Mystic Lake Hydroelectric Project
FERC Project No. 2301

Draft
Biological Assessment of Federally Listed Species
Volume IV - Public

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June 1, 2006

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Section 1 - Introduction

The biological assessment provides written documentation of the review process and the analysis of effects on threatened, endangered, proposed, and candidate species for the proposed re-licensing of Mystic Lake Hydroelectric Project FERC No. 2301.

1.1 Project and Evaluation Area

The Mystic Lake Hydroelectric Project No. 2301 (hereafter referred to as the Project) is situated in south-central Montana, primarily located in Stillwater County with a very small portion within Carbon County. Stillwater County is primarily rural or undeveloped with about 8,000 residents and low population density of 4.6 persons per square mile. The Project area is approximately 17 miles north of the Wyoming-Montana State line and about 40 miles southwest of Columbus, Montana. The nearest metropolitan area is Billings, Montana, approximately 70 miles to the northeast, with a population of about 90,000 people.

Mystic Lake is located in the Beartooth Mountain Range and surrounded on three sides by the Absaroka-Beartooth Wilderness. Mystic Lake is located at the head of a high mountain canyon at an elevation of 7,673.5 feet (ft) above mean sea level (amsl) in the upper reaches of West Rosebud Creek (Figure 1.1-1). Within West Rosebud Creek drainage (213.4 square miles), Mystic Lake is the fourth and largest lake in a chain of six hydraulically connected lakes (listed in order going downstream: Star, Silver, Island, Mystic, West Rosebud, and Emerald lakes). There are a total of 84 lakes within the West Rosebud Creek drainage, 14 of which are outside the designated Wilderness Area (Marcuson and Poore 1991). Six tributaries drain into Mystic Lake: West Rosebud, Fish, Huckleberry, and three unnamed creeks arbitrarily assigned identification numbers 7, 8, and 10 (Schollenberger 1984). The Beartooth Ranger District of the Custer National Forest manages approximately 124.7 square miles of the West Rosebud Creek drainage while the remaining 88.7 square miles is privately-owned land.

The Project area encompasses those waters and surrounding land within the West Rosebud Creek drainage, extending from the confluence with Fiddler Creek upstream to Island Lake, which could potentially be directly or indirectly affected by the Project. The waterways include Mystic Lake (Figure 1.1-1), approximately 22 miles of West Rosebud Creek from the outlet of Mystic Lake downstream to the confluence with Fiddler Creek, as well as two lakes within the 22-mile reach, West Rosebud Lake and Emerald Lake. However, neither Emerald Lake nor West Rosebud Creek downstream of West Rosebud Lake are located within the FERC Project boundary.

The FERC Project boundary (also referred to as Project boundary) is more limited than the Project area (Figure 1.1-1). The present FERC Project boundary is narrowly defined to include Mystic Lake and dam, the flow line, the penstock, the distribution lines from Mystic Lake Dam downstream to the powerhouse, the powerhouse and associated camp buildings for operations and maintenance, West Rosebud Lake and Re-regulation Dam, and two transmission lines (A-line and B-line) starting at the powerhouse extending 5.3-miles downstream to NorthWestern Energy's Line Creek Substation. Emerald Lake is not within the FERC Project boundary. The boundary at Mystic Lake is defined by the high water mark or elevation 7,673.5 ft amsl. The boundary at West Rosebud Lake is defined at 6,399.9 ft amsl. The total land acreage within the FERC Project boundary is 611.06 acres.

The evaluation area expands beyond the Project area and FERC Project boundary. The evaluation area varies depending on the species and its habitat and life history requirements. This assessment evaluates each species habitat requirements and the potential affects of the Project within the immediate area (Project area) and beyond as appropriate.

1.2 Proposed Action

Currently, PPL Montana is in the process of three operation and maintenance enhancement projects that include the following: 1) install a fish valve to protect resources in the bypass reach (a 30% design of the fish valve was filed with FERC on April 1, 2006), 2) modify transmission lines to meet raptor safety standards as line repairs are made, and 3) automate flow data collection and install a real-time USGS approved gage station just downstream of West Rosebud Lake. These projects will not materially alter or modify the impacts of the current facilities, daily operations, or maintenance activities but will improve efficiency of data collection and operations, and meet current standards for raptor safety.

PPL Montana proposes no change to the present operation of Mystic Lake, West Rosebud Lake, or West Rosebud Creek below the Re-regulation Dam described in the existing Mystic Project License. However, PPL Montana has agreed to work with agencies (MFWP, MDEQ, USFS) and American Whitewater over the next three years to develop a Whitewater Flow Plan for West Rosebud Creek below the Re-regulation Dam to file with the Commission by December 15, 2009. This plan may propose planned summer whitewater boating flows, conditions permitting and pending agency and Commission approval.

Other than proposed fish valve (flow restoration) modifications, PPL Montana does not anticipate any significant rehabilitation of this Project during the term of the new License. Replacement of equipment will be on an as-needed basis determined by mechanical condition, safety issues, efficiency, or improvements to the operational control of the current facility. In addition, PPL Montana does not anticipate any operational changes at the Mystic Project. The Project will be run as both a baseload and a peaking facility depending on electrical demands and water availability.

PPL Montana is not proposing to add generation capacity or to implement any significant modifications to the operational regime or Project structures (other than the new fish valve) under the new License. Thus, the footprint on the landscape and Project impacts will essentially remain as they currently exist.

1.2.1 Project Facilities

Prior to 1926, Mystic Lake was a natural body of water occupying 342.5 surface acres (138.7 ha). In 1926, Montana Power Company (MPC) built a dam, adding approximately 104.2 surface acres (42.2 ha) (Schollenberger 1984). Today, at the full pool elevation of 7,673.5 ft amsl, Mystic Lake occupies 446.7 acres (181 ha) with a maximum depth of 205 ft (Marcuson and Poore 1991). At low pool, elevation 7,612 ft amsl, the lake occupies approximately one-third fewer acres (Marcuson and Poore 1991). The useable storage at Mystic Lake is 20,800 acre-ft (MPC 1968). This is the volume of water between full pool elevation and low pool elevation, a 61.5 ft elevation difference. The total estimated cumulative volume of the lake varies due to some discrepancies in the various data sets used to generate the estimate, but the current estimate is approximately 47,000 acre-ft at full pool. Residence times also vary due to fluctuations in pool elevation, inflows and outflows.

Plant generation is 12.5 MW (nameplate rating). However, the nominal maximum generation is 10.5 MW due to friction losses in the water conveyance system. The Project consists of the following facilities: an arch-type dam (Mystic Lake Dam), an earthfill dike, a concrete intake structure, a flow line, a penstock, a surge tower, a tram and railroad, a housing compound, a powerhouse, distribution and transmission lines, and the Re-regulation Dam. Two of these components, the arch dam and earthfill dike, raise the elevation of the natural Mystic Lake by about 50 ft. The Re-regulation Dam is located one and one-half miles downstream from the powerhouse on West Rosebud Lake and re-regulates (attenuates) varying flows from the powerhouse during peaking operations.

1.2.1.1 Earthfill Dike

A concrete core earth dike 145 ft long and 15 ft high blocks the natural outlet to Mystic Lake. The concrete core wall is un-reinforced. It is 2 ft wide at the top and increases uniformly to 5 ft wide at the base. The foundation for the wall was constructed into the bedrock by excavating a cutoff trench between 2 and 4 ft deep.

The upstream slope of the earthfill dike is 3 ft horizontal to 1 ft vertical, and the downstream slope is 2 ft horizontal to 1 ft vertical. A layer of clay was placed over part of the bedrock upstream of the core wall. Finer material was placed adjacent to the core wall, and coarser sand and gravel towards the surface of both the upstream and downstream shells. A one-foot thick layer of riprap protects the upstream slope, and a 6-inch thick layer of reinforced concrete protects the downstream slope. The top of the concrete core wall is at elevation 7,675.0 ft amsl, and a 12-inch high timber board is installed along the crest to prevent

overtopping the dike. The timber raises the effective crest of the earthfill dam to elevation 7,676.0 ft amsl.

1.2.1.2 Arch Dam

At the new outlet to Mystic Lake is a concrete arch-type dam 368 ft long and 45 ft high with a spillway 300.5 ft long. The bedrock at the site was excavated in a trench to a suitable foundation. The dam thickness varies from 5 ft just below the crest to 10.5 ft at the base, and the radius of curvature varies between 180 ft and 147 ft.

The arch terminates in concrete gravity sections. The right abutment (facing upstream), constructed against the rock wall of the valley, is 5 ft long and 3 ft wide at the top, with a top elevation of 7,674.0 ft amsl. The left abutment is 60 ft long, 3 ft wide at the top, and 12 ft 10 inches high, with a batter of ½:1 on the downstream side. The top has an elevation of 7,674.0 ft amsl. A considerable amount of excavation spoil has been dumped against the right, downstream face of the arch dam. In 1990, the left abutment was reinforced with ten anchor bars.

