
PM1-4	Why is use of water from Hungry Horse to help maintain lake levels absent from other alternatives?	Please see response to comment PM1-39.
PM1-5	Status of previous assurances that the Army Corps of Engineers MOU states that Hungry Horse and the Kerr Dam will continue flow to maintain the levels in Flathead Lake.	See Section 3.1.3.5 for a discussion on the Memorandum of Understanding. The Preferred Alternative includes coordination with Hungry Horse operations.
PM1-6	The EIS needs additional discussion to justify why water from Hungry Horse cannot be used to maintain lake levels; the justification in the document that it would be "difficult" to make the water available is not adequate.	The Preferred Alternative includes coordination with Hungry Horse operations. Please see response to comment PM1-39 and Section 4.2.2.2, Increasing Hungry Horse Flows, of the FEIS.
PM1-7	Other studies have indicated that a draw down of 5 feet from Hungry Horse would result in a 1-foot increase to Flathead Lake. Hungry Horse has previously been drawndown by more that 100 feet without significant disruption to recreational users of that reservoir; therefore, a 5-foot draw down from the Hungry Horse would provide enough water to Flathead Lake in severe circumstances without affecting Hungry Horse.	Comment noted. The Preferred Alternative includes coordination with Hungry Horse operations. Please see response to comment PM1-39 and Section 4.2.2.2, Increasing Hungry Horse Flows, of the FEIS.

Comment Code	Comment	Response
PM1-8	EIS is inadequate because it does not fully explain reasons for eliminating the Hungry Horse option as an alternative.	Comment noted. The Preferred Alternative includes coordination with Hungry Horse operations. Please see response to comment PM1-39 and Section 4.2.2.2, Increasing Hungry Horse Flows, of the FEIS.
PM1-9	Hungry Horse operations should be pursued as an option.	Comment noted. The Preferred Alternative includes coordination with Hungry Horse operations. Please see response to comment PM1-39 and Section 4.2.2.2, Increasing Hungry Horse Flows, of the FEIS.
PM1-10	Comment regarding the limited availability of the document and that a document was requested and not provided.	Please refer to the response to comment CO2-1.
PM1-11	None of the alternatives in the EIS mandate a reduction in the lake level or downstream flows.	Alternative 2 includes a provision that allows the operator to deviate from the minimum instream flow rates that are in the current license. The proposed action and Alternatives 1 and 2 all call for a deviation from summer lake levels.
PM1-12	Request for a mediator between the BIA and the US to address conflicts between the proposed project and Articles 56 and 43 (for instance, the Army Corps of Engineers).	The commenter is in effect referring to the No Action Alternative, in which a number of government (both state and federal) agencies, the Confederated Salish and Kootenai Tribes (CSKT), PPL Montana, and other interested parties participate in a conference call to determine appropriate actions in drought situations. This approach is discussed in Section 4.2.2.1.
PM1-13	Recommendation to require the government to provide means for creating extra snow fall to the area in the winter so that parceling water in the summer won't be necessary.	The EIS is specifically focused on operation of the Kerr Dam and resolution of conflicts between license articles. The purpose and need of the project is not to eliminate drought, which is currently beyond our control.
PM1-14	Comment that the Hungry Horse Dam was not present during example years of 1940 and 1941, so all available water was entering Flathead Lake at the time. Therefore, the analysis of drought before the Hungry Horse Dam was built is erroneous.	The modeling was designed to determine what would happen in any year under current operations and modified current operations, using runoff values as inputs. In effect, the model can simulate that Hungry Horse is actually present even when it had not yet been constructed.
PM1-15	Continually lowering and raising the lake has elevated the water table in the lower valley, which has affected farmland and has the potential to affect septic tanks.	This comment addresses operational levels during nondrought operations which are under jurisdicition of FERC. Normal operating issues should be addressed through the FERC procedures.

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Comment Code	Comment	Response
PM1-16	If the lake elevation were maintained during the summer tourist season and dropped in the fall and then in the spring to protect farmers and property owners and owners of septic tanks, the only conflict would be PPL not making as much money from the Kerr Dam, and the Confederated Tribes because they are 50 percent owners.	Please refer to response to comment PM1-15.
PM1-17	The lake should be dropped to 2883 to protect farm land and septic systems.	During most years, the drought management plan would not be implemented and the issues raised by the commenter would not be affected. Please refer to response to comment PM1-15.
PM1-18	The alternatives don't have a balance of keeping the water level up in the summer to protect docks and businesses and sending water down river to protect fish.	Based on the information developed and presented in the EIS, Alternative 2 demonstrates a reasonable balance between lake levels and flows that minimize the effects of a drought on all users to the greatest extent possible.
PM1-19	All of the alternatives include a drop in lake levels.	Comment noted.
PM1-20	Since 1973, there has been a drought every 4.7 or 4.8 years, which is more frequent than the 17- or 18-year average presented in the EIS. Droughts do not happen with regularity, they happen in cycles. Because they do not happen with regularity, lowering the lake levels is a concern.	Comment noted. The Preferred Alternative includes the use of climate indicators to mitigate the effects of drought on water levels. Refer to Section 2.3.3 of the FEIS.
PM1-21	A lake level of 2,892.6 would be great; try and maintain that.	Comment noted. As shown in Figure 4.13 in the FEIS, modeling for Preferred Alternative 2 indicates that an average lake elevation of 2892.7' msl would be obtained in summer months for 8 out of 10 drought years.
PM1-22	Winter lake levels are important, with the problem of ice damage to public and private property.	Comment noted. See also response to comment PM 1-15. The Preferred Alternative requires the use of climate indicators which minimizes the frequency of high water levels during winter months.
PM1-23	Comment on the document; certain parts of the document are not up to standard and need some attention.	Comment noted.

Comment Code	Comment	Response
PM1-24	How were the various lake level numbers chosen (e.g., 2,892.2, 2,892.5, 2,892.6) and why were other numbers not chosen?	See response to comment FA1-12.
PM1-25	How was the flow rate of 8,000 cfs chosen instead of some other rates higher or lower than that?	See response to FA2-35.
PM1-26	Need additional clarification of the real/actual effects of lower lake levels on the old, young, and handicapped.	The FEIS recognizes comments regarding the impact of lower lake levels on the old, young, and handicapped. The Preferred Alternative maintains summer lake levels within normal ranges of those experienced on Flathead Lake which should minimize impacts to these groups.
PM1-27	How was the level of 2,888 chosen for the end of December level? The Army Corps of Engineers and DMT Plan Number 1 draft the lake to an elevation of 2,890 by the end of December; why was 2,888 chosen for this project?	The elevation 2,888' msl was first presented in the proposed action and was subjected to significant analysis in the alternatives development. It was found to be the lowest elevation through modeling and analysis that balanced the needs of flood control, lake levels, and minimum instream flows. Appendix B contains a descriptive analysis of the modeling conducted for the Preferred Alternative.
PM1-28	The document provides no information about what lake level significantly impacts shoreline area, area businesses, or boaters.	Section 4.8 of the EIS discusses such impacts; this section has been modified to include updated economic information.
PM1-29	The document does not have the most recent economic data; the data stopped at the year 2000. The commenter's research showed that Flathead County is the second fastest growing county in Montana, not the fourth as the document says; the local paper had a headline that the Interlake Flathead "Tax Base Soars."	Much of the socioeconomic data included in Section 3.6 was obtained from the 2000 Census. Economic data used is from the 2002 Economic Census and was updated in the FEIS, with data from the 2006 Economic Census. Changes to the EIS text were made as appropriate.
PM1-30	The use of the phrase "we will strive to attain" is ambiguous and should be more precise.	This language was removed from the FEIS. Refer to Section 2.3.3 for clarification on efforts to achieve desired lake elevations.

