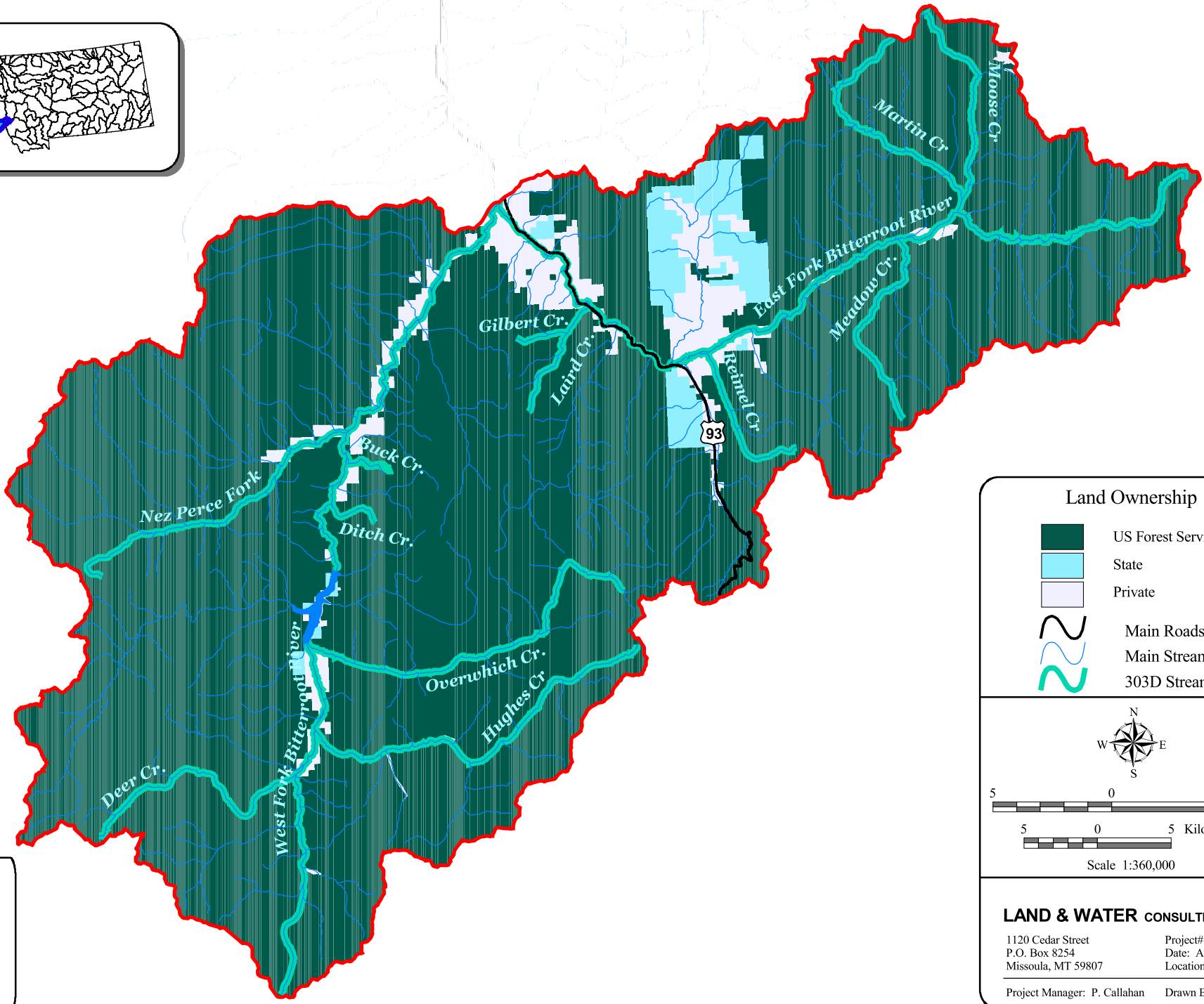
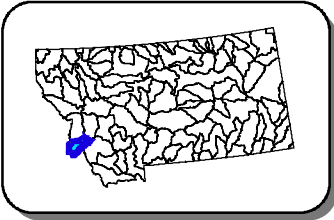


APPENDIX A – WATERSHED CHARACTERIZATION SUMMARY AND MAPS

Appendix A Maps

- Figure A-1. Land Ownership
- Figure A-2. USGS Station Gauges
- Figure A-3. Elevation
- Figure A-4. Slope (Percent)
- Figure A-5. Hillshade
- Figure A-6. Geology
- Figure A-7. General Soil Units
- Figure A-8. Soil Permeability
- Figure A-9. ISLE K-Factor
- Figure A-10. Mines and Prospects
- Figure A-11. Major Land Resource Areas
- Figure A-12. Vegetation Cover
- Figure A-13. Land Use and Land Cover
- Figure A-14. Roadless Areas
- Figure A-15. 2000 Burn Severity
- Figure A-16. Water Rights
- Figure A-17. Bull Trout Distribution
- Figure A-18. Westslope Cutthroat Trout Distribution

Summary of Selected Watershed Characteristics for the 14 303(d) Listed BHPA Watersheds Table



Land Ownership

- US Forest Service
- State
- Private
- Main Roads
- Main Streams
- 303D Streams

5 0 5 Miles

5 0 5 Kilometers

Scale 1:360,000

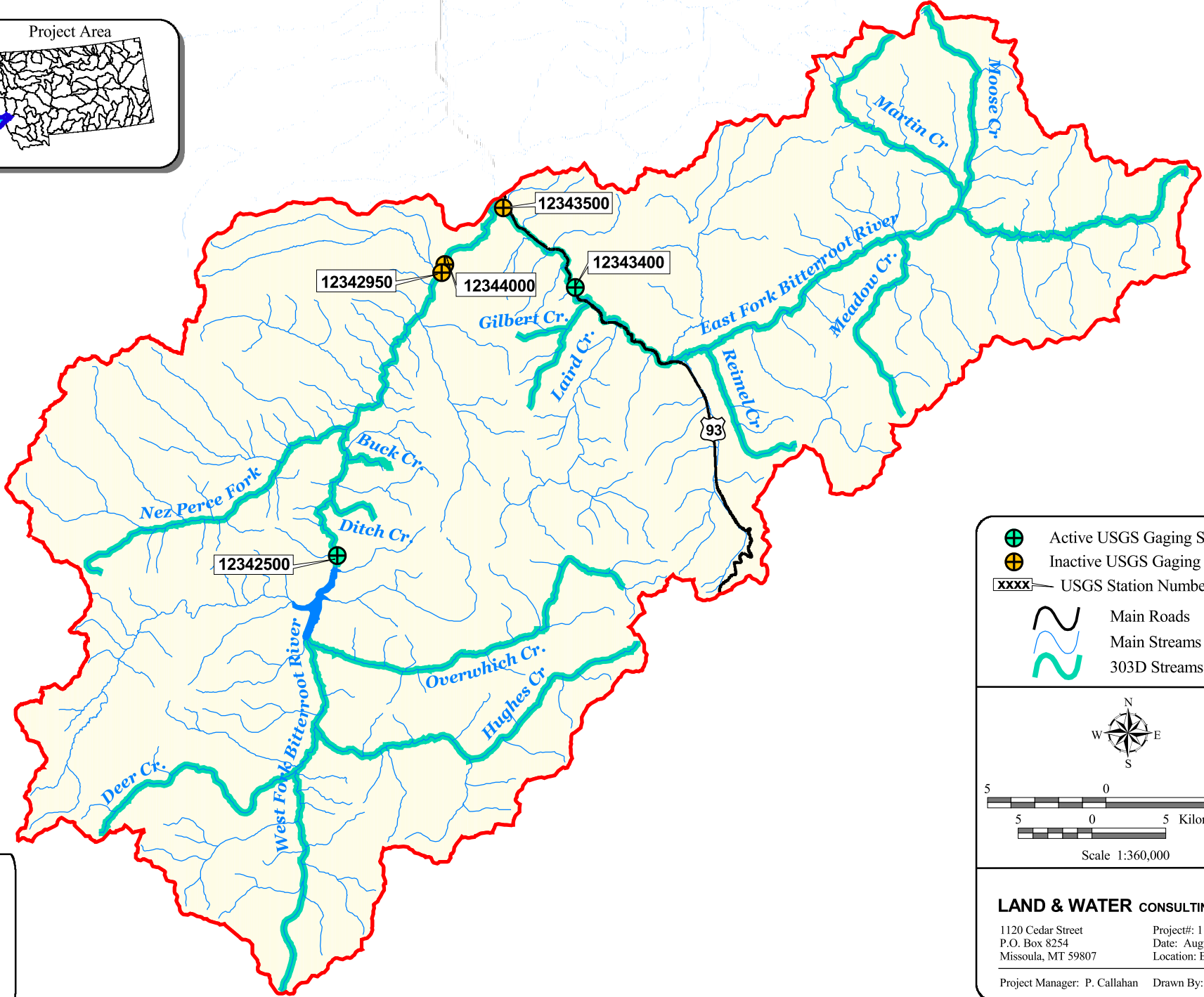
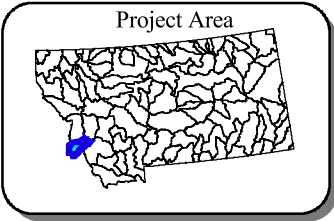
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Figure A-1
Land Ownership
Bitterroot Headwaters
TMDL Planning Area