The overflow crest of the arch dam is at elevation 7,670.0 ft amsl, but the pond elevation is raised by flashboards that provide flow control to the normal maximum operating level of 7,673.5 ft amsl. The flashboard configuration consists of 3 timbers each 12 inches high and 1 timber 6 inches high. There are 50 flashboard bays supporting the flashboards in 4-inch by 4-inch steel I-beams at 6.0-foot centers along the crest. A walkway extends approximately 260 ft from the left abutment, along the crest above the flashboards, and is used for access to install and remove the boards.

The dam is equipped with a low level outworks that consists of a 10-inch valve that can be opened to drain water from a depression between the original lakebed and the dam. The low-level outlet works provides a mechanism to drain the pool that collects behind the dam that cannot be drained via the main intake structure.

1.2.1.3 Concrete Intake Structure

Water is diverted from the lake through a 33-foot long by 7-foot high by 9-foot wide reinforced concrete culvert into an intake structure located behind a rock ridge at the left abutment of the earthfill dike. The centerline of the intake entrance is about 60 ft below the full pond surface of the lake and is equipped with trashracks and an 8-foot by 8-foot 8-inch motor operated slide gate. The gate can be operated either manually or electrically from the gatehouse or remotely from the powerhouse below. It closes automatically upon loss of downstream pressure. Full closure requires approximately eight minutes.

1.2.1.4 Flow Line

Upon passing through the intake structure, water enters a 1,005-foot long tunnel driven through quartzite rock. The tunnel terminates on the right side of the canyon (facing upstream) at a concrete portal valve house that joins it to a 57-inch diameter steel pipeline. At the portal valve house, an 18-inch valve and an 8-inch minimum release valve tap off the flow line. The minimum release valve (fish valve) is used to ensure minimum flows are maintained in the bypass reach upstream of the powerhouse.

The flow line is supported on steel saddles placed on concrete footings and connected with dresser type couplings. An inverted siphon near the middle of the flow line detours around an unstable area of the hillside, which resulted from rock fall and subsequent washout of the flow line bench in 1978. The inverted siphon system, used to bypass flow around the slide area, was installed in 1983. The original wood stave section of the flow line between the inverted siphon and the surge tank was replaced with a 5-foot diameter steel flow line in 1988. The remaining section of wood stave flow line between the rock tunnel and the inverted siphon was also replaced with a 5-foot diameter steel line in 1990. The flow line carries the water 9,012 ft around the mountainside to a point above the powerhouse where it terminates at a surge tank.

Currently, the Project has no mechanism in place to restore flow into the bypass reach if the flow line is accidentally breached under conditions where the lake elevation is less than 7,670 ft amsl. There exists a small low-level outlet works structure (fish valve) that allows small amounts (about 8-10 cfs) of water to be manually released from within the forebay. When the lake level is below about 7,650 ft amsl, the fish valve is also unavailable to augment flows in the bypass reach if flows through the flow line must be stopped completely. PPL Montana filed a 30% fish valve design (developed by GEI Consultants, Inc.) with FERC on April 1, 2006. The design incorporates a mechanism at the fish valve that would allow timely restoration of flows to the bypass reach in the event a penstock breach or some other emergency requires flows through the flow line to be halted for extended periods.

1.2.1.5 Surge Tank

The Johnson surge tank is 12 ft in diameter and 118.5 ft high. The flow line enters the surge tank at elevation 7,569 ft amsl near the base of the tank. The surge tank is equipped with a butterfly valve at the outlet that feeds a single, Kellogg butt-welded steel pressure pipe (penstock). The water in the flow line and surge tank can be maintained when de-watering the penstock by closing the butterfly valve. The valve can be operated locally or remotely from the powerhouse. It also has the ability to close automatically upon loss of downstream pressure in two minutes.

1.2.1.6 Penstock

From the surge tank, the flow drops to the powerhouse through a single penstock varying in diameter from 48 inches to 42 inches over 2,566 ft of its length. Then, approximately 123 ft upstream of the turbines the penstock bifurcates into two 28-inch diameter branches that supply each individual turbine. The wall thickness of the penstock(s) varies from one-half inch at the top to one and one-quarter at the bottom where the pressure guarantee is 650 pounds.

1.2.1.7 Powerhouse

The powerhouse is situated at elevation 6,550 ft amsl on the right bank (facing upstream) of West Rosebud Creek. It is a reinforced concrete structure 60 ft wide, 85 ft long, and 56 ft high. The building is constructed on three levels: a foundation level containing the turbine nozzles and turbine pit, a generator level (main floor), and an electrical equipment floor.

The powerhouse contains two Pelton waterwheel turbines each nameplate rated at 7,500 hp at 300 rpm under a net effective head of 1,050 ft. The elevation of the centerline of the water wheel jet is 6,545 ft amsl. The water wheels are mounted directly on a flange end of the generator shaft. There are two Westinghouse generators, each with an original nameplate rating of 6,250 kVA at 0.8 power factor, 3 phase, 60 cycle, 300 rpm, and 6,600 volts. In 1979-1980 the generators were rewound to 7,500 kVA.

Each generator has a direct connected exciter rated 50 kW, 125 volts. Each exciter will carry two generators. A spare motor-driven exciter rated at 50 kW and 125 volts is also located on the main floor of the powerhouse.

The operating room is located in the center portion of the building on the main floor. The 6,600 volts station bus is situated to the back of the operating room. Near each end of the building on the main floor is a Pauwels 12.5 kVA transformer to step up the generation voltage to 55,000 volts. Additionally, a 40-ton capacity traveling crane serves the powerhouse.

The second floor of the powerhouse is constructed over the portion occupied by the transformers, and other similar equipment on the main floor. The entire high-tension switches; control bus and equipment are located on this second floor indoors. This floor is 22 ft wide and runs the length of the building. The two end spaces are occupied by high-tension oil circuit breakers on the two outgoing transmission lines.

The nameplate rating for plant generation is 12.5 MW at a gross head of 1,128.5 ft with a total discharge of 169 cubic feet per second (cfs). The nominal maximum generation is 10.5 MW with a discharge of 152 cfs.

1.2.1.8 Tailrace

Flow through the water wheels is discharged through two 6 ft by 7 ft concrete tunnels that extend from the powerhouse to West Rosebud Creek. Tunnel No. 1 is 32 ft long and No. 2 is 68 ft long.

1.2.1.9 Re-regulation Dam

In 1978, a small Re-regulation Dam (hereafter referred to as the Re-regulation Dam) was constructed near the outlet of West Rosebud Lake, on the West Rosebud Creek about 1.5 miles downstream of the powerhouse. The dam is an earthfill embankment approximately 18 ft high and 420 ft long at the crest. The center portion of the dam has a concrete spillway structure that includes a 4 ft wide outlet valve chamber and a 36 ft wide flashboard section.

The dam impounds between 320 and 410 acre-ft of water between elevations 6,394 and 6,396 ft amsl. The FERC Project boundary is at 6,399.9 ft amsl. By raising and lowering the level of West Rosebud Lake, this structure re-regulates (attenuates) occasional peaking flow releases (169 cfs maximum) through Mystic Lake powerhouse (used for daily peaking) to around a 71.5 cfs average daily outflow from West Rosebud Lake.

PPL Montana is in the process of establishing a new USGS certified flow gage below the Re-regulation Dam with real-time flow data available through the USGS website for use by PPL Montana, resource agencies and the general public.

1.2.1.10 Dam Access

Tram: Due to the inaccessible terrain occupied by this development, an electric hoist-powered tram is constructed along the steel penstock. This tram provides motorized access by PPL Montana personnel to the steel pipeline from the powerhouse. The tram consists of a rail-mounted car hauled by a cable and hoist located in a motor house at the top of the penstock on a bench adjacent to the surge tank. The tram is not available for public use.

Railroad: Access for PPL Montana personnel between the dam and the penstock is provided by two locomotives running on a narrow gage railroad track constructed parallel to the flow line.

PPL Montana's Trail to Surge Tower: There is a trail on the same side of the canyon as the tram and flow line that is available and used by PPL Montana personnel to reach the flow line and Mystic Lake Dam if the tram is not operational. This trail is not regularly used by the public and is maintained by PPL Montana.

Mystic Lake Trail: A third option allowing public access to Mystic Lake Dam is a footpath three miles long rising 1,100 ft from the powerhouse to the dam running up the side of the

canyon opposite the flow line. This trail is not used as the primary access route to Mystic Lake Dam by PPL Montana personnel.

1.2.1.11 Camp

Due to the remote location of this generating facility, housing is provided for operations and maintenance employees. This "camp" includes four houses of 1920s vintage that have been remodeled on an as-needed basis. This area is referred to as the *PPL Montana Camp* throughout this document.

1.2.1.12 Distribution Lines

There are two distribution lines included with the Project; one provides power to the dam area and the other provides power to the surge tower area. The distribution line from the powerhouse to the dam is 9,363 ft long, single-phase, 4,160 volts of fiberglass pole side pin construction. The distribution line from the powerhouse to the surge tower is 2,068 ft long, three-phase, 4,160 volts of fiberglass pole side pin construction.