Comment Code	Comment	Response
PM1-31	Economic impacts to the land use or water quality have not been addressed.	Please see response to comments PM1-28 and PM1-29.
PM1-32	The document needs to identify the specific numbers of docks that are going to be affected; how many marinas are going to be affected; how many docks will be sheared off in the winter.	Additional detail has been added to the discussion of land use impacts in Section 4.4 of the FEIS.
PM1-33	The BOR and the BIA are under the same agency, and the BOR website says that Hungry Horse was built to help with flood control on Flathead Lake, so they should be able to help with the 6 inches Flathead Lake might need in those years.	Although both Bureaus are within the same Department, the laws and mandates governing each Bureau are substantially different. In this case, BIA is charged with developing a drought management plan that provides for minimum instream flows below the Kerr Project while reducing the effects of these flows on pool elevations above the Kerr Project. In order to minimize potential conflicts with other Project demands, our efforts need to be accomplished within the framework of the existing Kerr Project license without jeopardizing BOR's ability to address the myriad requirements of the Hungry Horse Project -- where BIA has no authority. However, both BIA and BOR recognize that some relief during drought years may be possible within the existing Hungry Horse operational framework and have added a coordination process under Alternative 2.
PM1-34	The meeting was not adequately publicized.	Comment noted. Meeting notices were placed in the Federal Register, advertised in the Lake County Leader and the Daily Interlake, and publicized on the project website. Please also refer to response to comment CO2-1.
PM1-35	Mitigation efforts should not undermine the other important attributes of the lake that the people of Montana cherish and depend upon.	Comment noted. The Preferred Alternative is intended to reduce the severity and duration of drought impacts to the lake while providing minimal flow levels to the Flathead River as necessary to maintain those important resources.
PM1-36	The water level has been adequately filled in the past, and the commenter does not understand why the lake level figures need to change.	It has been demonstrated that under drought conditions there is insufficient water to both fill the lake and maintain river flow requirements (e.g., conditions that occurred in 2001 with considerable hardship to lake residents). Modification of both lake level elevations and lower Flathead River stream flows is necessary to manage the inevitable conflicts under drought conditions.

Comment Code	Comment	Response
PM1-37	How many people in Flathead and Lake County get their potable water from Flathead Lake? If they can't service those lines within an adequate period of time in the spring when the lake bed/riverbed is dry enough to access them, they can lose out.	A discussion of Flathead Lake as a source of potable water was added to section 3.1.2.4. The Preferred Alternative minimizes impacts of high spring water levels to occur only during drought years.
PM1-38	Comment that the government agencies are not looking out for the citizens.	Comment noted.
PM1-39	Recommendation that a hybrid of the alternatives would be good.	Comment noted. Based on input received on the DEIS, modifications were made to the Preferred Alternative and presented in the Summary section of the FEIS. Modification included addition of an adaptive management plan, coordination with Hungry Horse operations, Article 56 deviation request, and a five-year update of the drought indicators.
PM1-40	Agree that the lake level minimum of 2892.2 is good because the 3 inches makes a difference in the ease of getting in and out of certain boats.	Comment noted.
PM1-41	The lake level priority alternative (Alternative 1) should have been considered, just as Alternative 2 was considered, because Alternative 1 emphasizes lake level over stream level, and Alternative 2 emphasizes stream level over lake level; a hybrid of these two alternatives should be considered.	See response to comment PM1-39. The Preferred Alternative includes deviations from lake levels and stream flows among other provisions.
PM1-42	The statement in the EIS that "if minimum instream flow deviations were approved, the impact would fall disproportionately on the minority population of the Flathead Reservation" only looks at the downstream users of the river and leaves out the impact on the Tribes and the people on the south half of the lake, specifically their business KwaTaqNuk and other businesses they have that are dependent on full pool.	Environmental justice analysis needs to determine two things: 1) there is an adverse effect, and; 2) the adverse effect falls disproportionately on minority or low income populations. In this specific case, the analysis is discussing Alternative 2 (the preferred alternative), and acknowledges that if flow deviations were approved to keep lake levels high, it would favor people on the south end of the lake, but have a negative effect on those populations for which the lower Flathead River is an important resource, most notably the CSKT.
PM1-43	Comment disagreeing that Alternative 2 and the proposed action are less likely to mitigate economic impacts in case of severe drought than Alternative 1.	The EIS states that Alternative 2 is more likely to mitigate economic impacts since it results in a higher lake elevation for 8 out of 10 modeled low water years. Alternative 1 would prioritize stream flows, which would result in lower lake levels.

Comment Code	Comment	Response
PM1-44	Under the PPL alternative and Alternative 2, reducing the level of water downstream would mimic natural drought conditions.	Comment noted. Under natural conditions during a drought, two things would occur; 1) Flathead Lake water levels would approach 2,883' feet in the summer, and 2) Lower Flathead River flows would be reduced due to the dwindling water supply. The Preferred Alternative attempts to mitigate the effects of drought to protect both resources.
PM1-45	There is evidence that fisheries downstream would not be affected by a reduction in flow to 6,000 cfs.	Generally, fisheries impacts are directly related to the availability of water. As water is reduced, fisheries impacts increase. Our analysis demonstrates that flows of 8,000 cfs result in higher lake levels with limited effects on downstream fisheries.
PM1-46	Consultation should occur more than once per month to conduct reviews of drought conditions.	Comment noted. Coordination issues have been addressed in modifications to the Preferred Alternative as shown in the FEIS. Please refer to response to comment PM1-39.
PM1-47	Figure 3.3 shows that the lake level does fill on an average and actual basis to 2,892 at all times, and there wasn't a problem keeping the lake filled prior to the development and implementation of BIA's 4(e) conditions.	Figure 3-3 represents average lake elevations for many years. Figure 3-4 shows that the elevation of Flathead Lake on June 15 is actually higher during drought years than the long term average. In average and wet years Flathead Lake water levels are kept lower on June 15 due to concerns over flooding. Figure 3-5 illustrates average Flathead Lake water levels from June 16 throught September 15 for both the average and the seven drought years. Since 1965, approximately 65% of the time the drought year summer average lake elevation is the same as the long term average. The one of the two years that did not meet the long term average was WY2001 which was caused by a conflict between the Article 43 water levels and Article 56 instream flows. The Preferred Alternative is intended to resolve that conflict.
PM1-48	There would be significant adverse impacts on homeowners, business owners, marinas and charter boats, and related businesses and multiple effects on the valley if the lake level is down. Comment to keep the lake at full pool.	Comment noted. The Preferred Alternative is intended to mitigate this effect.
PM1-49	Members of the irrigation project of the Flathead Reservation have a right to take water from the lake for irrigation; it's an insignificant impact with the lake levels or river flows because they rarely take the quantity that is set aside for the project, and it's a small amount of water.	Section 3.5 and Chapter 4 of the FEIS include a discussion of tribal uses of water from Flathead Lake, including irrigation.

