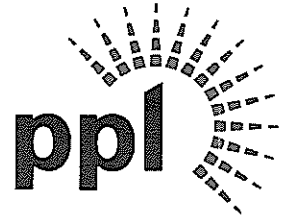


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PPLM-2301-1945

Magalie R. Salas
Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

Re: Filing of Mystic Lake Project 2301 Study 9 Supplemental Riparian Report per the
Commissions Integrated Licensing Process

November 15, 2005

Dear Secretary Salas:

As described in PPL Montana's November 1, 2005 Mystic Project study report meeting
summary filing with the Commission, PPL Montana herein files a Supplemental Riparian
Report for the Mystic Lake Project riparian corridor Study 9.

Sincerely,

Jon H. Jourdonnais,
Director Hydro Licensing and Compliance

Cc: PPL Montana will send Mystic stakeholders an email with directions to access
this filing at website www.mysticlakeproject.com

Study No. 9

**Aerial Survey of Riparian
Corridor – Supplemental Report
November 2005**

**Mystic Lake Hydroelectric
Project FERC No. 2301**

Mystic Lake, Montana

PPL Montana

45 Basin Creek Road
Butte, Montana 59701

November 15, 2005



**MYSTIC LAKE HYDROELECTRIC PROJECT
FERC PROJECT NO. 2301
PPL MONTANA SUPPLEMENTAL RIPARIAN REPORT, STUDY No. 9**

November 14, 2005

Prepared by

Ecosystem Research Group
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1. INTRODUCTION

This report is a supplement to the September 27, 2005 report titled Mystic Lake Hydroelectric Project - FERC Project No. 2301, PPL Montana Interim Draft Riparian Report, prepared by Ecosystem Research Group (ERG). The report was necessitated as the aerial photogrammetry needed for this analysis was delayed and not complete at the time of the September report. It is anticipated that there will be an additional supplemental report covering the lakeshore evaluation once those aerial photographs have been received by ERG. Citations and references for this report are contained in the September 27th, 2005 report. A four-part map series accompanies this report in Section 4.

The riparian area mapping for the West Rosebud Creek indicated that the creek riparian areas appear to be within the normal ranges of vegetative canopy coverages as described by Hansen et al. (1995). No comparative quantitative analysis of plant communities was conducted for this project, although the authors believe the upper stream reaches are close to pristine condition and the lower stream segments



Figure 1-1 Deciduous riparian type and narrow shrub and evergreen type changes based on streamtype and aspect differences

vegetation communities have been impacted by previous land uses. The riparian areas in the lower section of West Rosebud Creek within the project area have more non-native species and noxious weeds than the upper sections.

Riparian vegetation is classified according to Hansen's *Classification and Management of Montana's Riparian and Wetland Sites* (1995). The original project proposal noted: "ERG will complete riparian mapping on field sheets for all major riparian areas along the West Fork of Rosebud Creek on USFS property. In addition to

quantifying the riparian areas through on-the-ground mapping, ERG will assess the quality of the riparian areas using the Proper Functioning Condition (PFC) protocols used by the USFS." The condition of the stream as expressed by PFC was described in the September 27, 2005 Report.

2. VEGETATION MAPPING

The riparian types in the project area consist of both habitat types and community types, including coniferous forest, deciduous forest, shrub and herbaceous lifeform types. The predominant types include *Abies lasiocarpa* (subalpine fir), *Populus tremuloides* (quaking aspen), *Populus trichocarpa* (black cottonwood), and *Salix geyeriana* (Geyer's willow). ERG developed a mapping unit concept for this project because of extremely variable and small size of the discrete riparian mapping units. The microsite differences in habitat/community types result in having to use mapping unit complexes instead of pure habitat type polygons. This mapping unit concept is more precise than many of the agency mapping units due to the scale of maps and project goals. The project area riparian vegetation is a mosaic of habitat types and community types. In other words, a specific riparian habitat type may be only 1/10 of an acre in size and then transition into a different but similar habitat type. On the West Fork of Rosebud Creek, because of the orientation of the stream we observed an unusual distribution of types. We found deciduous habitat types (*Populus tremuloides* [quaking aspen] or *Populus trichocarpa* [black



Figure 2-1 B stream type riparian vegetation

cottonwood]) on the southern aspect (north side of stream) and very narrow shrub (*Salix*) type bordered by an evergreen riparian type (*Abies lasiocarpa* [subalpine fir] on the northern aspect (see Figure 1-1). This mosaic of riparian vegetation patterns necessitates the need for mapping unit complexes.

The West Fork Rosebud riparian mapping unit complexes are based on a grouping of Rosgen stream types. The steep A+, A1, and A2 stream types had very narrow and discontinuous riparian vegetation types. The A stream type riparian

mapping unit mix is found in the higher sections of West Rosebud Creek riparian areas in the steep, bedrock/bouldery stream type. This mapping unit has discontinuous riparian areas because of the steep slope and large amounts of bedrock inclusions. It is estimated to be composed of 30% *Populus trichocarpa* (black cottonwood), 35% *Salix* (willow), and 35% *Abies lasiocarpa* (subalpine fir) types.