1.2.1.13 Primary Transmission Lines

The Project is connected to the NorthWestern Energy's Line Creek switchyard (transmission grid) by two 50 kV lines each of which are approximately 5.3 miles (27,984 ft) long. The north line is referenced as the "A" line or the Mystic-Columbus Line and consists of 107 poles. The south line is referenced as the "B" line or the Mystic-Red Lodge line and consists of 112 poles. The right-of-way for the A-line and the B-line is 25 ft each side of the center line. The Federal Lands (USFS) associated with the power line right-of-ways totals 31.45 acres. The permit for the power line right-of-ways was issued to PPL Montana on August 9, 2001.

1.2.1.14 Plant Hydraulic Capacity and Generation

The maximum (summer) dependable capacity of the Mystic Lake plant is about 10.5 MW at a flow of around 152 cfs. Average annual generation is 56,770,010 kWh. The monthly average generation is 4,730,833 kWh.

1.2.2 Project Operations

The Mystic Lake annual operation stores water during runoff, maintains a summer pool for recreation, fisheries habitat, and aesthetics, and then draws the lake level down about 61.5 ft (18.8 m) through the winter to provide winter storage power and minimum flow benefits. Mystic Lake draft rates are planned to maintain lake elevation and meet downstream flow license requirements.

In addition, the Project may provide hourly peaking or load following where the Project maximizes or minimizes generation during a 24-hour period. Load following operations may

occur whenever economically beneficial or when load is required to enhance electric system stability or reliability. The elevation of West Rosebud Lake fluctuates on average less than 2 ft, between 6,394 and 6,396 ft amsl, during peaking operations.

1.2.2.1 Existing License Requirements

The existing license requires Mystic Lake elevation to be maintained within 10 ft (3 m) of maximum pool elevation (7,673.5 ft amsl) from July 10 to September 15 of each year. The lake is generally filled by mid-July soon after spring runoff decreases and inflows drop below turbine capacity and the threat of flooding has passed. The lake is maintained near full pool for recreation, fisheries habitat, and aesthetics through the summer. The lake is then drafted through the fall and winter to provide generation, downstream minimum flows, and flood control storage for the following spring. Mystic Lake has approximately 21,000 acre-ft of usable storage in 61.5 ft of drawdown between full (7,673.5 ft) and minimum (7,612 ft amsl) pool elevation (Federal Power Commission 1975). Mystic Lake generally reaches its lowest elevation (7,612 ft amsl) by mid-March. Mystic Lake is also drafted below the natural lake outlet barrier, just upstream of the dam, before the winter-freeze to prevent excessive ice pressure on the dam structure.

Present license minimum bypass reach flow requirements at the upper weir just above the powerhouse are 10 cfs during June, July, and August and 3 cfs during the rest of the year (September through May). These minimum flows protect fisheries and aquatic resources between Mystic Lake and the powerhouse. When Mystic Lake Dam is spilling less than 10 cfs into the bypass reach, the outlet valve (fish valve or bypass valve) can be used to provide up to an additional 10 cfs to meet the minimum 10 cfs flow requirement.

License required minimum flow in West Rosebud Creek below the Re-regulation Dam is 20 cfs, or lower when natural inflow conditions are less than 20 cfs.

1.2.2.2 Project Generation and Outflow Records

For the 24-year period of record where detailed generation and outflow records were available and analyzed, the following summary results were obtained. The facility generates its maximum output in July and minimum in April. These values closely correspond to available flow. On average, including outages, the facility generated about 1,611 kWh for each second foot day (1 sfd = 1 cfs for 24 hours) of water that was put through the turbines. A summary of the Project generation vs. outflow is presented in Table 1.2-1 below.

Table 1.2-1. Table of monthly average daily generation vs. monthly average daily flow, 1979-2002.

Month	Average Daily Generation (kWh)	Average Daily Reported Water Use (cfs)	kWh/sfd
Jan	91,536	57	1,621
Feb	75,089	48	1,566
Mar	64,879	43	1,501
Apr	47,079	25	1,363
May	84,569	54	1,571
Jun	185,247	125	1,484
Jul	232,219	136	1,710
Aug	221,191	131	1,692
Sep	154,321	89	1,741
Oct	135,125	79	1,708
Nov	134,639	79	1,704
Dec	106,175	64	1,673

1.2.2.3 Fish Valve Contribution to Bypass Reach Flows

The upper weir (near the powerhouse) has traditionally been the location where bypass reach flows have been measured to maintain minimum flows for compliance purposes. The question has been raised as to whether or not the flows measured at the lowermost reach of the bypass reach are reflective of the actual flows at the upstream end of the bypass reach. PPL Montana was asked to determine the proportion of water released by the fish valve relative to the amount of water that is measured at the upper weir. The following text summarizes the data analysis from two summer seasons (2004-2005) and one winter season (December 2005-March 2006) in the bypass reach. The goal of this analysis was to differentiate between the flow emitted by the fish valve versus flow originating from other sources. The complete analysis was filed with FERC on April 3, 2006 (*Study No. 6 Hydrologic Characterization of the West Rosebud Creek Bypass Reach Between Mystic Lake Dam and the Powerhouse – 2006 April Final Report*) is available at the Mystic Lake website (mysticlakeproject.com).

Whenever the Project is spilling over the dam, there is no need to operate the fish valve since the flows throughout the entire bypass reach are well above the 10 cfs minimum required flow. Based on the analysis, it is evident that fish valve releases in summer months are sometimes low relative to flow from other sources such as leakage, tributary inflows (e.g. Maxi Creek), and other sources. This conclusion is based on the observation that changes in the fish valve position result in highly correlated changes in the observed flow at the upper weir. In many cases, the fish valve is closed for extended periods during summer months when no intentional spill is coming from the dam, but when the lake elevation is above crest. In this case, significant leakage from the dam flashboards could be responsible for the reduced need for additional fish valve release flows. The data clearly indicate that during the summer, significant portions of the required 10 cfs minimum flows are from origins other

than the fish valve. If bypass flows become low enough, as SCADA data has shown, operators will adjust the fish valve to compensate and increase flows to make certain that the 10 cfs minimum flow is sustained, but for most of the summer, the fish valve is often completely closed, and all bypass flow is provided by leakage, tributary inflows and sources other than the fish valve.

Flow data from the fish valve and the upper weir were gathered through the winter of 2005 and into the spring of 2006. Additional analyses were performed to gauge the proportion of fish valve flows to bypass flows under these low flow, low runoff, and low lake elevation conditions. Although the analysis for winter conditions was slightly complicated by icing events at the upper weir, which seriously impaired accurate measurement of the flow during several days over the winter, an evident change in stage corresponding to the two changes in fish valve position was observed in the data set. Less head at lower lake elevations result in a decreased amount of flow being released from the fish valve in comparison to the amount of flow that is released at comparable valve settings at higher pool elevations. However, releases from the fish valve were adequate, even at low pool, to maintain the 3 cfs minimum instream flow in the bypass during the winter of 2005 – 2006, as measured at the upper weir.

In summary, there are often water sources other than the fish valve that are providing flow to the bypass reach during the summer and winter months. However, when measured flows at the upper weir indicate minimum requirements are not being met, the fish valve can be opened to augment flows in the bypass reach to obtain minimum flows whether these flows are 10 cfs in the summer or 3 cfs the rest of the year. The main limitation to measuring flow accurately in the winter occurs when extreme cold air freezes the upper weir.

1.2.3 Proposed Project Operations and Maintenance Plan

1.2.3.1 Operations

As mentioned previously, PPL Montana proposes no change to the present operation of Mystic Lake, West Rosebud Lake, or West Rosebud Creek below the Re-regulation Dam described in the existing Mystic Project License. However, PPL Montana has agreed to work with agencies (MFWP, MDEQ, USFS) and American Whitewater over the next three years to develop a Whitewater Flow Plan for West Rosebud Creek below the Re-regulation Dam to file with the Commission by December 15, 2009. This plan may propose planned summer whitewater boating flows, conditions permitting and pending agency and Commission approval.

Operational Plan for the Bypass Reach

PPL Montana, USFS, MFWP and MDEQ have consulted on the appropriate instream flow for the bypass reach for the Project under the new License that reflects current operations. Based on agency consultation, assessment of bypass reach fisheries, and review of historic bypass reach minimum flow data (1992-2002), PPL Montana proposes:

- During summer months (June, July & August) PPL Montana will provide **10 cfs** minimum flow as measured at the upper weir.
- During fall, winter, and spring months (September through May) PPL Montana will provide **5 cfs** minimum flow with an option of providing up to 11 days (randomly selected) each month of **4 cfs** as measured at the upper weir.
- During the entire year, PPL Montana will ramp descending bypass reach flows below 10 cfs at 2 cfs per hour.

PPL Montana also proposes to include standard FERC exception language for flow conditions beyond the control of the Licensee.

PPL Montana will provide flow ramping rates from the Mystic fish valve at no more than 2 cfs per hour to the bypass reach during planned flow decreases (e.g. summer 10 cfs to winter minimum on August 31) or during other flow reductions when flow in the bypass reach is less than 10 cfs. There will be no ramp rate requirements for the bypass reach at flows above 10 cfs.