Comment Code	Comment	Response
Public Meeting August 30, 2006		
PM2-1	What constitutes a drought?	A drought is defined as a situation where runoff entering Flathead Lake in the April-September period is < 72.6 % of normal.
PM2-2	Mixed use of the terms "drought" and "severe drought."	These terms have been more clearly defined in the EIS.
PM2-3	Reasoning for picking 2,892. [NOTE: The transcripts show the numbers 2,392 and 2,393 in comments PM2-3 and PM2-4; assume the commenter meant the numbers as they appear in the document.]	This is part of PPL Montana's proposed action and was evaluated as presented. The PPL Montana DMP indicates that a lake elevation of 2,892' msl would minimize effects on recreation and other summer lake use activities, and be a more realistic lake elevation goal under drought conditions. Please also refer to response to comment FA1-12.
PM2-4	How was 2,892 determined to be full pool instead of 2,893.	This elevation was included in PPL Montana's proposed action which was evaluated as presented. Please also see the response to comments FA1-12 and PM2-3.
PM2-5	Did an economist provide the required EIS assessment and was it sufficient?	See revised section 4.8 of the EIS for information regarding economic impacts. This section was developed under the supervision of an economist.
PM2-6	Reasoning for picking 2,892.	Please see the response to comment PM2-3.
PM2-7	Question whether the existing docks have been built at 2,893.	Our information indicates that docks have been built to accommodate full pool, which means that that docks would be usable (not flooded) at a lake elevation of 2,893' msl.
PM2-8	By requiring a target pool level of 2892.2, the Project operator will stay below that level at all times so not to accidentally exceed this target - even if stream flows would permit a higher pool.	The pool level of 2,892.2' msl is a target elevation and may be exceeded if instream flows are being met.

Responses to Summary Comments on the DEIS

Summary Report 2: Sorted by Commenter

Comment Code	Comment	Response
PM2-10	Impacts of the lake level on water quality as a result of point source discharges from municipal waste water treatment plants has not been fully considered in the EIS.	Section 3.3 discusses point source discharges, and we have added additional analysis in Section 4.5 (Water Quality).
PM2-11	What conditions could trump the drought management plan?	Generally, under any of the alternatives or any conditions where flood concerns were significant as determined by the USACE.
PM2-11(a)	Could ESA Issues affect implementation?	Alternatives 1 and 2 have been developed within the constraints identified in existing biological opinions. As such, there should not be additional requirements under the Endangered Species Act. However, all biological opinions include four general conditions that may require additional formal consideration of endangered species issues at some point in the future, they include: (1) exceeding the amount or extent of incidental take; (2) new information not considered previously; (3) a modification of existing actions not previously considered; or (4) a new species is listed or critical habitat designated.
PM2-12	Potential impacts on the lower river, specifically in drought years, have not been sufficiently discussed in the EIS.	Additional discussion regarding potential impacts on the lower river have been added throughout Sections 3 and 4 of the FEIS.
PM2-13	Distribution of materials to Native American tribes.	See response to comment CO2-1. A copy of the DEIS was distributed to the Confederated Salish and Kootenai Tribes.
PM2-14	Impacts of the drought management plan on the lower river, specifically in drought years.	Additional discussion regarding potential impacts on the lower river have been added throughout Sections 3 and 4 of the FEIS.
PM2-15	Are there triggers from January through March in the DMP to reassess implementation?	Section 2.3.3 of the FEIS describes the Preferred Alternative which includes monthly assessment of climate indicators.

Comment Code	Comment	Response
PM2-16	Frequency that the lake level will drop more than expected (e.g., 3 to 5 inches).	Analysis of the historic lake elevations data indicate that droughts occur once every 18 years.
PM2-17	Why wasn't drawing water out of Hungry Horse Dam studied as part of Alternatives 1 or 2?	Please refer to response to comment PM1-39.
PM2-18	Does the Kerr Project have authority to release from Hungry Horse Dam?	No. However, coordination with Hungry Horse operations has been added to the Preferred Alternative.
PM2-19	What results if PPL Montana disagrees with the BIA's proposal?	We would first try to resolve any differences with PPL. However, in the event that we approve an alternative that PPL opposes, they would have the opportunity to dispute our approval before FERC and then through the courts.
PM2-20	Analysis of potential impacts of various lake levels (2,892.2, 2,892.0, 2,892.5).	Please see response to comment FA1-12.
PM2-21	Analysis of using water stored in Hungry Horse and moving it for storage in Flathead Lake.	Please see response to comment PM1-39.
PM2-22	Evaluate the impacts of reducing Flathead River flows during the spring runoff period.	Chapter 4 of the FEIS discusses the impacts associated with this scenario.
PM2-23	What variables can the licensee control to obtain a lake elevation no lower or higher than 2,892.2 during the recreational season?	The licensee can control both water levels and release rates consistent with the FERC license for the project.

Comment Code	Comment	Response
PM2-24	How was the lake elevation of 2,888 selected for the end of December elevation in Alternatives 1 and 2?	This elevation was included in PPL Montana's proposed action. We assumed that PPL Montana indicated that a higher late season elevation provided more efficient and economic water use and alleviated some of the concerns identified for higher lake elevations, namely potential spring flooding. Our modeling confirmed that a 2,888' msl winter lake elevation would be necessary in a drought year to allow the lake to refill in the spring. Therefore, 2,888' msl was incorporated into Alternatives 1 and 2.
PM2-25	Consideration of the Army Corps of Engineer's option of 2,890 feet at the end of December.	Please refer to response to comment PM2-24.
PM2-26	At what lake level will damage to docks and other property occur?	Winter damage to docks and other shoreline property will occur at varying lake levels depending on the elevation of the dock and the materials out of which the dock is constructed. During the scoping process, comments were received that some docks may experience ice-related damage at over-winter lake elevations that exceed 2,885' to 2,886' msl.
PM2-27	What summer lake levels will significantly affect shoreline property owners, businesses, and boaters?	Section 4.8 of the FEIS discusses the impact of summer lake levels on shorline properties.
Montana Fish, Wildlife and Parks		
SA1-1	Recommend incorporating an additional alternative that includes an amendment to Article 56 and mimics the natural hydrograph. (see letter for specifics)	The intent of the minimimum instream flows in the Preferred Alternative are intended to mimic natural conditions in the lower Flathead River to the extent appropriate for existing conditions. Please refer to response to comment PM1-44.
Montana Fish, Wildlife and Parks		
SA2-1	Errata to first letter (SA-1)	Comment noted.

APPENDIX D

PPL Montana Drought Management Plan (2002)

KERR HYDROELECTRIC PROJECT NO. 5

DROUGHT MANAGEMENT PLAN

1. INTRODUCTION AND OVERVIEW

Flathead Lake is the largest freshwater lake west of the Mississippi River, measuring 28 miles long and 15 miles wide at its widest point.[1] Located in Lake and Flathead Counties, Montana, the lake supports a diverse fishery, wildlife and habitat resources and is the focal point of expanding shoreline development and a wide variety of recreational activities. The water flowing out of Flathead Lake is released into the lower Flathead River. The river also supports a diverse fishery, wildlife and habitat resources and recreational activities. The waters of this unitary lake and river system are also an important resource for the Confederated Salish and Kootenai Tribes of the Flathead Nation ("Tribes") and the Flathead Indian Reservation (the "Reservation").