- Active USGS Gaging Station
- Inactive USGS Gaging Station
- USGS Station Number
- Main Roads
- Main Streams
- 303D Streams

N
W —+— E
S

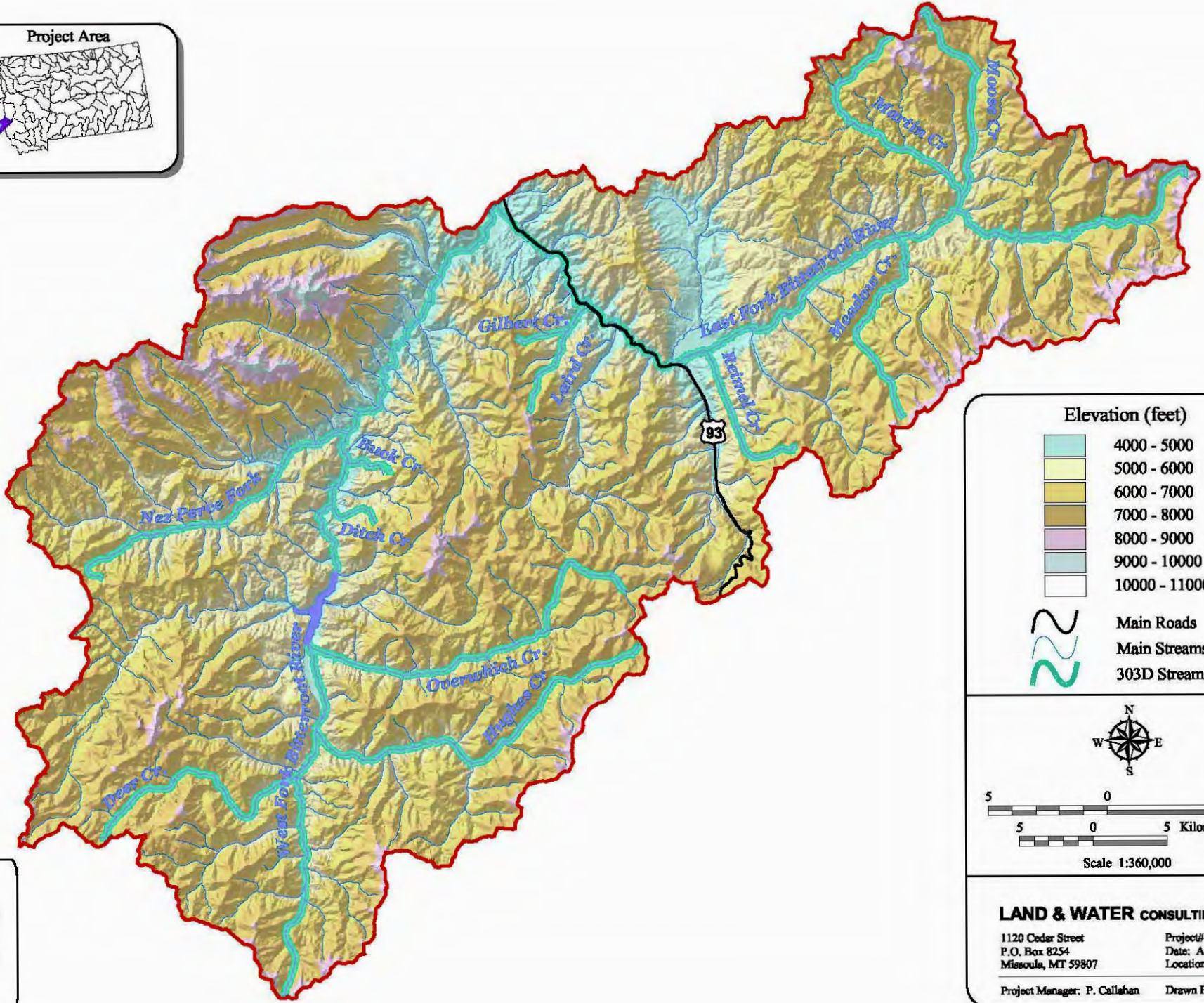
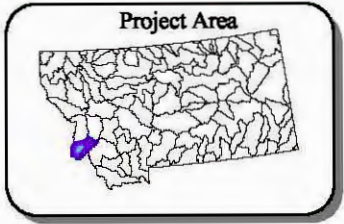
5 0 5 Miles

5 0 5 Kilometers

Scale 1:360,000




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Figure A-2
 USGS Stream Gages
 Bitterroot Headwaters
 TMDL Planning Area



Elevation (feet)

4000 - 5000
5000 - 6000
6000 - 7000
7000 - 8000
8000 - 9000
9000 - 10000
10000 - 11000