1.2.3.2 Maintenance

Other than proposed fish valve (flow restoration) modifications, PPL Montana does not anticipate any significant rehabilitation of this Project during the term of the new License. Replacement of equipment will be on an as-needed basis determined by mechanical condition, safety issues, efficiency, or improvements to the operational control of the current facility. In addition, PPL Montana does not anticipate any operational changes at the Mystic Project. The Project will be run as both a baseload and a peaking facility depending on electrical demands and water availability.

PPL Montana is not proposing to add generation capacity or to implement any significant modifications to the operational regime or Project structures (other than the new fish valve) under the new License. Thus, the footprint on the landscape and Project impacts will essentially remain as they currently exist.

1.2.4 Consultation Framework

Mystic Lake Project Technical Advisory Committees (TACs):

- Mystic Fisheries, Aquatic Habitats and Water Quality TAC (MFWP, USFS, MDEQ, and PPL Montana)
- Mystic Wildlife and Terrestrial Habitats TAC (USFS, MFWP, and PPL Montana)
- Mystic Recreation, Land-Use and Aesthetics TAC (MFWP, USFS, American Whitewater, and PPL Montana)
- Mystic Cultural Resources TAC (USFS, Montana SHPO, and PPL Montana)

For each TAC, PPL Montana will be responsible for managing PM&E funding, the FERC licensing process, and providing technical input related to the implementation of PM&E measures for fisheries, aquatic habitats and water quality, recreation, land-use and aesthetics, wildlife and terrestrial habitats and cultural resources for the Mystic Lake Project. PPL Montana will bear ultimate responsibility for ensuring that consultation and PM&E measures are implemented in a manner consistent with requirements of the Mystic Project License. In consultation with TAC members, PPL Montana will convene, facilitate and chair TAC meetings to fulfill consultation and implementation requirements of the License. The four TACs will meet on an as-needed basis to review and develop annual PM&E plans and coordinate the implementation of License PM&E measures. Although the four TACs will meet independently to address their respective PM&E measures, individual TACs may jointly meet with other TACs to more efficiently accomplish PM&E measures.

All TAC meetings will be open to the general public and non-governmental organizations (NGO's). Subcommittees and working groups may be organized as appropriate and may include staff of PPL Montana, TAC agencies, NGO's, outside consultants or others. Any such subcommittees or working groups will be advisory to their respective TACs. PPL Montana will seek to attain consensus among the members of each TAC in implementing PM&E and related license obligations. Multiple representatives of PPL Montana, TAC Agencies and the public may actively participate in TAC meetings. However, PPL Montana and each TAC agency and public will designate one person to officially represent their organization at each TAC meeting. All parties will be encouraged to commit to a good-faith effort to resolve any differences in a timely and cooperative manner.

1.2.5 Public/Recreational Use

Recreational use (vehicle and trail) on Forest Service lands encompassing the Project was monitored and quantified in 2005 between June and September. Vehicles were counted as they crossed the Forest boundary near Pine Grove Campground. During this study period, vehicles crossing the Forest boundary ranged from 263 to 704 per week with an average of 365. Trail counters were installed at four locations: 1) Mystic Lake Trail, 2) Phantom Creek, 3) Huckleberry Creek, and 4) Island Lake Trails. Phantom, Huckleberry, and Island Lake trails are all located above the Mystic Lake Trail. The majority of trail use occurred on the Mystic Lake Trail (72%). An estimated 3,600 people used the Mystic Lake Trail between July 2 and September 28. Approximately 60% of hikers only used the Mystic Lake Trail compared to the upper trails. While recreational use was relatively constant during the majority of the season, there was a notable spike during the 4th of July weekend and decline after Labor Day weekend. Recreational use in the winter is limited in the fall-spring (October-June) due to accessibility to the area and snow at the higher elevations. There will be minimal human impact during these months. The primary season for recreational activity in the Project area occurs between June and September. During this time period, there is potential for human-wildlife interactions or human disturbance that may displace or impact

wildlife species. These potential indirect or direct impacts are discussed separately for each of the following species: bald eagle, grizzly bear, gray wolf, and Canada lynx.

Section 2 - Species Assessment

2.1 Federally Threatened, Endangered, Proposed, and Candidate Species

Currently there are five federally listed species for the Custer National Forest, four of which occur in Stillwater and Carbon counties (Table 2.1-1). There are no proposed species in Montana. Black-tailed prairie dog was considered a candidate species as of February 4, 2000. The species was removed as a candidate from the ESA list in August of 2004. Status of each species and details of proposed removal of the bald eagle, grizzly bear, and gray wolf from the list of endangered and threatened wildlife are discussed in the following sections.

Table 2.1-1. Federally listed species for Stillwater and Carbon counties (USDI 2003), species status, presence in the Project area, and determination of effects.

Wildlife Species	Status	Present in Project Area	Determination
Bald Eagle (*Haliaeetus leucocephalus*)	Threatened	Yes	May effect-not likely to adversely effect
Grizzly Bear (*Ursus arctos horribilis*)	Threatened	Yes	May effect-not likely to adversely effect
Gray Wolf (*Canis lupus*)	Experimental/Nonessential Population	Yes	No Jeopardy
Canada Lynx (*Lynx canadensis*)	Threatened	Yes	No effect
Black-footed Ferret (*Mustela nigripes*)	Endangered	No	No effect

2.1.1 Bald Eagle (Threatened)

The bald eagle was classified as endangered in Montana in 1978 (USBR 1994). In July 1995, the U.S. Fish & Wildlife Service (USFWS) reviewed the status of the bald eagle and downlisted it from endangered to threatened in four of the five regions in the United States in which it is found (60 FR 36000). In July 1999, the USFWS proposed to remove the bald eagle from the list of endangered and threatened wildlife (64 FR 36453). Even if removed from the endangered species list, bald eagles and their habitat will be monitored and protected, as specified in the Eagle Protection Act and the Migratory Bird Treaty Act.

Bald eagles present within West Rosebud Creek watershed are part of the Pacific recovery region (ID, NV, CA, OR, MT). Delisting requirements for the Pacific region include: (1) a minimum of 800 nesting pairs; (2) an average reproductive rate of 1.0 fledged young per pair with an average success rate per occupied site of not less than 65%; (3) breeding population

goals met in at least 80% of the management zones; and (4) stable or increasing wintering populations (64 FR 36453).

In Montana the bald eagle population has clearly improved since listing in 1978. Between 1978 and 1995 the number of known breeding pairs increased from 12 to 166, well above the downlisting goal of 99 breeding pairs cited in the Montana Bald Eagle Recovery Plan. In 1995, during a summer survey, 196 viable nesting territories were found in Montana, placing the state seventh in the nation (behind Florida, Minnesota, Washington, Wisconsin, Michigan, and Oregon) in numbers of breeding bald eagles and eagles produced (http://fwp.mt.gov/wildthings/tande/baldeagle.html). Currently there are more than 300 nesting pairs in Montana (Backus 2006).

Key habitats for bald eagles include nesting territory and wintering habitat. Nesting territories are typically near large rivers, lakes, reservoirs, or ponds with fish. Nest sites are typically in conifer stands with large trees. Bald eagles will also nest in cottonwoods and other deciduous tree species where conifers are absent, such as along the Yellowstone River. Wintering habitat is found where food resources such as fish and waterfowl are abundant. In Montana, bald eagles tend to winter along major rivers and tailrace areas of some reservoirs. Mystic Lake is at high elevation (~7,675 ft) and experiences hard winters that result in snow and ice covered lakes and streams. Therefore, the Mystic Lake area does not provide suitable or optimal overwintering habitat for bald eagles.

Bald eagles are occasionally observed, however, foraging along West Rosebud Creek during late fall, winter, and early spring. Eagles have been reported roosting near the West Rosebud Lake outlet, foraging on spawning fish during fall. Currently, no nest sites have been identified in the vicinity of the Project area or on the Beartooth Ranger District (B. Pitman, Wildlife Biologist, Beartooth Ranger District, personal comm., 2003).

The response of bald eagles to human activities or disturbances is variable and depends on the intensity, duration, timing, predictability and location of the human activity; and on the affected eagle's age, gender, physiological condition, sensitivity, residency and mated status. The reaction of a bald eagle to human activities may vary from ephemeral, temporal, and spatial avoidance to total reproductive failure. In addition, some bald eagles tolerate greater levels of disturbance (e.g. eagles inhabiting urban versus rural areas) (USBR 1994).

Human activities originate from recreational opportunities in the drainage. The overall fishery in the drainage creates great recreational opportunities for the public and foraging opportunities for the bald eagle and other wildlife.

West Rosebud Lake (in the Project boundary) is a popular destination for anglers because of its proximity to Forest Service campgrounds and other recreation areas and because of its diverse fishery. The lake supports naturally reproducing populations of brown and brook

trout, mountain whitefish, and longnose suckers. Six thousand Arlee rainbow trout are also stocked into the lake annually (MFWP 2005).

The populations of fish in West Rosebud Lake are isolated from downstream by the Re-regulation Dam, and can only migrate upstream to near the powerhouse where they encounter natural barriers. Despite barriers being present in the system, there appears to be adequate spawning and rearing habitat upstream of West Rosebud Lake to provide ample angling opportunities while sustaining the lake's populations of fish (MFWP 2005). West Rosebud Creek upstream of the powerhouse has a thriving population of resident rainbow trout, but it does not appear that many of the stream dwelling fish migrate to West Rosebud Lake, or if they do migrate to the lake, their survival is low (MFWP 2005).