The two sources of water into Flathead Lake are natural precipitation runoff (*e.g.,* snow melt) and releases from the U.S. Bureau of Reclamation's ("Reclamation") Hungry Horse Dam located upstream. The Kerr Project, Federal Energy Regulatory Commission ("FERC" or the "Commission") Project No. 5, is presently owned and operated by PPL Montana, LLC ("PPLM"). The project was built by The Montana Power Company ("Montana Power"), PPLM's predecessor-in-interest, near the natural outlet of Flathead Lake. The project, which became commercially operational in 1939, extends the time period by several months each year when the lake will be at or near full elevation. PPLM operates the project as a storage reservoir for hydroelectric generation, recreation, conservation of fish and wildlife and flood control. The Kerr project operation controls the top ten feet of lake level and the flow of water downstream into the lower Flathead River in accordance with a federal license issued by the FERC in 1985 and subsequent Commission orders.

Reflecting the competing demands placed upon the water in the lake, the license places restrictions on the operation of the project for hydroelectric power generation purposes and flood control. In particular, the license presently requires PPLM to release specified minimum flows to protect the lower Flathead River while also maintaining full lake levels in the summer to enhance the recreational use of the lake, and also providing lower lake levels in the winter and spring to protect against flooding and adverse impact on lakeshore interests. Lower water levels reduce the amount of water for hydroelectric generation. Less generation may lead to generation-load imbalances and this may affect transmission load, which may, in turn affect the regional power grid. Although such competing demands are *reflected* in the project license, they are not *reconciled* by its terms during years in which the region experiences insufficient runoff volume to satisfy all of the license requirements.

1 *See Montana Power Co, et. al*, 79 FERC ¶ 61,376 at 62,609 (1998).

This obligation to balance competing interests stems from the Federal Power Act ("FPA") itself. Specifically, when issuing a license to a hydroelectric project, the Commission must ensure:

> That the project adopted, . . . shall be such as in the judgment of the Commission will be best adapted to a comprehensive plan for improving or developing a waterway or waterways for the use or benefit of interstate or foreign commerce, for the improvement and utilization of water-power development, for the adequate protection, mitigation, and enhancement of fish and wildlife (including related spawning grounds and habitat), and for other beneficial public uses, including irrigation, flood control, water supply, and recreational and other purposes referred to in section 4(e). . . .[2]

In the summer of 2001, the region and the Flathead Basin experienced a severe drought. Due to an inadequate volume of water flowing into the lake, it was not possible for the project operation to satisfy the competing demands for water levels in the lake and simultaneously to comply with the terms and conditions of the license regarding flow releases to the lower river. More importantly, there was no plan in place to manage a process for responding to the drought at the time when decisions needed to be made in 2001, and, as a result, the decisions with respect to apportioning the increasingly limited supply of water were made on an *ad hoc* basis without the input of all affected interests.

This "Drought Management Plan" ("DMP") is being submitted pursuant to Article 60 of the Kerr project license and the Commission's order of February 1, 2002.[3] As described below, the DMP sets forth a proactive process to respond to drought conditions to reconcile conflicting license articles relating to the competing uses of the water in Flathead Lake. This process would consist of an operating protocol by which PPLM as the project operator, in consultation with the Tribes, would monitor hydrological conditions and weather forecasts throughout the fall, winter and spring seasons. If during this monitoring process it is reasonably determined that there is a significant risk of a drought for the following summer, the DMP process proposed below would be initiated.

Article 60 of the project license requires the project licensees, after consultation with interested parties, to file a DMP with the Secretary of the U.S. Department of the Interior ("Interior") for approval. Consistent with Article 60, the DMP is being submitted to Interior for approval.

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2 16 U.S.C. § 803(a)(1).

3 *PPL Montana, LLC, et. al*, 98 FERC ¶ 61,098 (2002) (the "February 1st Order").

2. BACKGROUND

2.1 The Competing Demands on the Water in Flathead Lake

Flathead Lake is an important resource for the many interests that use its water. The Tribes depend upon the lake as one integrated natural resource component of their Reservation homeland. Portions of the Kerr project (*e.g.*, dam, penstocks, powerhouse and portions of Flathead Lake) are located within the boundaries of the Reservation. Landowners, businesses and private individuals around the lake rely upon adequate lake levels to support extensive year-round recreational, commercial opportunities, and irrigation. As project operator, PPLM regulates the lake water level to generate hydroelectric power, provide public recreation, conserve fish and wildlife resources and to manage flood control within the constraints of a federal license that concurrently requires specified lake levels to be maintained and specified minimum flows of water to be released. These requirements can be met in years in which a normal amount of water is available. Meeting these requirements in drought years, however, is difficult if not impossible.

The Tribes retained the Reservation for their "exclusive use and benefit" by the terms of the Treaty of Hellgate. Therein, the Tribes also reserved "[t]he exclusive right of taking fish in all the streams running through or bordering" the Reservation. As trustee delegated the authority for administering the Reservation and with a fiduciary duty to protect the Tribes' Treaty-reserved natural resources, Interior established conditions for Kerr Project operations that it believed to be necessary to assure adequate protection and utilization of the Reservation.

As the Commission has noted, "Flathead Lake is also an important recreation site."[4] The lake offers diverse recreational opportunities to adjoining landowners and thousands of visitors each year. Recreational activities conducted on and around the lake include boating, fishing (including sport fishing and ice fishing), hunting, trapping, hiking, camping, cross country skiing, ice-skating, snowmobiling, and sightseeing.[5] Several state parks, marinas, resorts, and recreation sites located at various points around the lake support these activities.[6]

Many of the recreational opportunities offered by Flathead Lake are affected by lake levels. As FERC staff explained in the FEIS:

> Under current Kerr dam operations, summer recreational activities on Flathead Lake begin after mid-June when the lake attains full

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4 79 FERC ¶ 61,376 at 62,609-10. In its 1996 Final Environmental Impact Statement ("FEIS") evaluating the potential impact of proposed modifications to the Kerr project operations, FERC staff reported that over 103,000 tourists visited Flathead Lake in 1992 during the summer recreation season alone. These visitors contributed an estimated $4 million (1992 dollars) to the regional economy during that season. *See* Office of Hydropower Licensing, Federal Energy Regulatory Commission, *Final Environmental Impact Statement for Proposed Modifications for the Kerr Hydrolectric Project*, at p. 3-42 (1996).

5 *See id*

6 *See id.*

> pool and end after lake drawdown begins in early October. Most recreational facilities (*i.e.*, private docks, public boat ramps, marinas) were constructed based on current full pool elevations of 2,893 feet msl.[7]

As a result, lowered lake levels caused by drought conditions could adversely affect recreational opportunities, shoreline interests and area businesses. The FEIS concluded:

> drought conditions would have a significant, but temporary, adverse impact on water-oriented recreation activities and recreational spending at Flathead Lake due to lower pool elevations during the recreation season. Net losses in recreational spending would be produced primarily by non-residents who could decide not to come [to] Flathead Lake while the water is low, and by local residents who would travel out of the two counties for boating or fishing. Persons owning shorefront homes for seasonal use would also likely decrease their visits and recreational use, both of which would decrease recreational spending.[8]

In the FEIS, FERC concluded that potential impacts could be mitigated by the implementation of a drought management plan that made provisions for maintaining at least adequate lake levels during periods of drought.[9]

Therefore, the various interests associated with the lake and downstream river place significant, often competing demands on the water held in the lake. As explained in the next section, such competing demands are reflected in the Kerr project license and serve to limit the operations of the project extensively.