The B stream type riparian mapping unit, is less steep than that described in the A stream type riparian mapping unit, has more continuity and a slightly wider area. This mapping unit is estimated to contain

more *Populus trichocarpa* (black cottonwood) and less *Salix* (willow) types than in the A type. The estimated composition of the B stream type mapping unit 25% *Populus trichocarpa* (black cottonwood), 55% *Abies lasiocarpa* (subalpine fir), and 20% *Salix* (willow) types.

The C stream type riparian mapping unit is found in the lower sections of the project areas. The unit is a more low gradient stream type and a corresponding larger component of *Populus trichocarpa* (black cottonwood) and *Salix* (willow) with a reduced *Abies lasiocarpa* (subalpine fir) component. We estimate the C stream type riparian mapping unit to be composed of 40% *Populus trichocarpa* (black cottonwood), 35% *Salix* (willow), 5% *Abies lasiocarpa* (subalpine fir), and 20% herbaceous types.

The Shrub/Sedge riparian mapping unit is associated with semi-permanently flooded riparian areas and is often found with beaver dam complexes or old flooded stream channels. We estimate the Shrub/Sedge riparian mapping unit to consist of 70% *Carex* (sedge), 20% *Salix* (willow), and 10% herbaceous types.

The Lentic riparian mapping unit consists of riparian area in association with ponds or lakes. These riparian types are found along shorelines and in the delta formations where streams inlet. We estimate that the Lentic riparian mapping unit consists of 40% *Carex* (sedge), 20% *Salix* (willow), 20% herbaceous, and 20% *Abies lasiocarpa* (subalpine fir) types. As with other riparian mapping units, the Lentic unit varies greatly depending on aspect; the *Abies lasiocarpa* (subalpine fir) types are almost always restricted to northerly aspects, while the *Carex* (sedge), *Salix* (willow), and herbaceous types are mainly found on southerly aspects.

Table 2-1 Riparian Mapping Unit Descriptions

Stream Type Riparian Mapping Units	Where Found	Common Habitat Types
A	Thin stringers along steep (>4%) mountain streams	<i>Populus trichocarpa</i> / <i>Cornus stolonifera</i> (Black Cottonwood / Red-Osier Dogwood) community type (on south facing banks) <i>Abies lasiocarpa</i> / <i>Calamagrostis canadensis</i> (Subalpine Fir / Bluejoint Reedgrass) habitat type (on north facing banks)
B	Broader stringers along moderate (2-4%) gradient streams	<i>Salix geyeriana</i> / <i>Calamagrostis canadensis</i> (Geyer's willow / Bluejoint Reedgrass) habitat type <i>Populus trichocarpa</i> / <i>Cornus stolonifera</i> (Black Cottonwood / Red-Osier Dogwood) community type <i>Abies lasiocarpa</i> / <i>Calamagrostis canadensis</i> (Subalpine Fir / Bluejoint Reedgrass) habitat type
C	Riparian areas along gradual (<2%) gradient streams and rivers	<i>Salix geyeriana</i> / <i>Carex rostrata</i> (Geyer's willow/ beaked sedge) habitat type <i>Salix geyeriana</i> / <i>Calamagrostis canadensis</i> (Geyer's willow / Bluejoint Reedgrass) habitat type

Stream Type Riparian Mapping Units	Where Found	Common Habitat Types
Shrub/Sedge	Semi-permanently flooded areas associated with beaver dam complexes	<i>Carex rostrata</i> (beaked sedge) habitat type <i>Salix geyeriana</i> / <i>Carex rostrata</i> (Geyer's willow/ beaked sedge) habitat type
Lentic	Riparian areas associated with shorelines of lakes and ponds	<i>Carex rostrata</i> (beaked sedge) habitat type <i>Salix geyeriana</i> / <i>Carex rostrata</i> (Geyer's willow/ beaked sedge) habitat type

3. HABITAT AND COMMUNITY TYPE DESCRIPTIONS

The following section provides descriptions of the major habitat types and community types found along West Rosebud Creek. Habitat types are defined by Hansen et al. (1995) as the land area that supports, or has the potential of supporting, the same climax vegetation type. Each habitat type represents a relatively narrow segment of environmental variation having a certain potential for vegetation development. Although any given habitat type may support a wide variety of disturbance-caused or seral vegetation, the ultimate product of vegetational succession anywhere within that habitat type will be a similar plant community (Hansen et al., 1995).

3.1 *ABIES LASIOCARPA* / *CALAMAGROSTIS CANADENSIS* (SUBALPINE FIR / BLUEJOINT REEDGRASS) HABITAT TYPE

The *Abies lasiocarpa* / *Calamagrostis canadensis* (subalpine fir / bluejoint reedgrass) habitat type is a major type at mid to high elevations (3,800 ft – 8,800 ft). It occurs along subirrigated stream terraces, pond margins, and moist toeslopes. *Pinus ponderosa* (lodgepole pine) and *Picea* (spruce) are major seral conifers of this habitat type; in time, *Abies lasiocarpa* (subalpine fir) and *Picea* (spruce) eventually dominate the stands. *Picea* / *Calamagrostis canadensis* (Spruce / bluejoint reedgrass) community types are considered as a late seral stage of the *Abies lasiocarpa* / *Calamagrostis canadensis* (subalpine fir / bluejoint reedgrass) habitat type (Hansen et al., 1995).