Emerald Lake continues to support healthy brook and brown trout populations. Trout populations are similar to those in West Rosebud Lake with brown trout averaging 11.8 in and 0.57 lb, and brook trout averaging 10.4 in and 0.43 lb. Mountain whitefish and longnose sucker appear to serve as forage base for brown trout (MFWP 2005). Emerald Lake is stocked with 6-inch rainbow trout (1,800/year), but few appear to survive to the spring. No rainbows were captured in the May 2001 sampling. Personal observations by MFWP biologists have found that many of the stocked rainbows emigrate down into West Rosebud Creek below the lake (MFWP 2005).

During 2004, brown, brook and rainbow trout and mountain whitefish and longnose suckers were analyzed for PCB as part of the Mystic Dam relicensing process. Tissues sampled were negative for detectible levels of PCB's and there does not appear to be any contamination of fish downstream of the Project.

Overall, fish populations in the Project area are in good health and will continue to provide a potential food source for bald eagles (MFWP 2005).

Potential disturbance from humans due to recreational use during periods in the fall and winter (October 1 – February 28) when bald eagles may utilize West Rosebud Creek have not been evaluated. Since winter conditions in the Project area do not provide optimal overwintering habitat, human impacts are minimal. Recreational use is known to be greatest during the summer months, especially in July (2005 data).

A recreational use survey conducted from May 26 to September 30, 2002 by PPL Montana in the West Rosebud Creek drainage targeted use of West Rosebud, Emerald, and Mystic lakes, the stream between them, and the mountain lakes higher in the drainage (PPL Montana 2002). Results suggest that most people who visit the area are from Montana and approximately 50% of the people who visit the area spend some time fishing (most fishing from shore). Of those fishing, more than half fished from the Pine Grove Campground to West Rosebud Lake, 23% fished Mystic Lake and 9% fished beyond Mystic. Two thirds of

anglers reported catching fish and of those catching fish, an average of 1.5 fish/angler was harvested (51% were rainbow, 24%brown, 12% cutthroat and 8% brook trout). The average number of fish caught per angler was 4.1 and about half of the anglers catching fish reported releasing all of their catch.

Future studies will determine whether 1) bald eagles are present in the Project area during this fall/winter time period (October 1 – February 28), 2) the degree of use of the resources by bald eagles, and 3) identify any potential impacts from human presence or recreational use. Note that recreational use is highest during the summer and minimal in comparison to the winter months due to accessibility and weather conditions.

Thus far, there have been no reports of any raptor electrocution in the Project area. However, PPL Montana is continuing the process of modifying the transmission lines (A-line and B-line) to meet raptor-safe standards and reduce potential of raptor electrocution. In 2004 and 2005, a total of 54 poles were replaced on the A-line with cross members and insulators. Similar upgrades will be made to 30 more poles on the A-line and 14 poles on the B-line by 2008.

Based on the information described above, the Project may effect, but is not likely to adversely affect bald eagles.

2.1.2 Grizzly Bear (Threatened)

Note that the Greater Yellowstone Area (GYA) includes the Project area, but the Primary Conservation Area does not include the Project area.

Grizzly bears were listed as federally threatened in 1975. At that time, there were fewer than 200 bears in the GYA and an annual average of 12 female bears with cubs of the year. Recovery goals for the grizzly bear were met starting in 1998. As of 2004, there are an estimated 530 bears and an annual average of 38 females with cubs each year (http://www.fs.fed.us/r1/wildlife/igbc/Subcommittee/yes/YEamend/gb_internet.htm). On November 17, 2005, the USFWS proposed the designation of the Greater Yellowstone Ecosystem Population of Grizzly Bears as a distinct population segment (DPS), removing the Yellowstone DPS of grizzly bears from the federal list of endangered and threatened wildlife (70 FR 69854).

Criteria used to gauge population recovery and determinant for delisting grizzly bears in the Yellowstone Ecosystem include (Interagency Conservation Strategy Team 2003):

- The total population throughout the GYA ecosystem must be more than 400 bears to ensure a minimum loss of genetic diversity.
- Fifteen females with cubs-of-the-year (COY) must be observed over a six-year running average inside the Primary Conservation Area (PCA, also known as

Recovery Area or 1983 Grizzly Bear Recovery Area) and within 10 miles of the PCA.

- Females with young must occupy 16 of 18 Bear Management Units (BMUs) on a six-year sum of verified sightings and evidence and no 2 adjacent BMUs can be unoccupied during the same six-year period. This criterion applies to the PCA.
- Known human-caused mortality cannot exceed 4% of the population estimate. Known human-caused female grizzly bear mortality cannot exceed 30% of the 4% mortality limit over the most recent six-year period. These criteria apply to all occupied areas, not just the PCA.

If the federal status of the Yellowstone grizzly bear population is changed and the species is removed, Forest Service Regions 1, 2, and 4 will classify the grizzly bear as a sensitive species in the Yellowstone area (Interagency Conservation Strategy Team 2003). The Custer National Forest will continue management under the existing land management plan (Custer National Forest and Grasslands Land and Resource Management Plan 1987) until amended or revised.

The Interagency Grizzly Bear Study Team (2003) prepared the *Final Conservation Strategy for the Grizzly Bear in Yellowstone Ecosystem* to demonstrate that adequate regulatory mechanisms will be in place if the grizzly bear is recovered and delisted in the Greater Yellowstone Area. The Forest Service proposes to amend Forest Service plans of six national forests in the Greater Yellowstone Area, including the Custer National Forest. The proposed Forest Service amendments would become effective when the partner agencies have signed the Conservation Strategy and the Yellowstone grizzly bear population has been federally delisted. The amendments would include: habitat standards, a nuisance bear standard, and monitoring requirements (http://www.fs.fed.us/r1/wildlife/igbc/Subcommittee/yes/YEamend/Amendment_external_9_8_2004.ppt, MFWP 2002).

Habitat standards apply only to the PCA and are designed to maintain 1998 habitat conditions that facilitate recovery. The habitat standards encompass secure habitat, developed sites standard, and restriction of livestock allotments within the PCA. Nuisance bear standards also apply only in the PCA, whereas the state management plans regulate areas outside the PCA. Removal of attractants (trash, food, etc.) is emphasized as part of the nuisance bear standard. Monitoring requirements include: compliance with habitat standards, open motorized access route density, total motorized access route density, habitat value and habitat effectiveness (cumulative effects model) (http://www.fs.fed.us/r1/wildlife/igbc/Subcommittee/yes/YEamend/Amendment_external_9_8_2004.ppt).

Beartooth Ranger District and Project area are inside the GYA, however the Project area is outside the PCA. Currently, there is no known denning site(s) within the vicinity of the Project area, most likely due to the limited availability of food resources (B. Pitman, Wildlife Biologist, Beartooth Ranger District, personal comm., 2003). The only recorded sighting of a

grizzly bear in the West Rosebud Creek drainage was in 1986 near the Forest Service boundary (B. Pitman, Wildlife Biologist, Beartooth Ranger District, personal comm., 05/2006). However, it is possible other grizzly bears have traveled through the area without being report to the Beartooth Ranger District. Other recorded sightings of grizzly bears have been outside of the Project area.

At this time, current bear-human interactions reported within the Project area have dealt with black bears at non-Project campground sites, Pine Grove and Emerald (downstream of PPL Montana Camp). Current efforts by the Forest Service to reduce bear-human interactions within the Project area include the presence of bear-resistant trash containers at the Emerald Lake campground and Pine Grove picnic grounds, and food storage order signs on picnic tables in these areas. The Forest Service plans to install heavy-duty food storage signs on all picnic tables in these areas in 2006.

Bear-human interactions can often be minimized by proper food (camp food, pet food, garbage, etc.) storage practices and placement of bear resistant containers in the Project area (e.g., PPL Montana housing compound and recreational facilities). Currently, the Forest Service has placed bear identification signs (to assist the public with differentiation between black and grizzly bears), bear aware signs, and bear resistant refuse containers at various recreational facilities in the Project area. These measures were taken to minimize and mitigate these potential impacts based on the *Special Order in the Northern Region – Gallatin Beaverhead, and Custer National Forests Rocky Mountain Region – Shoshone National Forest Intermountain Region – Bridger-Teton and Targhee National Forests (36 CFR 261.50 (a) & (b)).*

Since the Project is consistent with the standards presented in the *Conservation Strategy (IGBST 2003),* the Project would adhere to provisions in the amended Custer National Forest Plan when delisting occurs. Therefore, the re-licensing of the Project may effect, but is not likely to adversely affect grizzly bears.

2.1.3 Gray Wolf (Nonessential Experimental Population)

Gray wolves in Stillwater and Carbon counties are defined as an experimental/nonessential population. There are no designated areas of critical habitat in either county.

Suitable habitat for wolves has been defined as any place with an adequate supply of ungulate prey and freedom from excessive human persecution. Wolf packs generally require large home ranges. The actual extent of the home range depends primarily on pack size and the abundance and distribution of prey species.