 Main Roads
 Main Streams
 303D Streams



5 0 5 Miles

5 0 5 Kilometers

Scale 1:360,000

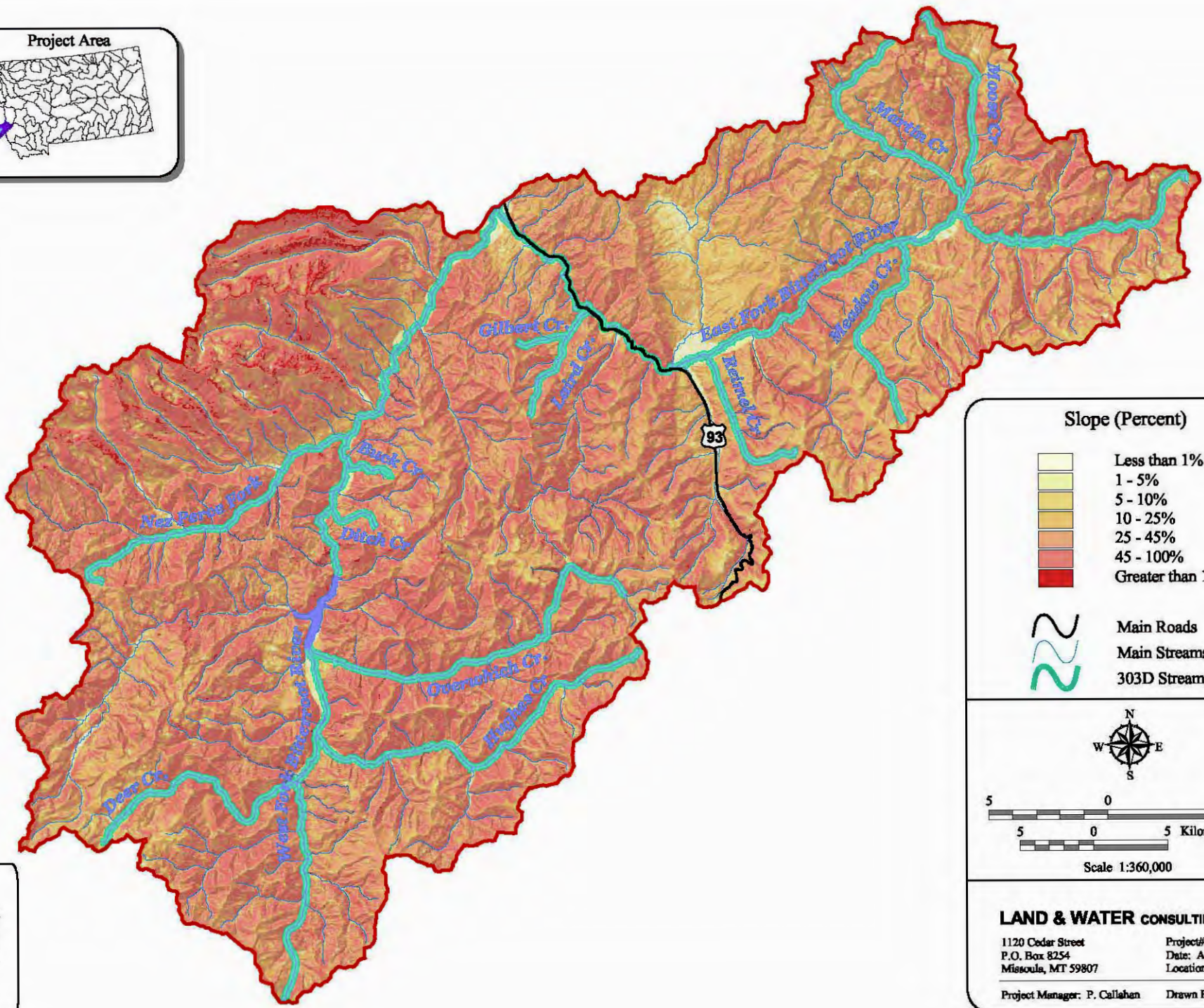
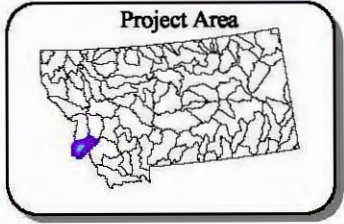
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Figure A-3
Elevation
Bitterroot Headwaters
TMDL Planning Area



Slope (Percent)

	Less than 1%
	1 - 5%
	5 - 10%
	10 - 25%
	25 - 45%
	45 - 100%
	Greater than 100%

Main Roads
 Main Streams
 303D Streams

Scale 1:360,000

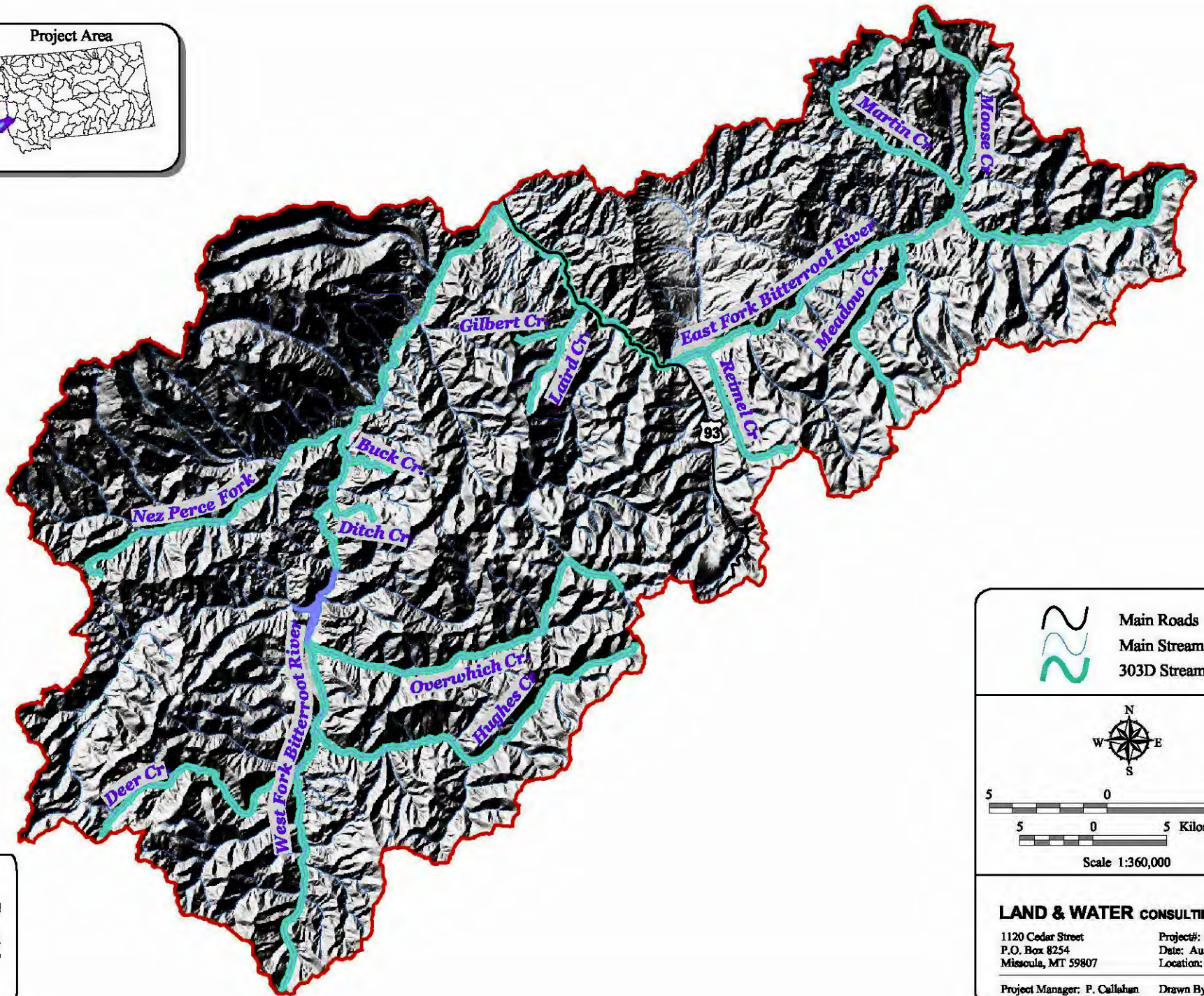
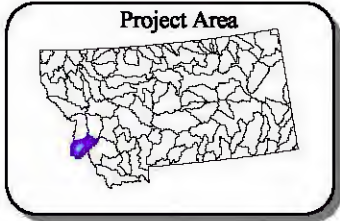
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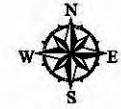
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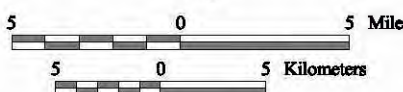
Project Manager: P. Callahan
 Drawn By: jcg