Table 3.1-1 Major Species in the Subalpine Fir / Bluejoint Reedgrass Habitat Type

Shrubs	Graminoids	Forbs
<i>Vaccinium scoparium</i> (grouse whortleberry)	<i>Calamagrostis canadensis</i> (bluejoint)	<i>Arnica cordifolia</i> (heartleaf arnica)
<i>Vaccinium caespitosum</i> (dwarf huckleberry)	<i>Calamagrostis rubescens</i> (pinegrass)	<i>Valeriana sitchensis</i> (Sitka valerian)
	<i>Carex garberi</i> (elk sedge)	

3.1.1 Adjacent Communities

Wetter sites are often dominated by various *Carex* (sedge) species and stands of *Alnus incana* (mountain alder) and *Calamagrostis inexpectans* (northern reedgrass). Adjacent drier, well drained sites support the *Abies lasiocarpa* / *Vaccinium scoparium* (subalpine fir / grouse whortleberry) and *Abies lasiocarpa* / *Menziesia ferruginea* (subalpine fir / fool’s huckleberry) habitat types (Hansen et al., 1995).

3.1.2 Relationship to Other Classification Systems

USDI Fish and Wildlife Service Wetland Classification (Cowardin et al., 1979)

System = palustrine; Class = forested wetland; Subclass = needle-leaved evergreen; Water Regime (nontidal) = seasonally flooded to saturated.

USDA Soil Conservation Service Range Site Classification (USDA SCS, 1983)

Foothills and Mountains, 20 inch Plus Precipitation Zone = overflow range site.

3.2 *SALIX GEYERIANA* / *CALAMAGROSTIS CANADENSIS* (GEYER'S WILLOW / BLUEJOINT REEDGRASS) HABITAT TYPE

The *Salix geyeriana* / *Calamagrostis canadensis* (Geyer's willow / Bluejoint Reedgrass) habitat type is a major type at mid to moderately high elevations (4,280 to 7,330 ft) throughout the mountains and foothills of Montana. This habitat type occupies streamside sites along major drainages and tributaries. Sites are also located near seeps and springs. The overstory is dominated by *Salix geyeriana* (Geyer's willow) and *Salix boothii* (Booth's willow) (Hansen et al., 1995).

Table 3.2-1 Major Species in the Geyer's Willow / Bluejoint Reedgrass Habitat Type

Shrubs	Graminoids	Forbs
<i>Salix geyeriana</i> (Geyer's willow)	<i>Calamagrostis canadensis</i> (bluejoint reedgrass)	<i>Geum macrophyllum</i> (largeleaf avens)
<i>Salix boothii</i> (Booth's willow)	<i>Agrostis gigantea</i> (redtop)	<i>Pyrola asarifolia</i> (pink wintergreen)
<i>Salix bebbiana</i> (Bebb willow)	<i>Poa pratensis</i> (Kentucky bluegrass)	<i>Galium trifidum</i> (threepetal bedstraw)
<i>Alnus incana</i> (mountain alder)	<i>Phleum pratense</i> (timothy)	<i>Fragaria virginiana</i> (strawberry)

3.2.1 Adjacent Communities

Adjacent sites that are slightly wetter may support *Salix geyeriana* / *Carex rostrata* (Geyer's willow/ beaked sedge) habitat type. In other situations, wetter sites may support the *Carex rostrata* (beaked sedge) habitat type or open water. Drier sites may support a variety of types including the *Poa pratensis*

(Kentucky bluegrass) and *Juncus balticus* (Baltic rush) community types or upland types (Hansen et al., 1995).

3.2.2 Relationship to Other Classification Systems

USDI Fish and Wildlife Service Wetland Classification (Cowardin et al., 1979)

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = saturated to temporarily flooded.

USDA Soil Conservation Service Range Site Classification (USDA SCS, 1983)

Foothills and Mountains, 20 inch Plus Precipitation Zone = subirrigated range site, wet meadow range site.

3.3 *SALIX GEYERIANA* / *CAREX ROSTRATA* (GEYER'S WILLOW / BEAKED SEDGE) HABITAT TYPE

The *Salix geyeriana* / *Carex rostrata* (Geyer's willow/beaked sedge) habitat type is a major type at mid to moderately high elevations (4,800 - 7,030 ft) throughout the mountains and valleys of Montana. This habitat type occupies wet streambanks, terraces, seeps, springs, and on ponded areas near abandoned beaver ponds. The *Salix geyeriana* - *Salix boothii* (Geyer's willow - Booth's willow) dominated types occupy intermediate elevations in comparison to the *Salix drummondiana* (Drummond willow) dominated types, which occupy the higher elevation sites (Hansen et al., 1995).

Table 3.3-1 Major Species in the Geyer's Willow / Beaked Sedge Habitat Type

Shrubs	Graminoids	Forbs
<i>Salix geyeriana</i> (Geyer's willow)	<i>Carex rostrata</i> (beaked sedge)	<i>Geum macrophyllum</i> (largeleaf avens)
<i>Salix boothii</i> (Booth's willow)	<i>Calamagrostis canadensis</i> (bluejoint reedgrass)	<i>Epilobium ciliatum</i> (common willow-herb)
<i>Salix bebbiana</i> (Bebb willow)	<i>Carex aquatilis</i> (water sedge)	<i>Galium trifidum</i> (small bedstraw)

3.3.1 Adjacent Communities

Adjacent sites that are slightly wetter support *Carex rostrata* (beaked sedge) habitat type, the *Typha latifolia* (common cattail) habitat type, or open water. The *Salix geyeriana* / *Calamagrostis canadensis* (Geyer's willow / bluejoint reedgrass) habitat type or the *Salix geyeriana* (Geyer's willow) community type may occupy adjacent drier sites. Other communities on drier disturbed sites include *Poa pratensis* (Kentucky bluegrass), *Agrostis gigantea* (redtop), or *Juncus balticus* (Baltic rush) community types (Hansen et al., 1995).