The gray wolf was reintroduced into unoccupied portions of its historic range in Yellowstone National Park in 1995. The reintroduction was conducted with the purpose of conservation and recovery (59 FR 42108, 59 FR 60266). These reintroduced populations were designated

as nonessential experimental populations (ESA section 10j) that were geographically separated from non-experimental populations allowing for greater flexibility for management. Under this designation the wolves are treated as a proposed species, and therefore are not subject to the prohibitions and consultation requirements of section 7(a)(2) of the Endangered Species Act (ESA).

Reintroduction started with 14 wolves from Alberta in 1995 and 17 wolves from British Columbia in 1996 that were released in Yellowstone National Park. By 1998, the wolves had expanded from Yellowstone National Park to the Greater Yellowstone Area (GYA). By 2004, there were an estimated 324 wolves in 30 breeding pairs in the GYA (71 FR 6634). A breeding pair as defined by the USFWS includes an adult male and an adult female that raise at least 2 pups until December 31 of the year of their birth. The northern Mountain Rocky wolf recovery plan approved in 1987 by the USFWS identified a recovered wolf population as being at least 10 breeding pairs for three consecutive years in each of three recovery areas (northwestern Montana, central Idaho, and the Yellowstone area). This recovery population would comprise approximately 300 wolves (59FR 42108).

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In February 2006, the USFWS announced their intent to establish a distinct population segment (DPS) of the gray wolf in the northern Rocky Mountains (71 FR 6634). This DPS encompasses all of Montana, Idaho, Wyoming, and parts of Washington, Oregon, and Utah. If the Northern Rocky Mountain DPS is delisted in future rules, the individual states and Tribes will resume sole management of wolves within their respective boundaries. Currently, Montana and Idaho have adopted state laws and wolf management plans, approved by the USFWS, to conserve their share of a recovered Northern Rocky Mountain wolf population into the foreseeable future. Wyoming's law and its wolf management plan have not been approved by the USFWS. (http://news.fws.gov/NewsReleases/showNews.cfm?newsId =2B76CC08-65BF-03E7-2F39DB75431B7319)

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Although wolves are occasionally observed on the Beartooth Ranger District (USFWS et al. 2006), no wolves have been reported within the Project area. However, the number present and their reproductive status are currently unknown (B. Pitman, Wildlife Biologist, Beartooth Ranger District, personal comm., 2004). In October 2005, three wolves (no breeding pairs) were reported in the foothills of the Beartooth Plateau (USFWS et al. 2006). In November 2005, tracks of three wolves were verified between the West and East Rosebud drainages (USFWS et al. 2006). A brief trapping season was conducted in December 2005, however no wolves were captured.

The primary threat to wolves is human-caused mortality. Human-caused mortality includes legal and illegal killings, car collisions, and control actions to resolve conflicts. The re-licensing of the Project will not lead to an increase in road or trail densities or the development of the area.

The Project will not likely jeopardize the continued existence of the gray wolf species or result in destruction. In addition the status of the Gray wolf is nonessential experimental population, thus the determination of impact is no jeopardy.

2.1.4 Canada Lynx (Threatened)

The Canada lynx was listed as threatened in the contiguous United States as a distinct populations segment (DPS) under the ESA on March 24, 2000 (http://mountain-prairie.fws.gov/species/mammals/lynx/). The DPS includes the states of Colorado, Idaho, Maine, Michigan, Minnesota, Montana, New Hampshire, New York, Oregon, Utah, Vermont, Washington, Wisconsin, and Wyoming (68 FR 40076). In 2003, the USFWS reanalyzed the basis for listing lynx as threatened in the 14 states. Results from this reanalysis found the lynx was not endangered throughout a significant portion of its range (68 FR 40076). However, this finding did not change the threatened status of the lynx.

In 2005, the USFWS proposed to designate critical habitat for the contiguous United States DPS of the Canada lynx (70 FR 68294) (Figure 2.1-1). The only critical habitat designation for lynx in Montana (Unit 3) is located west of the continental divide in the vicinity of Glacier Park and not near Mystic Lake Project. The USFWS did not propose to designate critical habitat in the Greater Yellowstone Ecosystem because habitat appears to be of lower quality and naturally highly-fragmented. However, the Greater Yellowstone Ecosystem remains one of six ‘core areas’ in the lynx recovery outline (http:///mountain-

prairie.fws.gov/species/ mammals/lynx/final%20lynx%20RecoveryOutline9-05.pdf). Core areas must meet the following criteria: persistent verified records of lynx occurrence over time, recent (within last 20 years) evidence of reproduction, presence of snowshoe hare densities averaging 0.5 hare/hectare over time, a minimum of 1,250 km^2 (483 mi^2) of boreal forest habitat, and snow conditions that favor the competitive advantage for lynx (http://mountain-prairie.fws.gov/species/mammals/lynx/final%20lynx%20RecoveryOutline9-05.pdf).

Lynx rely on a mosaic of habitats including both early and late successional stages for foraging and denning. Boreal, sub-boreal, and western montane forests represent lynx habitat that provide cover, protection, den sites, and prey (snowshoe hare) (Lynx Conservation Agreement 2000). Den sites often utilize woody debris from down logs, rootwads, and windfall for security and cover for kittens. Home range size varies depending on gender, abundance of prey, season, and population density.

Lynx are well adapted for wintering in high elevation habitats. In the winter, lynx occupy environments with deep soft snow that often exclude competing predators. Threats to lynx habitat include timber harvest, road development, fire suppression, trails, livestock grazing, recreational activities that compact snow (Lynx Conservation Agreement 2000). These threats can adversely impact lynx productivity, mortality, movement, or habitat (Ruediger et al. 2000). Trails or compacted snow can allow for previously excluded competing predators access to lynx habitat.

In Montana, lynx have been historically and currently documented throughout the Rocky Mountains (including the Greater Yellowstone Ecosystem) (Ruediger et al. 2000). The Lynx Habitat Model (Custer National Forest 2006) was used to identify potential lynx habitat in the West Rosebud Creek drainage. The model used the U.S. Forest Service Timber Stand Management Record System (TSMRS) database, Custer National Forest Stratum Codes, Beartooth Ranger District Definitions. The following parameters were queried to identify potential foraging habitat:

- Queried for sawtimber, poletimber and seedling-sapling stands for all tree species.
    - Sawtimber stands are those where at least 10% of the crown cover is trees greater than or equal to 5” dbh (diameter at breast height) and the crown cover of trees 9 inches dbh and larger is at least equal to that of trees 5 to 8.9 inches dbh.
    - Poletimber stands are those where at least 10% of the crown cover is trees greater than or equal to 5” dbh (diameter at breast height) and the crown closure of trees 5 to 8.9 inches dbh exceeds that of trees 9 inches dbh and larger.
    - Seedling/sapling stands are those with at least 10% crown closure of all sizes and the stand size is not poletimber or sawtimber.
- Queried the above for medium to well stocked (medium stocked is crown closure 40% - 69%, well stocked is crown closure 70% and greater).

- Included as foraging habitat only the above areas greater than or equal to 6000' elevation.

Queries were also conducted to identify potential denning habitat:

- Queried for sawtimber (as defined for foraging habitat) stands for all tree species.
- Queried for medium to well stocked (as defined for foraging habitat).
- Selected for northerly aspect.
- Included as denning habitat only the above areas greater than or equal to 6000' elevation.

Results from the model indicate an estimated 9,930 acres of potential foraging habitat and 2,100 acres of potential denning habitat in the West Rosebud Creek drainage downstream of Mystic Lake Dam (CNF 2006). Upstream of the dam, the model estimates 4,600 acres potential foraging habitat and 420 acres potential denning habitat (CNF 2006). The locations of these habitat types are shown in Figure 2.1-2 and exist within the vicinity of the Project area where human presence occurs at varying levels throughout the year. However, very little lynx habitat occurs within the Project boundary. Potential habitat within the West Rosebud Creek and Mystic Lake watersheds exists mainly in the Absaroka-Beartooth Wilderness Area.

At this point, no lynx have been observed or documented within the vicinity of the Project. However, lynx have been reported on rare occasions on or near the Beartooth Mountain's portion of the Beartooth Ranger District (B. Pitman, Wildlife Biologist, Beartooth Ranger District, personal comm., 2004). Additionally, the majority of the high elevation area surrounding the Project is designated Wilderness Area, which does not allow for snowmobiling, road development, or timber harvest and limits motorized recreational activities, therefore limiting the potential and amount of human disturbance.

Due to the remoteness (location within the Wilderness Area) of potential habitat and distance from the Project, the re-licensing of the Project will have no effect on the lynx. The majority of the area surrounding the Project is designated Wilderness Area, which does not allow for snowmobiling, road development, or timber harvest and limits motorized recreational activities, therefore limiting the amount of human disturbance.

2.1.5 Black-footed Ferret (Endangered)

Suitable habitat (prairie lands) for the black-footed ferret is not present in the Project area. The black-footed ferret has not been documented in the Project area. Therefore, the re-licensing of the Project will have no effect on the black-footed ferret.