Figure A-4
Slope
Bitterroot Headwaters
TMDL Planning Area




 Main Roads
 Main Streams
 303D Streams




 5 0 5 Miles
 5 0 5 Kilometers

Scale 1:360,000

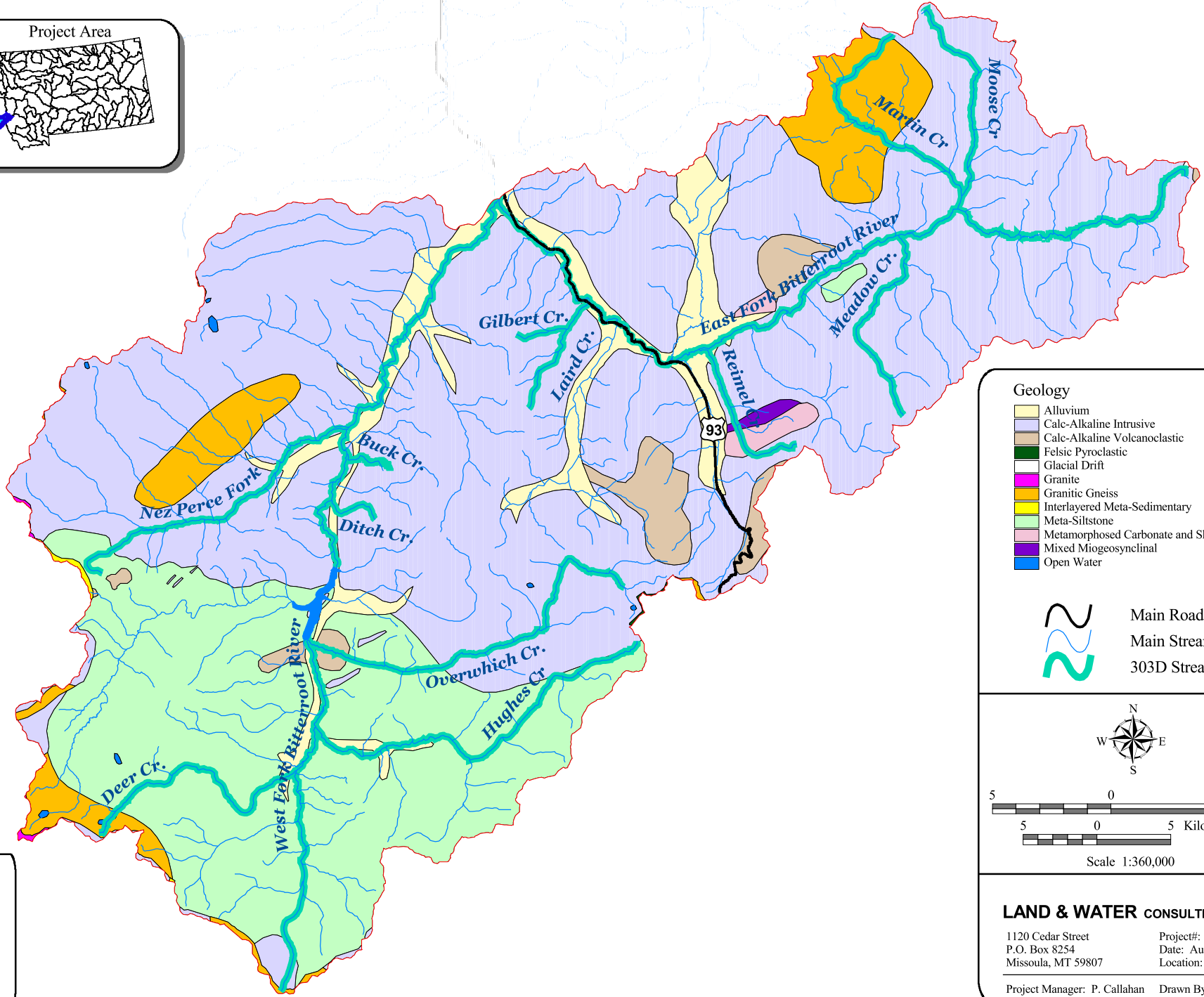
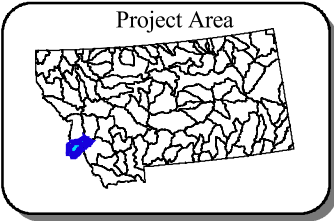
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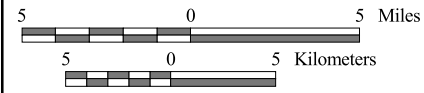
Figure A-5
 Bitterroot Headwaters
 TMDL Planning Area



Geology

- Alluvium
- Calc-Alkaline Intrusive
- Calc-Alkaline Volcanoclastic
- Felsic Pyroclastic
- Glacial Drift
- Granite
- Granitic Gneiss
- Interlayered Meta-Sedimentary
- Meta-Siltstone
- Metamorphosed Carbonate and Shale
- Mixed Miogeosynclinal
- Open Water

- Main Roads
- Main Streams
- 303D Streams



Scale 1:360,000

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Figure A-6
 Geology
 Bitterroot Headwaters
 TMDL Planning Area

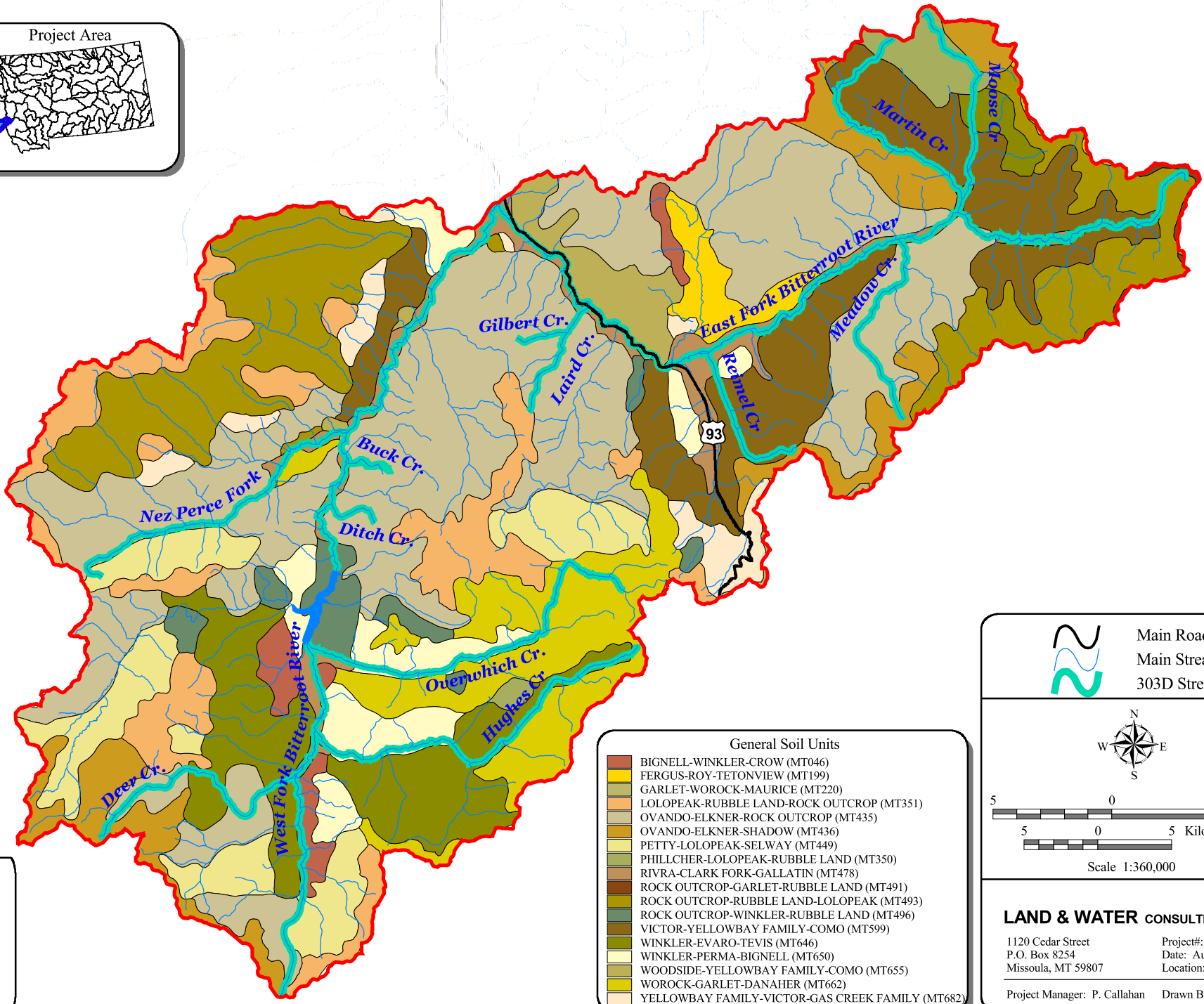
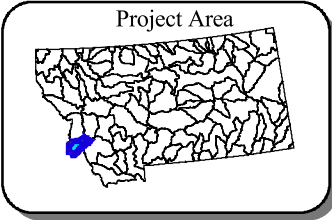