2.2 License History and Discussion of Relevant License Articles

By order issued July 17, 1985, the Commission approved a comprehensive settlement and issued a new joint license to Montana Power and the Tribes for a 50-year term.[10] PPLM acquired Montana Power's interest under the Kerr license in connection with its acquisition of a number of generating assets from Montana Power in December 1999.[11] The license provides, among other

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7 *Id.* at 3-43.

8 *Id.* at 4-42.

9 *See id.* at 4-38.

10 *Montana Power Co., et al.*, 32 FERC ¶ 61,070 (1985).

11 *PPL Montana, LLC*, 88 FERC ¶ 62,010 (1999).

things, that PPLM shall operate the project for the first 30 years of the license term, after which the Tribes may elect to have the project conveyed to them.[12]

As issued in 1985, the new license contained several articles regulating, among other things, the level of Flathead Lake (Article 43), as well as minimum flow releases from the dam (Article 44).[13] Article 43 specifies that for flood control purposes, Flathead Lake's water level shall be regulated in accordance with a 1962 Memorandum of Understanding (the "MOU") between the licensee and the U.S. Army Corps of Engineers (the "Corps") that was amended by the Commission in 1966. The MOU states in pertinent part:

> The level of the Flathead Lake shall be raised to elevation 2890 feet by Memorial Day [May 30]. The lake will then be raised as rapidly and early thereafter as possible to reach 2893 feet taking into account the flood potential still existing in the river basin above the lake as determined by the Corps of Army Engineers. Should the potential flood condition subside then the filling of the lake will be accelerated so that the lake reaches the 2893 feet level by June 15.[14]

In addition to Article 43, license Articles 12 and 23 relate to the authority of the Secretary of the Army (*i.e.*, the Corps). Article 12 is a broad reservation of the Army's authority to prescribe operations for navigation purposes. Article 23 specifically states that the Army has the authority to prescribe rules for the operation of "navigation facilities", including those that are part of the project works, "including control of the level of the pool caused by such dam . . ., as may be made from time to time by the Secretary of the Army."[15]

The language of Article 12 distinguishes between the Corps and the Commission, reserving to the Corps jurisdiction over navigation and to the Commission jurisdiction over protection of life and property. Flood control is an incident of both of these functions since navigation is impeded by flooding and flooding can cause injury to life and property. To the extent that controlling floods is part of operating a facility for navigation purposes, Articles 12

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12 PPLM, Interior and the Tribes are currently litigating, *inter alia,* whether the Commission has correctly held that PPLM alone is solely responsible for fulfillment of the terms and conditions of the existing license for the current portion of the license term. *PPL Montana, LLC, et al.*, 93 FERC ¶ 62,198 (2000), *on reh'g*, 94 FERC ¶ 61,129 (2001), *on reh'g*, 95 FERC ¶ 61,053 (2001), *appeal pending sub nom.* PPL Montana, LLC v. FERC, No. 01-1264 (D.C. Cir., Petition for Review filed June 11, 2001).

13 32 FERC ¶ 61,070 at 61,186. Article 44 required the licensee to maintain continuous minimum instream flows pending Interior's exercise of its 4(e) conditioning authority reserved by Article 45 of the 1985 license. *See id.* The minimum flow requirements in Article 44 were then superseded by Article 56 (added to the license in 1997) summarized below.

14 Recently, the Commission has confirmed that Article 43 and the MOU prescribe lake levels that PPLM is required to maintain. *PPL Montana, LLC*, 95 FERC ¶ 61,363 (2001); *see also PPL Montana, LLC*, 98 FERC ¶ 61,098, *slip op.* at 3 n.7 (2002).

15 35 FPC at 1839.

and 23 would apply to the operation of both the turbines and the spill gates. Although Ordering Paragraph 1 of the 1985 Order issuing the present license for the Kerr Project states that a number of specific license articles are subject to and shall not diminish "any ownership or other rights that the Tribes may have ... by reason of ... the Treaty of Hell Gate," Articles 12 and 23 are not among them.[16] If the omission of Articles 12 and 23 from Ordering Paragraph 1 was not inadvertent, it may suggest a different relationship between the Treaty and the legal requirements of these Articles. Moreover, the MOU provides that the Corps and PPLM (as Montana Power's successor) can agree to modify the MOU, but until that occurs or until the Commission suspends the operation of Article 43 as it did last summer, Article 43 imposes on PPLM the obligation to follow the direction of the Corps as set out in the MOU.

In 1997, the project license was amended by a Commission order adopting Interior's section 4(e) conditions[17] that placed additional restrictions upon the operation of the Kerr project. As amended by the 1997 order, the license now requires PPLM to: (1) operate the project as a baseload facility (Article 55); (2) maintain minimum instream flows throughout the year (Article 56); (3) conform to between-day restrictions on flow variations (Article 57); and (4) operate in accordance with hourly maximum allowable ramping rates (Article 58) which could be later modified in light of the results of a required ramping rate study (Article 59).[18]

Article 56 requires the project to be operated in accordance with the following minimum flows:

- August 1 to April 15—Continuous at 3,200 cubic feet per second ("cfs").
- April 16 to April 30—Increased from 3,200 cfs to 5,000 cfs at 120 cfs per day.
- May 1 to May 15—Increased from 5,000 cfs to 12,700 cfs at 510 cfs per day.
- May 16 to June 30—Continuous flows at 12,700 cfs.
- July 1 to July 15—Reduced from 12,700 to 6,400 cfs at 420 cfs per day.[19]

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16 32 FERC ¶ 61,070 (1985)

17 *Montana Power Co., et al.*, 79 FERC ¶ 61,376 (1997). Articles 45 and 46 reserved Interior's authority to impose additional conditions upon the new license pursuant to section 4(e) of FPA, 16 U.S.C. § 797(e). Section 4(e) authorizes federal resource agencies to impose conditions upon the operation of hydroelectric projects (through the project license) in order to protect federal reservations (e.g., Indian reservations and other lands owned by the United States) from the impacts of such projects. *See* 16 U.S.C. § 797(e). Interior possesses Section 4(e) authority over the Kerr project license by virtue of the fact that portions of the project (namely the dam, penstocks, powerhouse, and portions of Flathead Lake) are located within the boundaries of the Flathead Indian Reservation. *See* 79 FERC ¶ 61,376 at 62,610.

18 *See* 79 FERC ¶ 61,376 at 62,616. These license articles also provide that the operating requirements for lake regulation and releases from the project can be modified by operating emergencies or upon written approval from the Commission and the Secretary of the Interior. *See id.*

19 *See id.*

- July 16 to July 31—Reduced from 6,400 cfs to 3,200 cfs at 200 cfs per day.