3.3.2 Relationship to Other Classification Systems

USDI Fish and Wildlife Service Wetland Classification (Cowardin et al., 1979)

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = seasonally flooded to saturated.

USDA Soil Conservation Service Range Site Classification (USDA SCS, 1983)

Foothills and Mountains, 20 inch Plus Precipitation Zone = subirrigated range site, wet meadow range site.

3.4 CAREX ROSTRATA (BEAKED SEDGE) HABITAT TYPE

The *Carex rostrata* (beaked sedge) habitat type is a major, widely distributed type ranging from low elevations to the subalpine zone throughout Montana. Sites range in elevation from 2,200 to 7,400 feet. Sites are either adjacent to low gradient streams in wide valley bottoms or associated with perennial seeps. It can occur in standing water or on sites that become relatively dry later in the growing season. Many sites are located where beaver ponds have filled with sediment. The surface may occasionally be mounded. The *Carex rostrata* (beaked sedge) habitat type represents one of the wettest riparian and wetland communities (Hansen et al., 1995).

Three phases of this site have been identified, generally reflecting a gradual moisture and aeration gradient.

- Wettest - *Carex rostrata* (beaked sedge) phase
- Intermediate - *Carex aquatilis* (water sedge) phase
- Driest - *Deschampsia caespitosa* (tufted hairgrass) phase (Hansen et al., 1995).

Table 3.4-1 Major Species in the Beaked Sedge Habitat Type

Shrubs	Graminoids	Forbs
<i>Salix geyeriana</i> (Geyer's willow)	<i>Carex rostrata</i> (beaked sedge)	<i>Epilobium ciliatum</i> (common willow-herb)
<i>Salix boothii</i> (Booth's willow)	<i>Deschampsia caespitosa</i> (tufted hairgrass)	<i>Polygonum amphibium</i> (water smartweed)
<i>Salix drummondiana</i> (Drummond willow)	<i>Carex vecicaria</i> (inflated sedge)	<i>Gallium triflorum</i> (fragrant bedstraw)

3.4.1 Adjacent Communities

Wetter sites are often absent but *Scirpus acutus* (hardstem bulrush) or *Typha latifolia* (common cattail) may be present along pond margins. Adjacent slightly drier sites are capable of supporting a variety of types, including those dominated by *Carex aquatilis* (water sedge), *Salix geyeriana* (Geyer's willow), *Potentilla fruitcosa* (shrubby cinquefoil), *Juncus balticus* (Baltic rush), and *Poa palustris* (fowl bluegrass) (Hansen et al., 1995).

3.4.2 Relationship to Other Classification Systems

USDI Fish and Wildlife Service Wetland Classification (Cowardin et al., 1979)

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = semipermanently flooded to seasonally flooded to saturated.

USDA Soil Conservation Service Range Site Classification (USDA SCS, 1983)

Foothills and Mountains, 20 inch Plus Precipitation Zone = subirrigated range site, wet meadow range site.

3.5 *POPULUS TRICHOCARPA* / *CORNUS STOLONIFERA* (BLACK COTTONWOOD / RED-OSIER DOGWOOD) COMMUNITY TYPE

The *Populus trichocarpa* / *Cornus stolonifera* (Black Cottonwood / Red-Osier Dogwood) Community Type represents a mid-seral stage of primary succession. This is a major type at low to mid elevations throughout the mountains and foothills of Montana. In central and eastern Montana *Populus trichocarpa*

(black cottonwood) tends to occur at higher elevations than *Populus angustifolia* (narrowleaf cottonwood). Stands may be broad and extensive, or they may be relatively narrow stringers (Hansen et al., 1995).

Table 3.5-1 Major Species in the Black Cottonwood / Red-Osier Dogwood Community Type

Shrubs	Graminoids	Forbs
<i>Cornus stolonifera</i> (red-osier dogwood)	<i>Poa pratensis</i> (Kentucky bluegrass)	<i>Smilacina stellata</i> (starry Solomon-plume)
<i>Rosa woodsii</i> (Wood's rose)	<i>Deschampsia caespitosa</i> (tufted hairgrass)	<i>Gallium triflorum</i> (fragrant bedstraw)
<i>Prunus virginiana</i> (chokecherry)	<i>Poa compressa</i> (Canada bluegrass)	<i>Actaea rubra</i> (baneberry)

3.5.1 Adjacent Communities

Adjacent wetter communities may be dominated by a variety of types including the *Salix exigua* (sandbar willow) and the *Salix lasiandra* (Pacific willow) community types, or the *Typha latifolia* (common cattail) or the *Eleocharis* (spikesedge) dominated habitat types. Adjacent drier communities may be dominated by a variety of *Populus trichocarpa* (black cottonwood) types, or by a variety of upland species (Hansen et al., 1995).