Figure A-7
Bitterroot Headwaters
TMDL Planning Area
General Soil Units


- General Soil Units**
- BIGNELL-WINKLER-CROW (MT046)
 - FERGUS-ROY-TETONVIEW (MT199)
 - GARLET-WOROCK-MAURICE (MT220)
 - LOLOPEAK-RUBBLE LAND-ROCK OUTCROP (MT351)
 - OVANDO-ELKNER-ROCK OUTCROP (MT435)
 - OVANDO-ELKNER-SHADOW (MT436)
 - PETTY-LOLOPEAK-SELWAY (MT449)
 - PHILLCHER-LOLOPEAK-RUBBLE LAND (MT350)
 - RIVRA-CLARK FORK-GALLATIN (MT478)
 - ROCK OUTCROP-GARLET-RUBBLE LAND (MT491)
 - ROCK OUTCROP-RUBBLE LAND-LOLOPEAK (MT493)
 - ROCK OUTCROP-WINKLER-RUBBLE LAND (MT496)
 - VICTOR-YELLOWBAY FAMILY-COMO (MT599)
 - WINKLER-EVARO-TEVIS (MT646)
 - WINKLER-PERMA-BIGNELL (MT650)
 - WOODSIDE-YELLOWBAY FAMILY-COMO (MT655)
 - WOROCK-GARLET-DANAHER (MT662)
 - YELLOWBAY FAMILY-VICTOR-GAS CREEK FAMILY (MT682)




Main Roads


Main Streams

303D Streams





5 Miles



5 Kilometers

Scale 1:360,000

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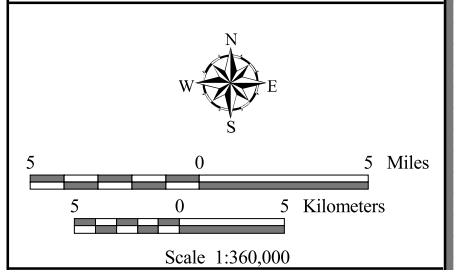
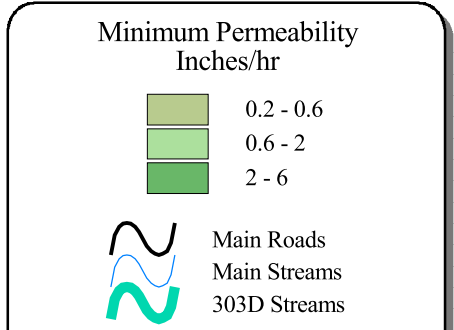
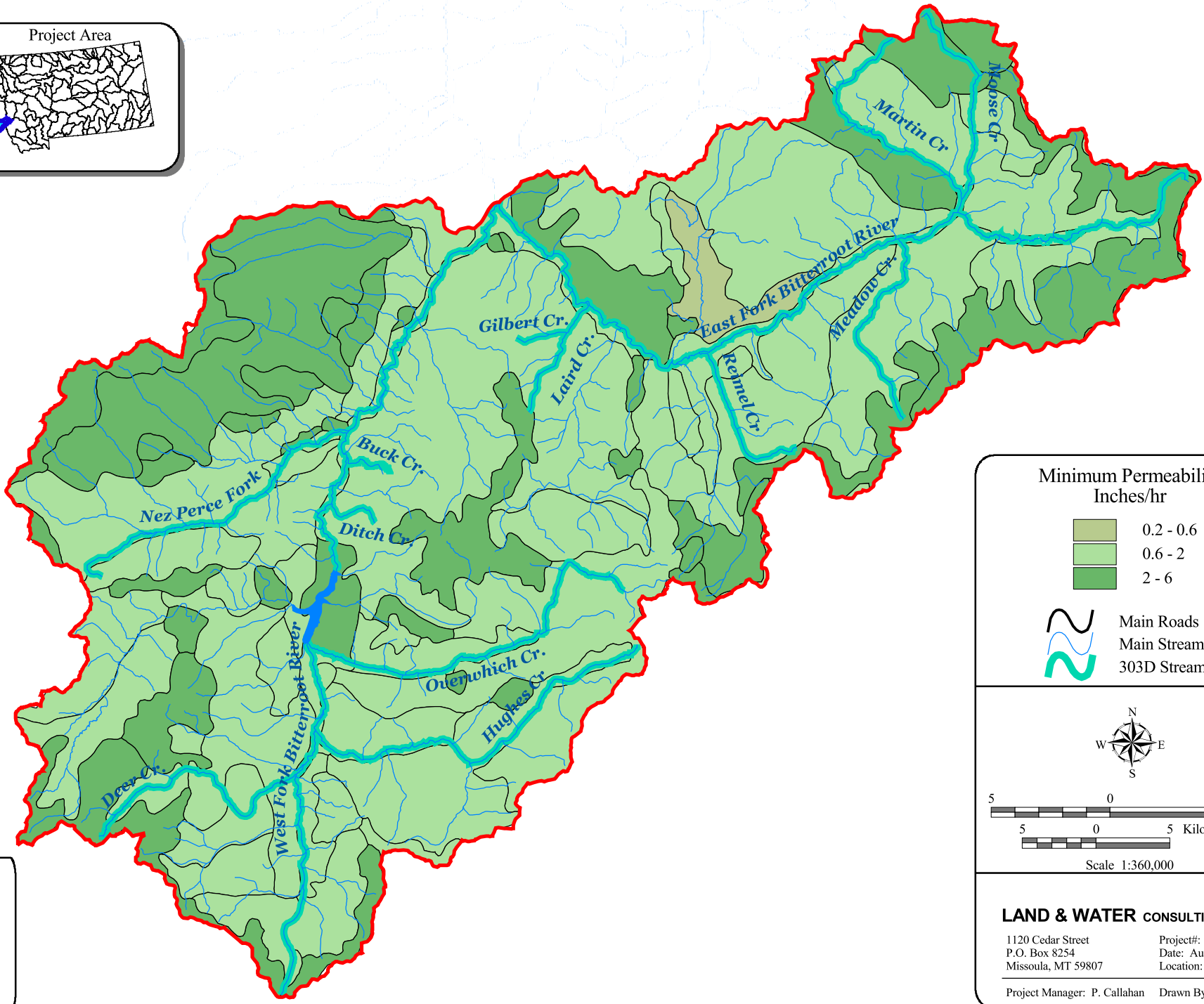
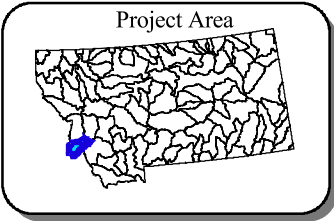
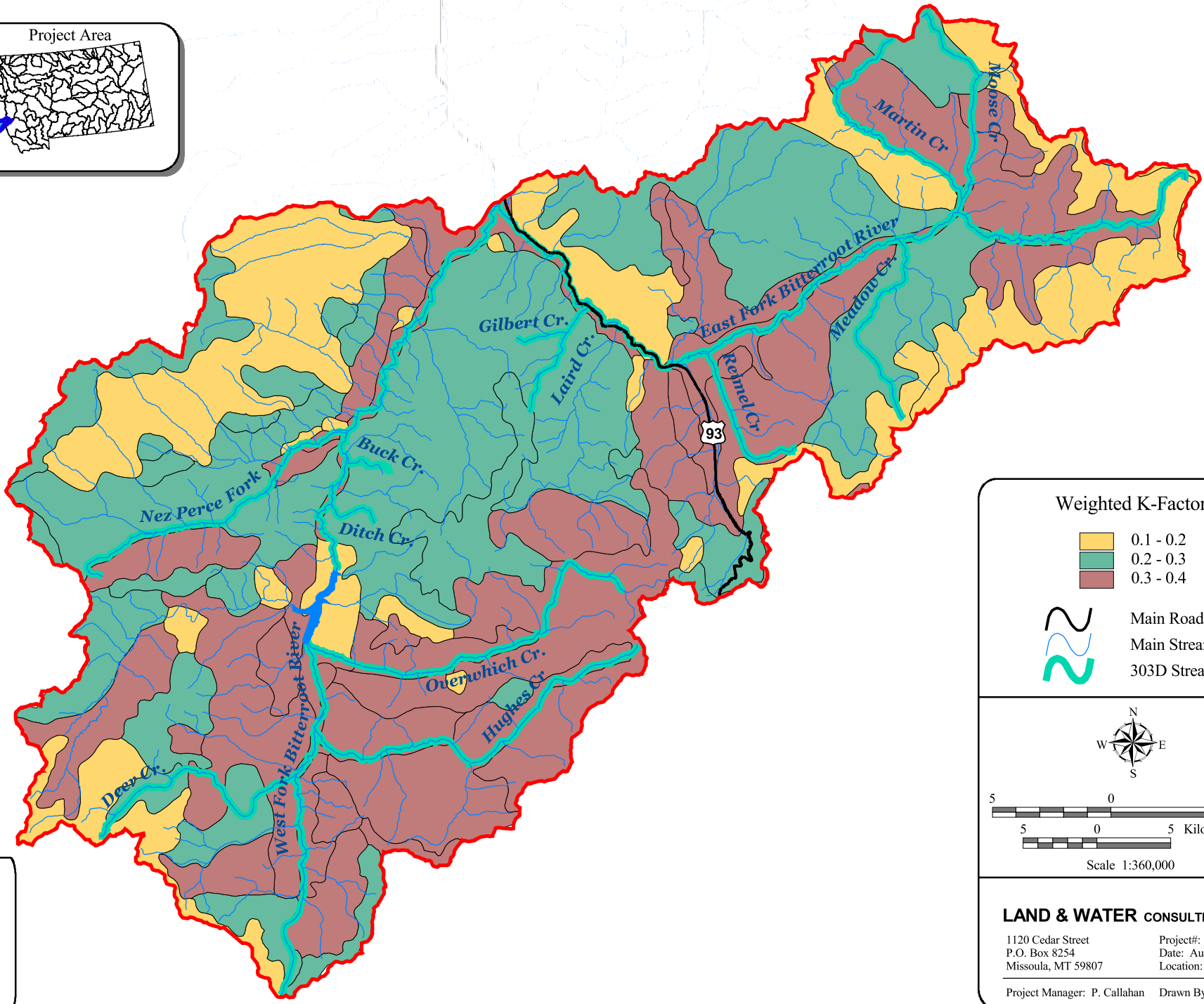
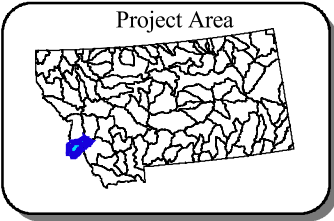