Article 60 requires the licensees to develop and implement a drought management plan for Flathead Lake.[20] Concerned that the new license articles added through Interior's prescriptive 4(e) authority would conflict with other aspects of the license, the Commission also included a new Article 77 that would have required the drought management plan prescribed by Article 60 to "include explicit criteria for determining when minimum discharge requirements can be relaxed to meet target lake levels."[21] As the Commission later explained:

> Commission staff was concerned about two aspects of [Article 60]. First, the proposed [drought management] plan made no provision for considering the impact on the lake of providing required minimum flows under drought conditions. In other words, under drought conditions, maintaining the minimum flows could delay or prevent the lake from reaching full pond, with resultant adverse impacts on the fishery and other resources. Further, the plan did not require consultation with the Flathead Joint Board of Control, which represents three Montana irrigation districts. Thus, water use could be decided without any input from people who would be greatly affected by the drought management plan.[22]

On rehearing of the 1997 Order, however, Interior objected to the inclusion of Article 77 on the basis that it would favor lake levels at the expense of minimum instream flows.[23] In order to prevent this from occurring, Interior amended its Article 60 to read:

> The licensees, in consultation with the U.S. Army Corps of Engineers, the Bureau of Reclamation, the Bureau of Indian Affairs, and the Montana Department of Environmental Quality, shall develop and implement a drought management plan for Flathead Lake, *which shall be filed with the Secretary*. The drought management plan shall include, but not be limited to, provisions for re-evaluation and adjustment of Flathead Lake flood control requirements and other provisions necessary to facilitate compliance with lower Flathead River minimum instream flow requirements designated by the Secretary. *The Secretary reserves the right to reject, modify, or otherwise alter the drought management plan in whole or in part.*[24]

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20 *See* 79 FERC ¶ 61,376 at 62,617.

21 *Id.* at 62,622.

22 *Montana Power Co., et. al*, 85 FERC ¶ 61,164 at 61,656 (1998).

23 *See id.*

24 *Id.* at 61,658 (emphasis added).

Noting its lack of authority under the FPA to reject Interior's 4(e) conditions, the Commission adopted Article 60 as amended and deleted Article 77, noting that it was "not meaningful [in] light of Interior's" prescriptive amendment of Article 60.[25]

2.3 The Drought of 2001

The potential for these license articles to impose contradictory operational requirements upon the project was experienced last year. The Flathead Basin experienced an extended drought in the spring and summer of 2001. However, there was no DMP in place to guide operation of the project once it was determined all the competing demands for the water in Flathead Lake could not be achieved while simultaneously maintaining compliance with the terms and conditions of the project license. As early as March 2001, PPLM was thus required to seek short-term variances in its license requirements from the Commission and Interior because low water volumes into the system rendered it impossible to meet the lake level (Article 43) and minimum release (Article 56) requirements of the project license. In responding to PPLM's request, the Commission noted: "[u]nder the present hydrological conditions, we understand that PPL Montana cannot satisfy the requirements of both license articles."[26] Ultimately, these drought conditions required PPLM, with the concurrence of Interior, to reduce releases from Flathead Lake into the Flathead River, but ultimately resulted in Flathead Lake levels significantly below full elevation during the summer recreation season.[27]

Without an effective DMP in place, decisions regarding the appropriate means of operating the Kerr project during this drought were contentious and often resulted in operational determinations made on an *ad hoc* basis after the optimal point in time for such decisions to be made. In particular, PPLM's continued request for authorization to modify the minimum releases imposed by Article 56 was denied, resulting in substantially lower Flathead Lake levels in June, which created public controversy. Ultimately, PPLM and Interior reached an informal agreement whereby minimum flows were modified from the levels prescribed by Article 56, and the elevation of Flathead Lake was allowed to rise, supplemented by inflows from the Reclamation's upstream Hungry Horse project. In the absence of a DMP, there simply was no systematic way for PPLM, Interior, the Commission, the Tribes, and interested stakeholders to proactively reconcile the competing demands for the water in Flathead Lake during the drought of 2001.

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25 *Id.* at 61,657.

26 95 FERC ¶ 61,363 (2001).

27 The history of the need for modified minimum flows under Article 56 and the modified minimum flows subsequently authorized by Interior are set forth in PPLM's letters to Interior dated May 8, 15, 24 and June 18, 2001, as well as in letters from the Assistant Secretary of Indian Affairs of Interior to PPLM dated May 16, 25 and June 19, 2001. In addition, on June 11, 2001, the Commission stayed Article 43 of the license through December 31, 2001, to the extent it required PPLM to raise the level of Flathead Lake to 2893 feet. *See PPL Montana, LLC, et al.*, 95 FERC ¶ 61,363 (2001).

2.4 The Commission's February 1, 2002 Order

Some uncertainty now exists concerning the respective responsibilities of PPLM and the Tribes in implementing the requirements of the current project license. Earlier, however, the Tribes had initiated development of the DMP under Article 60. Furthermore, the Tribes sought several extensions of the original 1998 deadline for completion of the DMP. Most recently, the Tribes sought an extension until December 31, 2002. PPLM opposed the Tribes' request due to the potential that the parties may have to again resolve project operation issues without a DMP in place should the drought extend into the spring and summer of 2002.

On October 18, 2001, through an order issued on delegated authority, the Commission granted an extension of time until December 31, 2002 as requested by the Tribes.[28] In addition, the order granting the extension stated that, based on the Commission's interpretation of the Tribes' status as a co-licensee in its prior orders, "while the Tribes may take on the responsibility of preparing [the DMP], the responsibility for ensuring that [it is] filed rests with PPLM."[29] Thus, the October 18th Order placed responsibility for filing the DMP on PPLM.

PPLM sought rehearing of the October 18th Order to the extent it placed sole responsibility for completing the DMP upon PPLM, as well as to the granting of the extension itself. In particular, PPLM renewed its assertions that an effective DMP must be in place prior to the spring and summer of 2002 in order to deal with potential drought conditions effectively. On rehearing, the Commission denied the Tribes' request for the extension, but reiterated that PPLM "has the sole responsibility for filing the drought management plan."[30] The Commission stated:

> [t]he Division Director's order should not have granted the Tribes' request for an extension to file the plans. Since PPL Montana has the sole rights and obligations of the license during the present portion of the license term, it is the proper entity to request an extension for filing plans under license articles. . . . PPL Montana has not only the responsibility for the drought management plan but also the authority to develop the plan itself; the Tribes, conversely, have no such authority under the license and may prepare the plan only to the extent permitted by PPL Montana.[31]

The Commission directed PPLM to file a DMP or a request for an extension to file one within 30 days.

Putting aside the question of licensee responsibility raised by the Commission's recent orders for this project, the DMP detailed below is being submitted in satisfaction of the Commission's February 1, 2002 Order. In contrast to the events of last summer, the DMP

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28 *PPL Montana, LLC, et al.*, 97 FERC ¶ 62,050 (2001).

29 *Id.* at 64,074.

30 98 FERC ¶ 61,098, *slip op.* at 4.

31 *Id.*

outlined in the next section provides a means for, and procedures by which, drought issues will be resolved proactively, within an appropriate timeframe, and with the input of all interested stakeholders.