3.5.2 Relationship to Other Classification Systems

USDI Fish and Wildlife Service Wetland Classification (Cowardin et al., 1979)

System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

USDA Soil Conservation Service Range Site Classification (USDA SCS, 1983)

Western Sedimentary Plains, 10-14 inch Precipitation Zone = overflow range site, subirrigated range site, wet meadow range site.

4. RIPARIAN POLYGON DELINEATION METHODS

ERG collected information from the Custer National Forest, Montana Natural Heritage Program, USFS Region 1, and Montana Natural Resource Information System. All data was converted to an ArcGIS 9.1 geodatabase format in Montana State Plane NAD 83 projection. Orthorectified color infrared (IR) imagery, flown in July 2005, was provided by Montana Aerial Photography (MAP, Inc.). Photography was flown at a scale of 1:4,800.

The high-dpi orthorectified imagery was delivered with a 0.8 foot pixel width, providing good resolution for digitizing at a scale of 1:500. West Rosebud Creek (from the USFS boundary to the dam at Mystic Lake) and associated ponds and lakes were digitized into a polygon shapefile. Riparian polygons were first digitized from polygons drawn onto field maps during the June 2005 site visit. These polygons were then updated using field notes, photo interpretation, and literature (Hansen et al., 1995). For areas with very narrow riparian stringers, which were not detectable from the color IR imagery, ERG digitized an offset trace of the streambank, depending on channel type. The steeper and more narrow “A” channel types had riparian areas digitized at 1.5–3 meter widths, while broader “B” and “C” channel types had up to 5 meter riparian stringers. All riparian polygons were stratified by the channel type they were associated with, described in Section 2 of this report.

Polygons were digitized within a geodatabase feature dataset. A topology was created and checked to ensure that no gaps or overlap occurs between the riparian polygons.

Table 4-1 Riparian Classification Along West Rosebud Creek

Stream Type Riparian Mapping Unit	Acres	Percent of Total Area
A	26.1	18%
B	57.6	40%
C	40.2	28%
Lentic	3.5	2%
Shrub/Sedge	17.6	12%
Total	145	100%

Custer National Forest’s Timber Stand Management Record System (TSMRS) data was clipped with the riparian polygons in order to compare the National Forest’s classification of the same area along West Rosebud Creek. See Table 4-2 for the results of this comparison.

Table 4-2 TSMRS Classification of Same Area Along West Rosebud Creek

Cover Type	Acres	Percent of Total Area
No Data	8.4	6%
CW = cottonwood	12.6	9%
DF = Douglas fir	0.4	<1%
LP = lodgepole pine	52.8	36%

Cover Type	Acres	Percent of Total Area
NF = non-forested	70.4	49%
PP = ponderosa pine	0.4	<1%
Total	145	100%

Next USFS Region 1 Satellite Image Land Classification (SILC) data was clipped with the riparian polygons in order to compare the classification of the same area along West Rosebud Creek. See Table 4-3 for the results of this comparison.

Table 4-3 SILC Classification of Same Area Along West Rosebud Creek

Cover Type	Acres	Percent of Total Area
3150 – low/moderate cover grasslands	10.4	7%
3170 – moderate/high cover grasslands	0.2	<1%
3625 – sagebrush/xeric shrublands	1.0	<1%
4101 – aspen	26.2	18%
4203 – lodgepole pine	24.3	17%
4204 – whitebark pine	1.2	1%
4205 – limber pine	1.6	1%
4206 – ponderosa pine	50.5	35%
4237 – subalpine fir/spruce	27.3	19%
5000 – water	0.6	<1%
7300 – rock	1.9	1%
Total	145	100%










The following four maps display the project area at a scale of 1:12,000. Riparian polygons are shown with the color IR imagery background. PFC locations are displayed with photographs of the site.

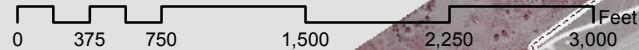
PPL Montana
Mystic Lake
HYDROELECTRIC PROJECT
RIPARIAN SURVEY
Map 1 W. Rosebud Creek