Figure A-8
Soil Permeability
Bitterroot Headwaters
TMDL Planning Area




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Weighted K-Factor

	0.1 - 0.2
	0.2 - 0.3
	0.3 - 0.4

	Main Roads
	Main Streams
	303D Streams

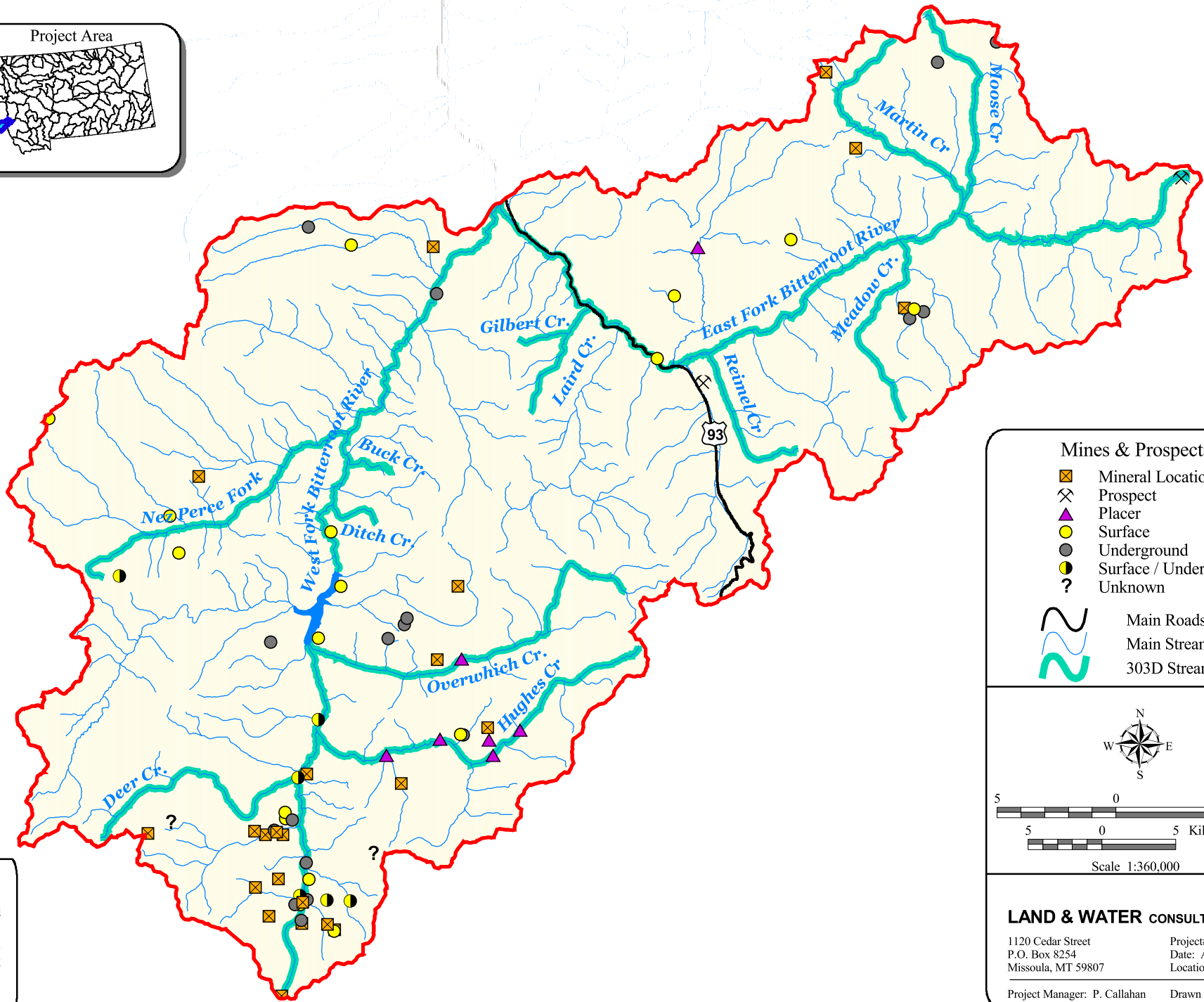
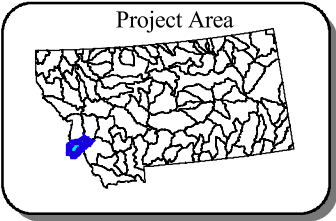
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Figure A-9
 USLE K-factor
 Bitterroot Headwaters
 TMDL Planning Area