Section 3 - Conservation Measures

Conservation measures were developed for the grizzly bear and bald eagle since the effects of determination was *may effect, but not likely to adversely effect*. The Project is not projected to affect Canada lynx, gray wolf, or black-footed ferret.

3.1 Bald Eagle (Threatened)

3.1.1 Monitoring

The determination for the bald eagle was *may effect, but not likely to adversely effect* based on the potential for human disturbance to bald eagles as a result of recreational use and activities in the Project area. Potential sources of human disturbance include recreational use of non-Project facilities, such as Pine Grove and Emerald campgrounds, and Project facilities, specifically West Rosebud Lake. The presence of the Project coupled with Forest Service campground facilities provides recreational opportunities in West Rosebud Creek drainage for the public and could potentially disturb or disrupt bald eagle roosting and foraging behavior.

PPL Montana and the Forest Service have agreed to establish a baseline of bald eagle use of West Rosebud Creek and associated water bodies from the Mystic Lake Trailhead (powerhouse) to the outlet of Emerald Lake and determine disturbance effects of recreation on bald eagles (see Appendix A, this document, for details). This conservation measure (also a proposed protection, mitigation, and enhancement measure) was developed to monitor bald eagles use and to measure potential harmful effects related to the Project.

The monitoring program will involve surveying eagles along West Rosebud Creek from Emerald Lake upstream to the powerhouse. The survey will be conducted annually for the first three years of the new License; then once every five years for the term of the license or until the bald eagle is delisted.

The results of the survey will determine whether bald eagles are present in the Project area during the fall and winter and the degree of their use of the resources, and will identify any potential adverse impacts from human presence or recreational use. PPL Montana will consult with the Mystic Wildlife and Terrestrial Habitats TAC on corrective actions, if required, within the constraints of the new License.

3.1.2 Project Transmission and Distribution Lines

PPL Montana and the Forest Service evaluated Project power lines in May 2004. The following summarize results from the May 2004 site visit.

The distribution line from the powerhouse upstream to Mystic Lake is mostly below treetop level and thus is expected to have minimal collision or electrocution hazard potential to avian wildlife. The configuration of the power line from the powerhouse to the surge tower has the potential to electrocute raptors attempting to perch on the crossarms. Potential conservation measures include installation of perch guards or artificial perches.

In the PPL Montana Camp area the configuration of corner power poles and poles containing transformers or uninsulated jumper wires provide potential electrocution hazards to raptors attempting to perch on them. Four such poles were identified in PPL Montana's Camp and powerhouse area. Potential conservation measures include installation of artificial perches or replacement of uninsulated jumper wires with insulated wires.

The transmission lines that present a potential electrocution or collision hazard include the A- and B-lines. These two lines run parallel from the Like Creek Substation up to the Project's powerhouse (5.3 miles). These two lines are part of the Project facilities and boundary. Due to the potential risk for electrocution or collision of raptors with transmission lines, PPL Montana is modifying the transmission lines to meet raptor-safe standards.

To date (June 2006), there have been no reports of any raptor electrocution or collisions in the Project area. However, PPL Montana is continuing the process of modifying the transmission lines (A-line and B-line) to meet raptor-safe standards and reduce potential of raptor electrocution or collision. A total of 54 poles have been replaced on the A-line (20 in 2004, 34 in 2005). Raptor proof framing was used on all poles replaced. PPL Montana estimates that approximately 30 more poles will need to be replaced on the A-line and about 14 poles will need to be replaced on the B-line. These poles are scheduled to be replaced in 2007 and 2008. Thus the replacement project that includes raptor proof framing should be complete by the end of 2008. However, this schedule is subject to change.

PPL Montana will consult with the Mystic Wildlife and Terrestrial Habitats TAC after issuance of the new License to see what additional improvements are appropriate in the PPL Montana Camp.

3.2 **Grizzly Bear** (Threatened)

3.2.1 Human-Bear Interactions

The determination for the grizzly bear was *may effect, but not likely to adversely effect* based on the potential for recreational use in the Project area resulting in human-bear encounters. Recreational use within the Project area is associated with the presence of the Project coupled with Forest Service campground facilities, fishing opportunities, and hiking trails. Encounters between bear and human encounters could be detrimental to bears.

Bear-human interactions may be induced by Project related recreation. Bears are often attracted to public recreational facilities in the Project area when food or refuse are not stored properly. Improper food storage creates an unsafe environment for the public and increases the chance of a bear visiting and increases the potential frequency of bears visiting a campground.

Bear-human interactions can often be minimized by proper food (camp food, pet food, garbage, etc.) storage practices and placement of bear resistant containers at Project facilities (PPL Montana Camp, West Rosebud Lake) and non-Project facilities (campgrounds). Currently, bear-human interactions that have been reported have dealt with black bears. However, there is also potential for this same interaction to occur between grizzly bears and humans.

Currently, there are bear identification signs (differentiate between black and grizzly bears), bear aware signs, and bear resistant refuse containers at various recreational facilities within the Project area. PPL Montana will collaborate with the USFS for any future maintenance or bear aware sign postings within the Project area. The signs will educate the public regarding keeping a clean camp and consequences to bears and people when public areas are not kept clean.

The presence of bears in the Project area is a safety issue, even though most of the human-bear encounters have been with black bears and not grizzly bears. To increase safety for the public, PPL Montana will place bear resistant trash containers specific to Project facilities in recreational areas surrounding West Rosebud Lake (Re-regulation Dam) and the PPL Montana Camp.

This mitigation measure addresses the issue of proper food and trash storage around recreational facilities within the Project boundary. Safe food storage measures are based on the *Special Order in the Northern Region – Gallatin Beaverhead, and Custer National Forests Rocky Mountain Region – Shoshone National Forest Intermountain Region – Bridger-Teton and Targhee National Forests (36 CFR 261.50 (a) & (b)).*

The objective of this measure, as described above, is to reduce and prevent potential bear-human interactions for recreational users. Minimizing bear-human interactions will establish a safer recreational environment for both humans and bears. PPL Montana will implement this measure in 2007.

Section 4 - Conclusion

The determination of effects for federally listed species is summarized in Table 4.1-1. The re-licensing of the Project was determined to *may effect, but not likely to adversely effect* the bald eagle and grizzly bear. There was no jeopardy determination for the gray wolf and no effect determination for the Canada lynx and black-footed ferret.

Table 4.1-1. Determination of effects for federally listed species for Stillwater and Carbon counties (USDI 2003).

Wildlife Species	Status	Present in Project Area	Determination
Bald Eagle (*Haliaeetus leucocephalus*)	Threatened	Yes	May effect-not likely to adversely effect
Grizzly Bear (*Ursus arctos horribilis*)	Threatened	Yes	May effect-not likely to adversely effect
Gray Wolf (*Canis lupus*)	Experimental/Nonessential Population	Yes	No Jeopardy
Canada Lynx (*Lynx canadensis*)	Threatened	Yes	No effect
Black-footed Ferret (*Mustela nigripes*)	Endangered	No	No effect

4.1 Bald Eagle

Bald eagles are present in the Project area; however there have been no documentation of bald eagle's nest in the Project area or on the Beartooth Ranger District. Recreation occurring within the Project boundary (West Rosebud Lake) and outside the Project boundary (campgrounds, trails, West Rosebud Creek downstream of the powerhouse) could disturb bald eagles during the winter, if present in the area. Therefore, the determination is *may effect, but not likely to adversely effect.* As a conservation measure, PPL Montana proposes a bald eagle survey (details in section 8 - Appendix A, this document).

4.2 Grizzly Bear

Reported sightings of grizzly bears in the Project area have been limited. The most recent sighting of an individual grizzly bear in the Project area was reported in 1986. Thus far there have been no reports of grizzly-human encounters; however there have been black bear-human encounters in the Project area. These encounters are primarily related to improper food storage and present a public safety issue and could be detrimental to the bear. As a conservation measure, PPL Montana will have bear-resistant trash containers at Project

facilities (West Rosebud Lake, PPL Montana Camp). PPL Montana will also collaborate with the USFS for any future maintenance or bear aware sign postings within the Project area.

4.3 Gray Wolf

The gray wolf has not been reported in the Project area. This species is designated as an experimental/nonessential population, thus the determination is no jeopardy.

4.4 Canada Lynx

Canada lynx has not been observed in the Project area and critical habitat proposed for this species does not include the Project area. The Lynx Habitat Model (Custer National Forest 2006) was used to identify potential lynx habitat in the West Rosebud Creek drainage. Results from the model indicate very little lynx habitat occurs within the Project boundary. Potential habitat within the West Rosebud Creek and Mystic Lake drainages exists mainly in the Absaroka-Beartooth Wilderness Area. The Wilderness Area does not allow for snowmobiling, road development, or timber harvest and limits motorized recreational activities, therefore limiting the potential and amount of human disturbance. Therefore, the determination is no effect.

4.5 Black-footed Ferret

The Project area does not provide habitat for the black-footed ferret. Therefore, the determination is no effect.