Projection: Montana State Plane NAD 83

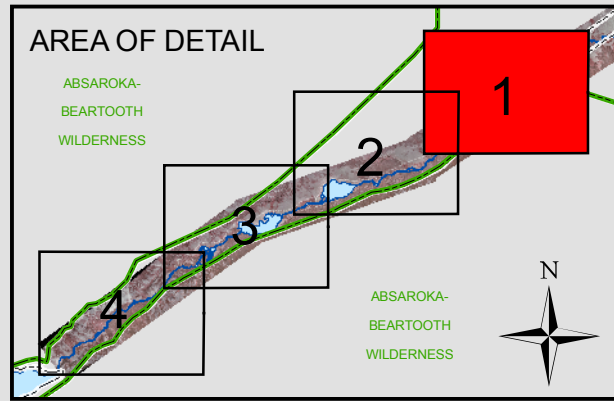
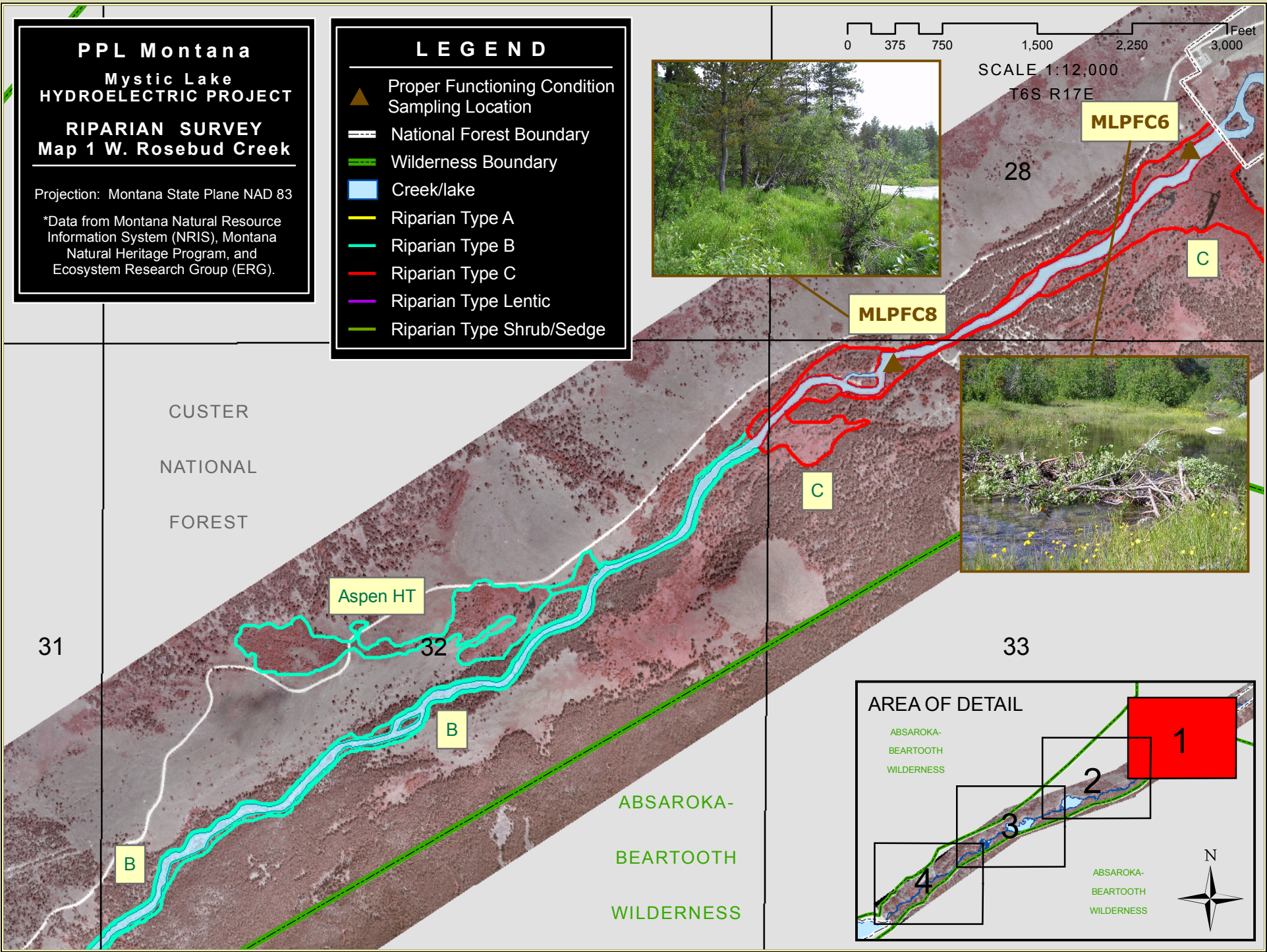
*Data from Montana Natural Resource Information System (NRIS), Montana Natural Heritage Program, and Ecosystem Research Group (ERG).

LEGEND

-  Proper Functioning Condition Sampling Location
-  National Forest Boundary
-  Wilderness Boundary
-  Creek/lake
-  Riparian Type A
-  Riparian Type B
-  Riparian Type C
-  Riparian Type Lentic
-  Riparian Type Shrub/Sedge



SCALE 1:12,000
T6S R17E

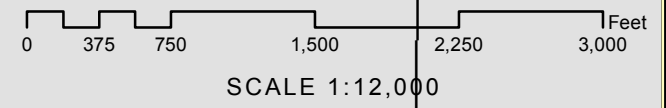
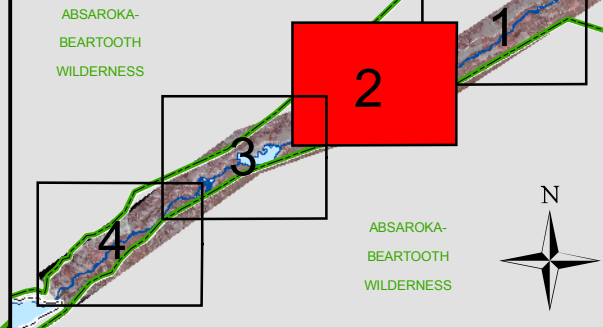


PPL Montana
Mystic Lake
HYDROELECTRIC PROJECT
RIPARIAN SURVEY
Map 2 W. Rosebud Creek

Projection: Montana State Plane NAD 83

*Data from Montana Natural Resource Information System (NRIS), Montana Natural Heritage Program, and Ecosystem Research Group (ERG).