Mines & Prospects

- ☒ Mineral Location
- ⊗ Prospect
- ▲ Placer
- Surface
- Underground
- Surface / Underground
- ? Unknown

 Main Roads
 Main Streams
 303D Streams





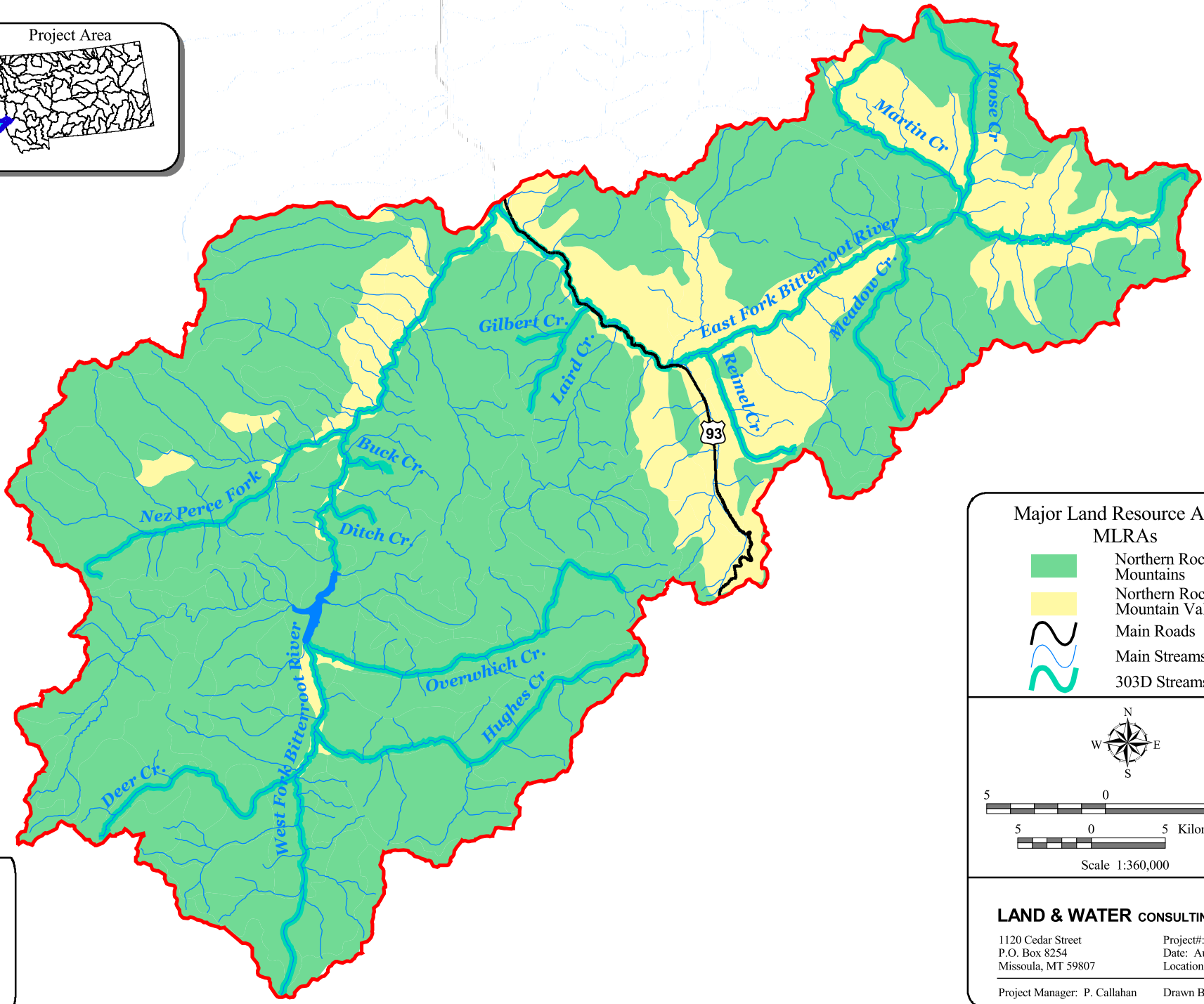
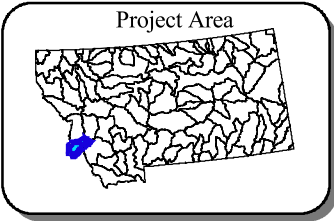
 5 Miles
 5 Kilometers
 Scale 1:360,000

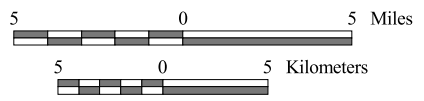
Figure A-10
 Mines & Prospects
 Bitterroot Headwaters
 TMDL Planning Area

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**Major Land Resource Areas
MLRAs**

- Northern Rocky Mountains
- Northern Rocky Mountain Valleys
- Main Roads
- Main Streams
- 303D Streams



Scale 1:360,000

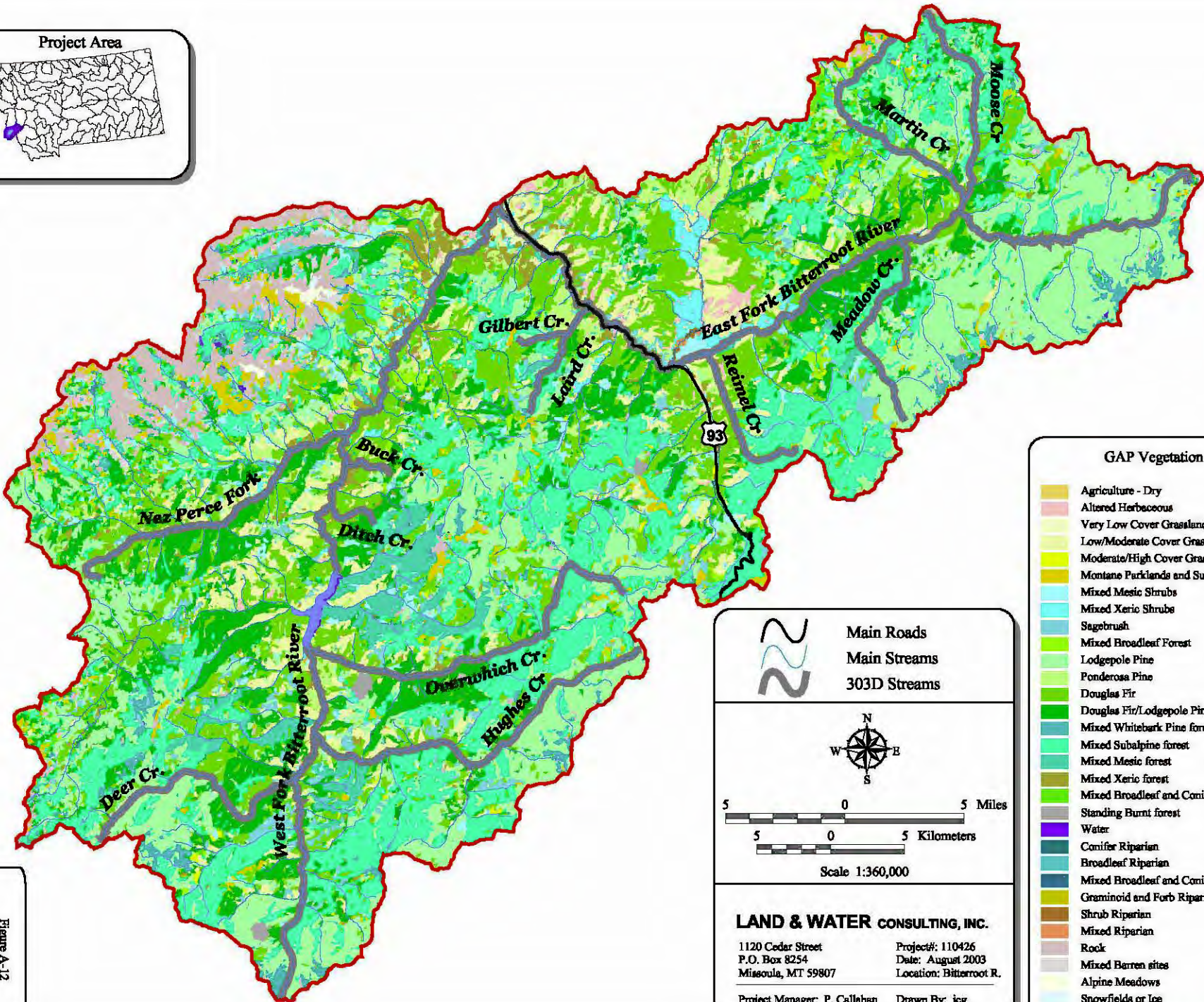
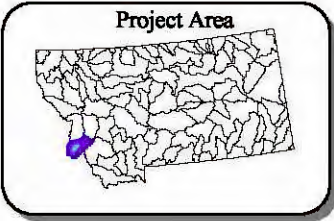
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
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Figure A-11
Major Land Resource Areas
Bitterroot Headwaters
TMDL Planning Area