3. DROUGHT MANAGEMENT PLAN

3.1 DMP Development Process

By definition, any drought management plan has to deal with the effects of a water shortage. The existence of a shortage means that entities or individuals who under normal water conditions are able to enjoy or have water for particular uses, have to do with less when nature does not provide the water. Doing with less causes hardship. That hardship can take the form of biological effects, such as diminished growth or increased mortality for life forms that depend on the water, or economic effects, such as diminished revenues for businesses or diminished enjoyment for individuals who depend on being able to use water for recreational use. Thus, drought management is inherently about managing scarcity and about making choices in which people, environmental resources, and/or businesses will be affected. With the Kerr Project, it is also about inherent conflicts of interest because any allocation of water to remain in Flathead Lake represents a diminution of the amount of water available to be passed downstream. Thus, the issue is one of finding the appropriate balance of competing interests so that the hardships of drought do not fall disproportionately on any one interest or resource.

In response to the 2001 drought, PPLM and the Tribes developed a coordination process with the Commission, Reclamation, the U.S. Army Corps of Engineers, the National Marine Fisheries Service ("NMFS"), the U.S. Fish and Wildlife Service, Montana Department of Fish, Wildlife, and Parks and the U.S. Congressional delegation from Montana. This informal coordination process has consisted of conference calls held on a monthly basis shortly after the Natural Resource Conservation Service ("NRCS") and the River Forecast Center ("RFC") issues "early bird" and formal monthly basin runoff volume forecasts. PPLM then projected operations for the upcoming month using the forecasts. Thereafter, discussions were held on the conference call to take feedback from the above-identified consulting parties. Finally, decisions on operations were issued to the public in the form of a press release. This Drought Management Plan seeks to formalize and add structure to this process.

Article 60 of the project license requires the licensees to develop a DMP in consultation with the Corps, Reclamation, the Bureau of Indian Affairs and the Montana Department of Environmental Quality. Prior to the issuance of the February 1st Order, the Tribes had undertaken responsibility for the development of the DMP but the February 1st Order held that PPLM, as the sole current licensee of the project bears the responsibility to prepare and submit the DMP. The February 1st Order requires PPLM to submit a DMP or seek an extension of time to do so within thirty days of the date of the order.

Due to the short period of time in which the parties have had to formalize the proposed approach, consultation with these agencies on the DMP set forth herein has not been achieved. Accordingly, although this DMP is being submitted according to the timing dictated by the

February 1st Order, PPLM hereby proposes a formal consultation process as part of the implementation of the DMP. In promoting public awareness of the DMP, PPLM has made arrangements to hold a public forum (details discussed herein at section 3.2.5) and will provide public notice in local news media of this informational opportunity. Additionally, to assure adequate opportunity for public participation in developing the DMP, PPLM respectfully requests that Interior and/or the Commission to set a formal public comment period for public response to this DMP proposal for thirty days after conclusion of the public forum. A formal ruling from Interior with respect to the DMP here proposed is respectfully requested, if possible by May 15, 2002.

3.2 Drought Management Planning

3.2.1 Drought Management Plan Goals

The Drought Management Plan, at the least, will accomplish the following goals:

- Provide for the development of an annual process through which water conditions will be evaluated, an annual plan will be prepared and updated at monthly intervals.
- Provide for a process by which, in low water years, forecasts will be converted into a protocol for operation of the Kerr project during critical periods.
- Provide for input by all interested stakeholders and consideration of the information submitted.
- Provide for communication of water shortage information to all interests.
- Provide for a drought response plan that is fair to all interests at stake.

3.2.2 Drought Management Principles

The development of a drought management plan requires decisions to be made with respect to the apportionment of water – a finite resource – when supply is insufficient to meet demands. There are difficult choices implicated in all decisions as to how to apportion the use of water in a drought. With respect to the Kerr project, lower lake levels affect the ability to utilize docks, channels and slips, for instance,[32] and thereby may affect the availability of recreational opportunities, which, in turn may affect commercial revenues in the summer season, recognizing that the resource, with the presence of the project, has extended full lake levels, creating those opportunities. The lack of water may also have certain effects upon aquatic life and wildlife that depends upon the aquatic resources and may affect lower river spawning areas. The lake and river were in existence prior to the construction of the project and would have experienced

[32] In the winter, however, lower lake levels are desirable because they prevent freeze damage to dock structures. In addition, as amended, the MOU recognizes that lower lake levels also serve to prevent inundation of land at the upper end of the lake by flooding.

natural hydrologic cycles of high and low water years. Thus, in drought situations, natural impacts to the resource were experienced. Therefore, the natural resource should not be impacted more than it would have been if the project had not been constructed.

Moreover, lower water levels obviously reduce the amount of water available for hydroelectric generation. Lower generation may lead to generation-load imbalances and this may have affects on transmission line load which may, in turn, affect the regional power grid. Thus, there are no easy answers with respect to drought management and the best use of water when less is available to an area that depends on the water to support a number of legitimate activities.

3.2.3 Drought Response Framework

The DMP will consist of a tiered response process consisting of specific changes to the operation of the Kerr project over an annual period that are designed to allow the project to operate effectively under lower water conditions and a framework by which water conditions will be reevaluated on a monthly basis based on updated forecasts provided by the NRCS and the RFC. Specifically, the DMP would respond to drought conditions, as they may occur in certain years, by implementing the following changes in order of magnitude of the drought: (1) set a higher end-of-December lake elevation; (2) operate the project under a modified annual operating curve that is updated monthly; (3) revise the target lake elevation for the recreation season; and (4) modify Article 56 release requirements or increase upstream outflows from the Hungry Horse project.

- **A Proposed Higher End-of-December Lake Elevation**

The protocol by which water resources would be apportioned requires that affected parties agree to a point in time when to initiate decision making and the volume of water that should be retained in the reservoir prior to initiation of the decision making process. The most appropriate point in time to initiate an evaluation of water conditions is approximately January 1st of each year, which will allow for adequate consideration of forecasts and a timely response as necessary. On or about January 1st of each year, interested stakeholders will have the first information available that may suggest that it is possible that a low water year may occur.

It is submitted that the DMP should target a level of lake elevation at the end of each year at or about 2888.0 feet. However, such an alternative approach whereby the project would retain more water in the reservoir is not without risk. Based on a higher operating level and the associated issues of shoreline interests experienced during the winter of 2001 - 2002, the DMP proposes that drafting the lake to an elevation at or about 2888.0 feet by the end of the year drops the water level low enough for shoreline protection during the winter months. Setting the lake at an elevation at or about 2888.0 feet provides sufficient storage capacity to absorb large runoff volumes to protect against flooding on the river both above and below Flathead Lake. Drafting to an elevation at or about 2888.0 feet utilizes water more efficiently and economically in the fall rather than spilling it and adding to potential flooding in the spring. Historically, runoff volumes show that in only one out of ten years would other DMP measures have to be used if the end of the year elevation is at or about 2888.0 feet.

- **Prepare and Operate Project Under Agreed-Upon Operating Curves**

Beginning each first of January through June, PPLM and the Tribes will develop a minimum required volume runoff curve that would be needed to satisfy all license requirements and would serve as a baseline. If the January volume runoff forecast, or subsequent monthly forecasts, are below the minimum required then the project is declared to be in a drought and all other provisions of the DMP are activated.