AREA OF DETAIL



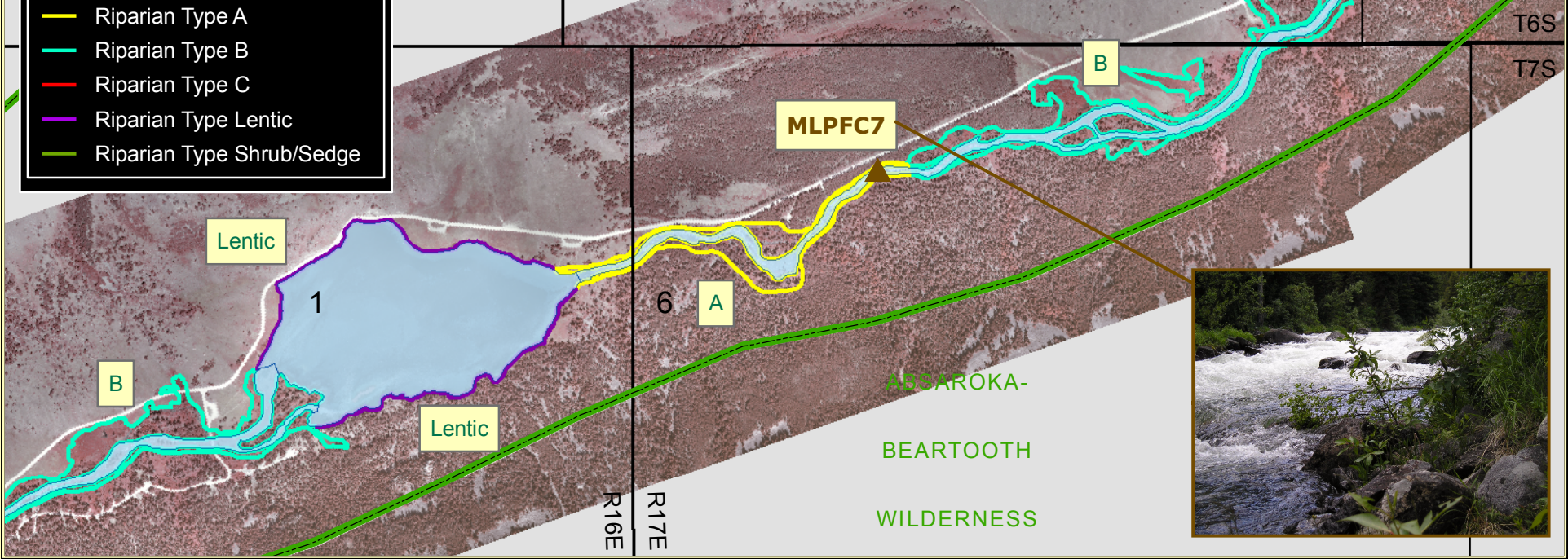
CUSTER
 NATIONAL
 FOREST

31

32

LEGEND

- Proper Functioning Condition Sampling Location
- National Forest Boundary
- Wilderness Boundary
- Creek/lake
- Riparian Type A
- Riparian Type B
- Riparian Type C
- Riparian Type Lentic
- Riparian Type Shrub/Sedge



Map last updated November 11, 2005.