Section 5 - Acronyms

Acronym	Name
A-B	Absaroka-Beartooth Wilderness
ADA	Americans with Disabilities Act
AEI	American Enterprises, Inc.
AGB	Allen Grade Bridge
amsl	above mean seal level
APE	Area of Potential Effect
BA	Biological Assessment
BLM	Bureau of Land Management
BMU	Bear Management Units
BO	Biological Opinion
BZ	Backshore Zone
°C	degrees Celsius
$CaCO_3$	Calcium Carbonate
CCC	Civilian Conservation Corps
CEII	Critical Energy Infrastructure Information
cfs	cubic feet per second
CNF	Custer National Forest
CNFP	Custer National Forest Management Plan
Commission	Federal Energy Regulatory Commission
COY	cub-of-the-year
CPUE	catch-per-unit-effort
CRM	Cultural Resource Management
CRSP	Cultural Resource Study Plan
DNA	deoxyribonucleic acid
DOI	Department of Interior
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ERG	Ecosystem Research Group
ESA	Endangered Species Act
EST	Eastern Shoshone Tribe
°F	degrees Fahrenheit
FERC	Federal Energy Regulatory Commission
FLA	Final Licensing Application

Acronym	Name
FOIA	Freedom of Information Act
FPA	Federal Power Act
ft	feet
FWP	Fish, Wildlife, and Parks
FWS	Fish and Wildlife Service
FZ	Fluctuation Zone
g	grams
GIS	Geographic Information System
GPOR	Generation point of receipt
GYA	Greater Yellowstone Area
ha	hectares
H-A&E	Historic Architectural and Engineering Properties
HADU	Harlequin duck
HAP	Historic Archaeological Properties
HPMP	Historic Properties Management Plan
HUC	Hydrological Unit Code
ILP	Integrated Licensing Process
lbs	pounds
km	kilometer
kVA	kilovolt-amperes
kW	kilowatt
kWh	kilowatt hour
M	meters
m^3	cubic meters
MDEQ	Montana Department of Environmental Quality
MDOL	Montana Department of Livestock
MEPA	Montana Environmental Policy Act
MFWP	Montana Department of Fish, Wildlife and Parks
mg/L	milligrams per liter (mg/L = ppm, parts per million)
mm	millimeters
MDNRC	Montana Department of Natural Resources and Conservation
MOU	Memorandum of Understanding
MPC	Montana Power Company
MSHPO	Montana State Historic Preservation Officer
MW	megawatt
N	Nitrogen
NEPA	National Environmental Protection Act
NGO	Non-governmental organization
NIP	Non-Internet Public

Acronym	Name
NO_2	Nitrite
NO_3	Nitrate
NOI	Notification of Intent
NPS	National Park Service
NRHP	National Register of Historic Places
NTU	Nephelometric Turbidity Units
OHV	Off Highway Vehicles
P	Phosphorus
PAD	Pre-Application Document
PAP	Prehistoric Archaeological Properties
PCB	Polychlorinated Byphenyl
PCR	Polymerase chain reaction
PFC	Proper Functioning Condition
PGC	Pine Grove Campground
pH	$pH = - \log [H^+]$
PINE	Paired interspersed nuclear deoxyribonucleic acid elements
PM&E	Protections, Mitigation, and Enhancement
POF	Plant Operating Facilities
RIK	Replacements-In-Kind
RG	Resource Group
RLUA	Recreation, Land Use, and Aesthetics
rpm	revolutions per minute
RUSLE	Revised Universal Soil Loss Equation
SCADA	Supervisory Control and Data Acquisition
SCMP	Stillwater County Master Plan
SCORP	Statewide Comprehensive Outdoor Recreation Plan
SD	Standard deviation
sfd	second foot day
SHPO	State Historic Preservation Officer
s.u.	standard units
TAC	Technical Advisory Committee
TCP	Traditional Cultural Properties
TDG	Total Dissolved Gases
TDS	Total Dissolved Solids
TKN	Total Kjeldahl Nitrogen

Acronym	Name
TU	Trout Unlimited
µmhos/cm	micromhos per centimeter, (1 µS/cm = 1 µmho/cm)
µS/cm	microSiemens per centimeter (Specific Conductivity)
USDI	United States Department of Interior
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VQO	Visual Quality Objective
WMP	Weed Management Plan
WQC	Water Quality Certificate
WQS	Water Quality Standards
WRL	West Rosebud Lake
YNP	Yellowstone National Park

Section 6 - References

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Section 8 - Appendix A

8.1 Bald Eagle Long-term Monitoring

Introduction
Management of bald eagle wintering and migration habitat should focus on freedom from human harassment. Risks to eagles include loss of perching, foraging, and roosting opportunities due to human disturbance (Greater Yellowstone Bald Eagle Working Group 1995). Monitoring seasons in the Greater Yellowstone Ecosystem include fall – Oct. 1 to Nov. 15, and winter – Nov. 16 to Feb. 28 (Harmata and Oakleaf 1992).

Objectives
Establish baseline of bald eagle use of West Rosebud Creek and associated water bodies from the Mystic Lake Trailhead to the outlet of Emerald Lake; determine disturbance effects of recreation on bald eagles.

Method
Drive road, looking for eagles along creek, lakes, and lake shores. Stop periodically and search through binoculars.

Survey

- Route: Mystic Lake trailhead parking area to outlet of Emerald Lake
- Monitor weekly or every other week from Oct. 1 to Feb. 28.
- Conduct monitoring for each of the first three years after license issuance, then once every five years for the term of the new Project License or until bald eagles are delisted.
- Record data on Midwinter Bald Eagle Survey Standardized Form adapted for Mystic Lake Hydroelectric Project. Include observed recreation activity, if any, along creek and at lakes during time of survey. This survey method is consistent with the Nationwide Midwinter Bald Eagle Survey. The Forest Service recognizes that some portions of West Rosebud Creek will not be visible from the road.
- If warranted, adapt future monitoring method and timing to better monitor disturbance effects of recreation on bald eagles.
- Report date and location of incidental sightings outside survey period to the Beartooth Ranger District wildlife biologist.

Progress of the measure will be filed with the Commission within one year of the completion of the first 3-yr survey, followed by subsequent reports within one year of the completion of each additional survey conducted on 5-year interval for the term of the license. The Mystic Wildlife and Terrestrial TAC will meet regularly to discuss progress of the PM&E measure.

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MIDWINTER BALD EAGLE SURVEY
STANDARDIZED SURVEY FORM
ADAPTED FOR MYSTIC LAKE HYDROELECTRIC PROJECT FERC No. 2301

_____
YEAR

Note: Please complete ALL sections of this form.

Survey Site Location

1. State: Montana Survey Site Number:_____

2. Drainage or Body of Water: West Rosebud Creek

3. Site Name:

4. County or Counties: Stillwater/Carbon

5. Start

Point:_____

6. End

Point:_____

7. Did this year's survey cover the same area that has been surveyed on this route in past years? (Circle One) **Y N**

Survey Procedures

1. Survey Date:_____ 2. Time at Start:_____ 3. Total time of survey (minutes):_____

4. Roost or nonroost <circle one>

5. Continuous Route, Fixed Point, or Both

6.Total Miles Surveyed_____*

* The total miles surveyed should be the amount of shoreline or other habitat that is observed. For a route along a river, it is usually the one-way direction that the vehicle or aircraft travels along the river. On a lake or reservoir, it is the amount of shoreline habitat that is viewed (from one or many viewpoints).

7. Survey Method (*Circle All That Apply)*): Road Vehicle Foot Travel Fixed Point Boat Vehicle/Fixed Point Other_____

Survey Results

1. Total Bald Eagles Counted:_____ No. of Adults:_____ No. of Immatures: _____

No. of Unknown Age: _____

Location of bald eagles (plot on map if possible): _____

2. Total Golden Eagles Counted:_____ No. of Adults:_____ No. of Immatures:_____

No. of Unknown Age: _____

3. Number of Unidentified Eagles Counted (*not identified to species):* _____

Recreation Use During Survey

Fisherman present during survey? Yes No

Locations and number at each location: _____

Estimated minimum distance to nearest bald eagle: _____

Other recreationists present during survey? Yes No

Locations and number at each location: _____

Estimated minimum distance to nearest bald eagle: _____

Observers

1. Name of Recorder: _____

2. No. of Observers:_____

3. Address:_____

City:_____ State:_____ Zip:_____ Email:_____

Phone:_____

4. Affiliation:

PPL Montana
US Forest Service
Other_____

General Weather and Ice Conditions

*Temperature:*_____F. *Precipitation:* None Snowy Rainy

Was there fog at any time during the count? Yes No

Was there precipitation at any time during the count? Yes No

Wind: ___No wind (calm or <1 mi/hr)
___Light wind (breezy or 1-7 mi/hr)
___Moderate wind (windy or 8-18 mi/hr)
___Strong wind (gusty to >18 mi/hr)

Cloud Cover: Clear Foggy than Clear Foggy Partly Cloudy Cloudy then Clearing Cloudy

Some ice? Yes No *Percentage of ice cover over entire survey route*:_____%

How did this year's weather compare to past years?

Weather: Very Mild Mild Normal Harsh Very Harsh

Ice: Much Less Than Normal Less Than Normal Normal More Than Normal Much More Than Normal

Comments:

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