Following the publication of the final January runoff forecast issued by the NRCS and RFC,[33] PPLM, in consultation with the Tribes and with input from the Corps, Interior and Reclamation, will evaluate current and forecasted water conditions and prepare an annual operating curve for Flathead Lake.[34] This process will allow for the development of target elevations for the lake given current and forecasted water conditions, which shall then be made available to interested parties. Based on subsequent forecasts, PPLM, as the project operator, in consultation with the Tribes and with input from the Corps and Reclamation, will continuously reevaluate current and projected water conditions and will revise the annual operating curve for the project as appropriate. PPLM will make the results of these updates available to interested parties. The decision to operate the lake pursuant to operating curves derived from consultation may have certain consequences with respect to the way the project is operated in certain months. These operating curves may affect the manner in which the project uses water to generate electricity, among other consequences.

This process will allow for input from government agencies, presentation of the present operating curve and baseline conditions to the public in order to keep them apprised of water conditions and it will allow consulting entities to jointly review updated climatologic data and develop an appropriate progressive operating curve and adjustments thereto based on an interpretation of the data. To assist in this process, PPLM as the operator and in consultation with the Tribes will issue an annual projection for a twelve-month period on or about January 1st of each year. Thereafter, monthly updates to the annual projection will be issued.

- **Revision to Target Lake Elevation for June 15th to September Period**

If the modified project operations discussed above are inadequate to resolve a drought situation in a given year, PPLM proposes to reduce the target elevation of Flathead Lake from 2893.0 feet as of June 15th to 2892.0 feet. Based on a review of historical data, drought

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33 These forecasts are publicly available at the following websites: http://www.mt.nrcs.usda.gov/swcs/forecast/bor.html or http://www.nwrfc.noaa.gov/cgiin/r_fcst_d?prod=ESPPDR&desc=Northwest_Season.

34 PPLM and the Tribes have committed to share information and to strive to reach agreement as to forecasted data in deriving updated operating curves. However, in the event that the Tribes and PPLM are unable to agree, as project operator and licensee under the current licensee, and consistent with the recent Commission ruling, PPLM bears sole responsibility for preparing updated operating curves until there is a change with respect to PPLM's obligations under the license.

conditions requiring a revised target elevation have occurred in only one out of every eighteen years.

To accomplish this proposed modification, PPLM would need to vary project operation from that indicated in the MOU, which sets 2893.0, conditions permitting, as the target elevation. PPLM believes that in low water situations such a variance from the target elevation is reasonably appropriate and consistent with the MOU and Article 60, as discussed above. The MOU was developed in order to set forth principles and procedures for regulation of Flathead Lake "in the interest of flood control."[35] To the extent that PPLM determines that it is not possible to reach the 2893.0 target elevation based on such forecasts, such determination would be based on the lack of available water—the opposite situation from that contemplated in the MOU.[36] Moreover, by making a decision not to raise the lake to the target elevation of 2893.0 feet as early as possible, PPLM would be able to provide those interested in lake level with advance notice that the lake would not be refilled to full pool. This advance notice would allow those affected by lake levels to plan appropriately. Accordingly, it is appropriate under drought conditions to modify the target lake elevation from 2893.0 feet to 2892.0 feet. If the Corps determines that it is appropriate to modify the MOU to reflect a 2892.0 feet elevation under drought conditions, PPLM is willing to make such a revision.

- **Modification of Article 56 or Stream Flows From Upstream Hungry Horse Project**

As a third measure, to the extent that the preceding measures are not adequate to provide sufficient water to meet the revised target elevation and the minimum instream flow requirements of Article 56 of the license, PPLM hereby seeks Interior's approval to take additional measures and seek additional inflows to resolve the situation without causing additional reduction in lake levels. Given the proposed measures discussed above, under drought situations that initial actions do not fully resolve, this aspect of the DMP would be implemented.

Under these extreme conditions the only remaining options that would adequately balance the interests of Flathead River and Flathead Lake and maintain a balance of inflows and outflows to prevent additional reduction in the level of Flathead Lake are to modify operating conditions set forth in license Article 56 and/or Article 57 or to increase outflows from the Hungry Horse project. The DMP requires Interior's approval of a protocol that revises minimum flow releases, ramp rates, between day flow changes or requires additional water to be released from Reclamation's Hungry Horse project in order to balance and/or supplement inflows and thereby maintain lake levels at approximately the 2892 foot level.

From an ecological standpoint, Lower Flathead River instream flow and wetted usable area data (CSKT 1990) indicate that if minimum flows from the Kerr project are maintained at

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35 *Montana Power Co.*, 35 FPC 250 (1966).

36 Of course, flooding can also be a function of timing of water availability rather than total amount (*e.g.*, in the event of an abnormally warm spring causing early, concentrated snow melt). Thus, PPLM as the project operator will still have to consult with the Corps as to this issue.

approximately 6,000-8,000 cfs from mid-April through mid-July that detrimental impacts to native westslope cutthroat and bull trout spawning and aquatic river habitat during infrequent drought years would be minimal. Periodic flows in the lower river between 6,000-8,000 cfs may actually benefit native fishes by reducing northern pike predation and spawning success in side channel habitats in the lower river which require spring flows near 12,700 cfs. However, present Interior 4(e) flows should be maintained in normal or above average flow years to benefit the ecology of the lower river, notwithstanding the contrary nature of managing the lower river for both northern pike and native fish recovery.

Accordingly, the DMP seeks Interior's concurrence that in drought conditions, these measures will be a part of the DMP when it appears that the lake would otherwise be drawn down below 2892.0 feet. Specifically, if inflows into Flathead Lake are between 8,000 cfs and 12,000 cfs, the minimum release requirements of Article 56 shall be relaxed to the extent that PPLM shall balance inflows into and outflows from Flathead Lake. This will permit Interior through supervision of Hungry Horse releases to have some discretion to supplement releases to maintain instream flows into the Flathead River.

In its approval of this DMP, Interior is respectfully requested to approve the above-described protocol for modification of the 4(e) conditions and/or modify Hungry Horse releases under severe conditions when other means of resolving the situation have not been adequate.

3.2.4 Drought Response Timeline

January 1st (on or about)	Initial drought monitoring will commence by establishing a minimum volume runoff curve for Flathead Lake elevation.
January 1st (on or about)	Annual operational plan provided to Interior pursuant Article 62 of the license, as revised, incorporating the first formal forecast in January for the April-July runoff volume.
January - June	Monthly updates to annual forecast, consultation with all affected agencies and proposed revisions to operating protocol as necessary.
July - September	Continued monthly consultation with affected entities, including consultation with the U.S. Fish and Wildlife Service, NMFS and Reclamation regarding Columbia River Operations and downstream Endangered Species Act issues for supplemental DMP support from the Hungry Horse project. Monthly updates to annual forecasts continue.
October - December	Monthly updates to forecasts, consultation with all affected agencies and proposed revisions to operating protocol as necessary.

3.2.5 Public Notice and Comment

As noted above, the DMP provides for and suggests a number of avenues for public participation. First, PPLM respectfully requests that, in order to provide for public comment on this DMP proposal, Interior and/or the Commission set a formal public comment period for a period of 30 days concluding April 18, 2002. Second, PPLM has scheduled a public forum in order to distribute information regarding this DMP proposal. The public forum will be held in the week of March 18, 2002, in Kalispell, Montana. PPLM will provide public notice in local news media of this opportunity for discussion. Finally, throughout the relevant time periods, the revised annual operating curves prepared as part of the DMP will be made publicly available in a timely manner.