PPL Montana
Mystic Lake
HYDROELECTRIC PROJECT

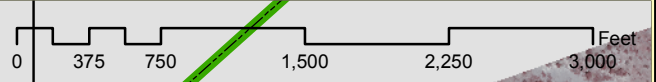
RIPARIAN SURVEY
Map 3 W. Rosebud Creek

Projection: Montana State Plane NAD 83

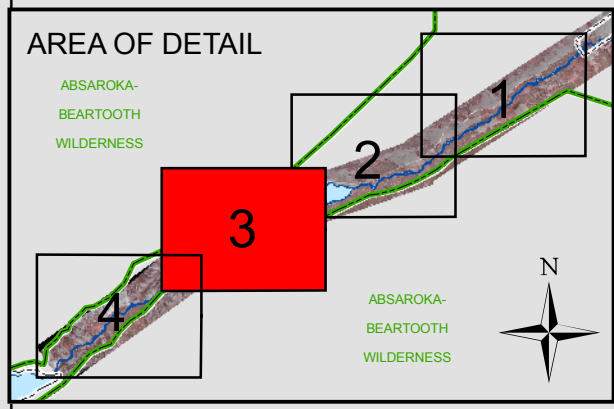
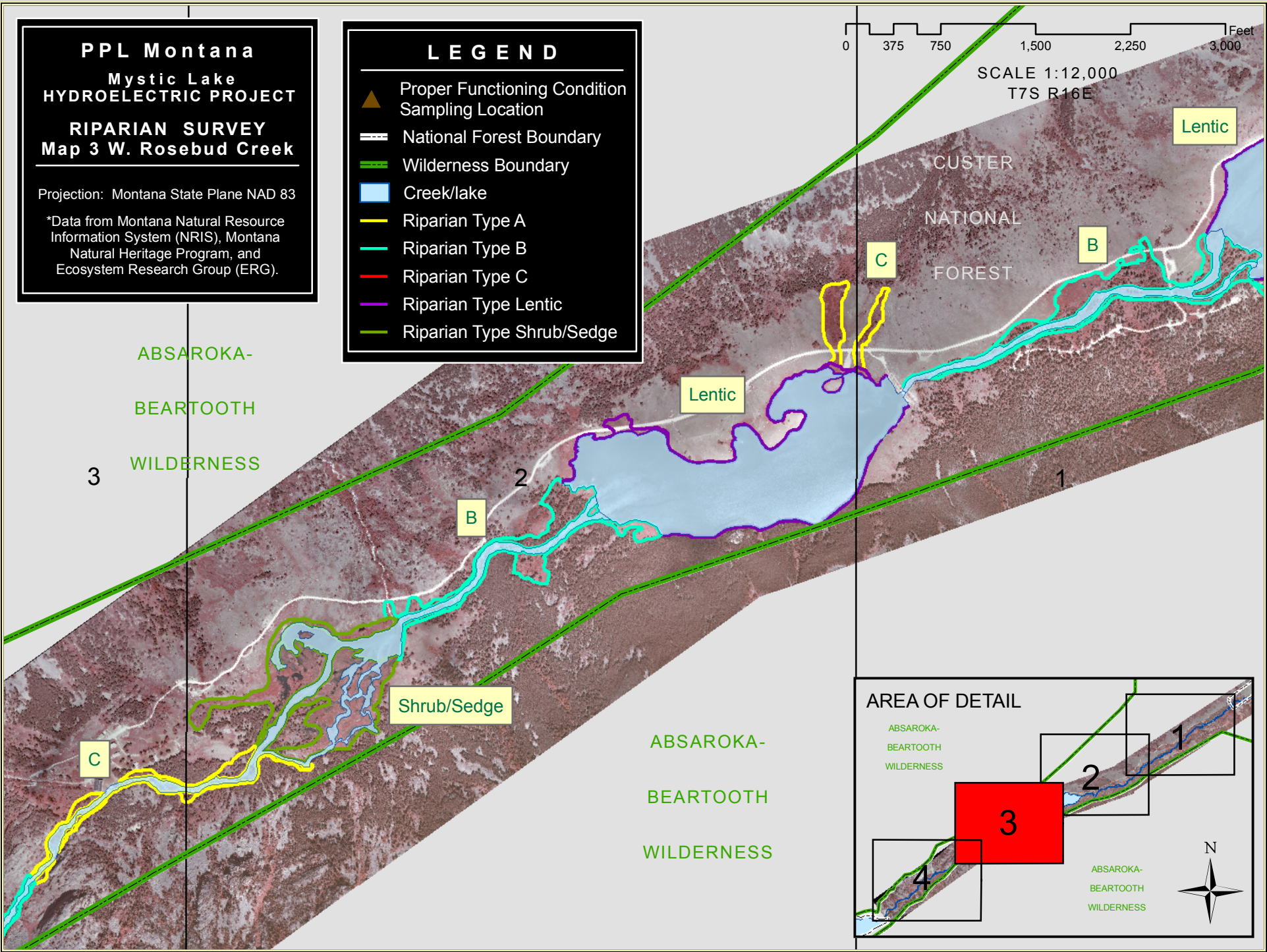
*Data from Montana Natural Resource Information System (NRIS), Montana Natural Heritage Program, and Ecosystem Research Group (ERG).

LEGEND

-  Proper Functioning Condition Sampling Location
-  National Forest Boundary
-  Wilderness Boundary
-  Creek/lake
-  Riparian Type A
-  Riparian Type B
-  Riparian Type C
-  Riparian Type Lentic
-  Riparian Type Shrub/Sedge



SCALE 1:12,000
 T7S R16E



Map last updated November 11, 2005.












PPL Montana
Mystic Lake
HYDROELECTRIC PROJECT
RIPARIAN SURVEY
Map 4 W. Rosebud Creek

Projection: Montana State Plane NAD 83

*Data from Montana Natural Resource Information System (NRIS), Montana Natural Heritage Program, and Ecosystem Research Group (ERG).

LEGEND

-  Proper Functioning Condition Sampling Location
-  National Forest Boundary
-  Wilderness Boundary
-  Creek/lake
-  Riparian Type A
-  Riparian Type B
-  Riparian Type C
-  Riparian Type Lentic
-  Riparian Type Shrub/Sedge

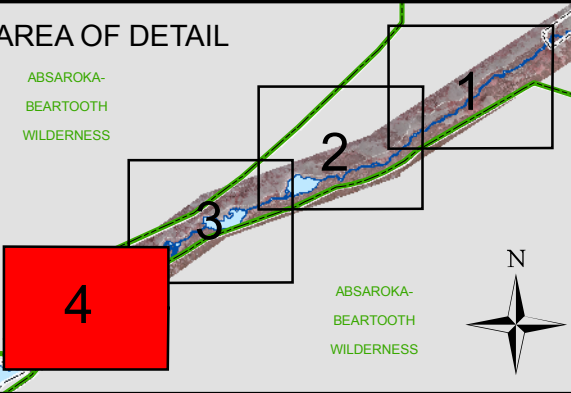
ABSAROKA-
BEARTOOTH
WILDERNESS

SCALE 1:12,000
T7S R16E

CUSTER
NATIONAL
FOREST

AREA OF DETAIL

ABSAROKA-
BEARTOOTH
WILDERNESS



MLPFC4

MLPFC5