 Main Roads
 Main Streams
 303D Streams


 W N E S

 5 0 5 Miles
 5 0 5 Kilometers
 Scale 1:360,000

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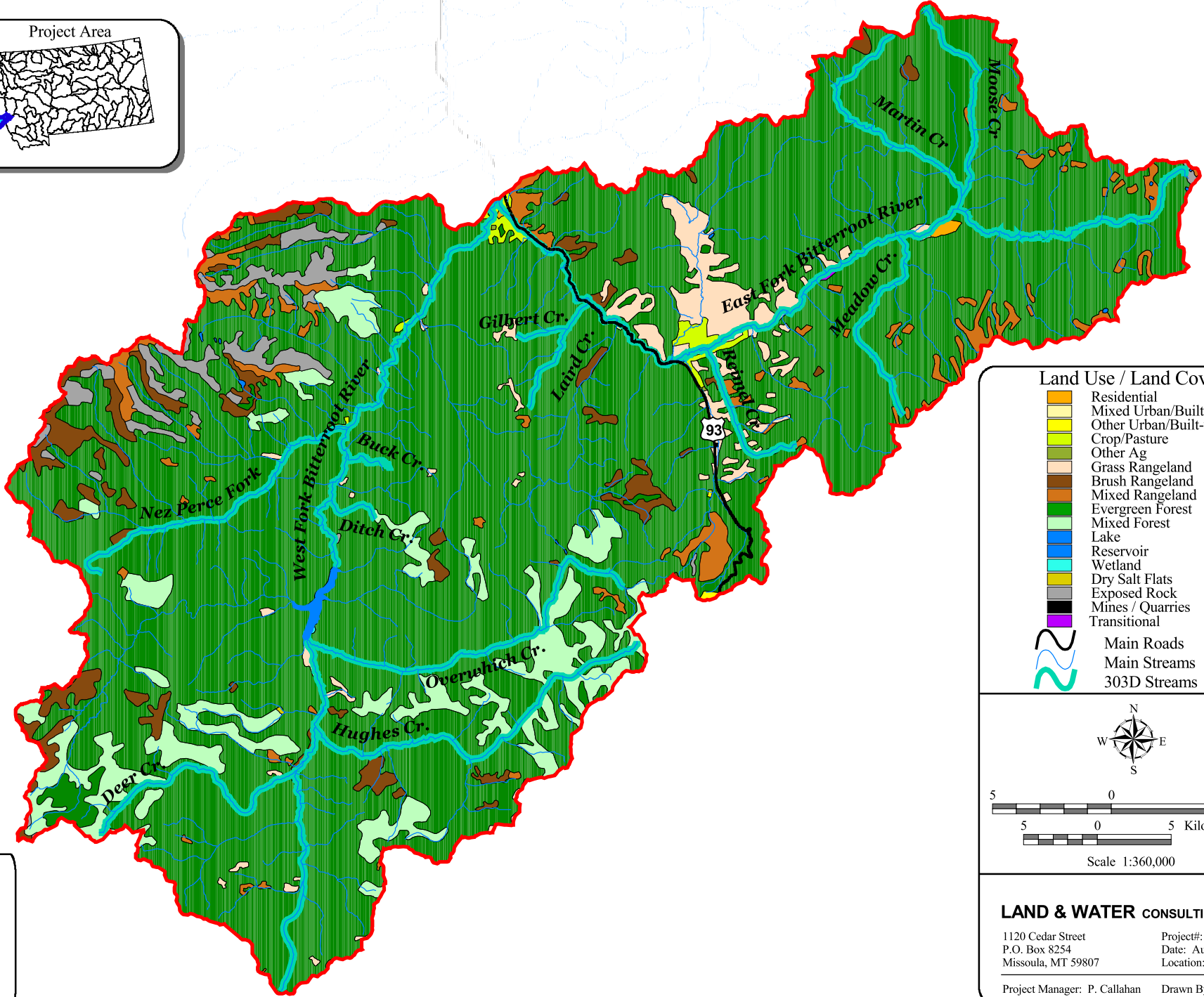
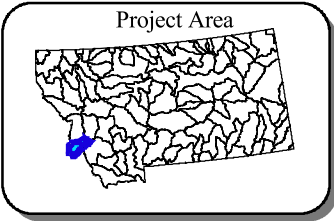
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GAP Vegetation

-  Agriculture - Dry
-  Altered Herbaceous
-  Very Low Cover Grassland
-  Low/Moderate Cover Grassland
-  Moderate/High Cover Grassland
-  Montane Parklands and Subalpine Meadows
-  Mixed Mesic Shrubs
-  Mixed Xeric Shrubs
-  Sagebrush
-  Mixed Broadleaf Forest
-  Lodgepole Pine
-  Ponderosa Pine
-  Douglas Fir
-  Douglas Fir/Lodgepole Pine
-  Mixed Whitebark Pine forest
-  Mixed Subalpine forest
-  Mixed Mesic forest
-  Mixed Xeric forest
-  Mixed Broadleaf and Conifer forest
-  Standing Burnt forest
-  Water
-  Conifer Riparian
-  Broadleaf Riparian
-  Mixed Broadleaf and Conifer Riparian
-  Graminoid and Forb Riparian
-  Shrub Riparian
-  Mixed Riparian
- Rock
- Mixed Barren sites
- Alpine Meadows
- Snowfields or Ice

Figure A-12
 Bitterroot Headwaters
 TMDL Planning Area
 Vegetation Cover



Land Use / Land Cover

- Residential
- Mixed Urban/Built-up
- Other Urban/Built-up
- Crop/Pasture
- Other Ag
- Grass Rangeland
- Brush Rangeland
- Mixed Rangeland
- Evergreen Forest
- Mixed Forest
- Lake
- Reservoir
- Wetland
- Dry Salt Flats
- Exposed Rock
- Mines / Quarries
- Transitional
- Main Roads
- Main Streams
- 303D Streams

N
W E
S

5 0 5 Miles
5 0 5 Kilometers

Scale 1:360,000

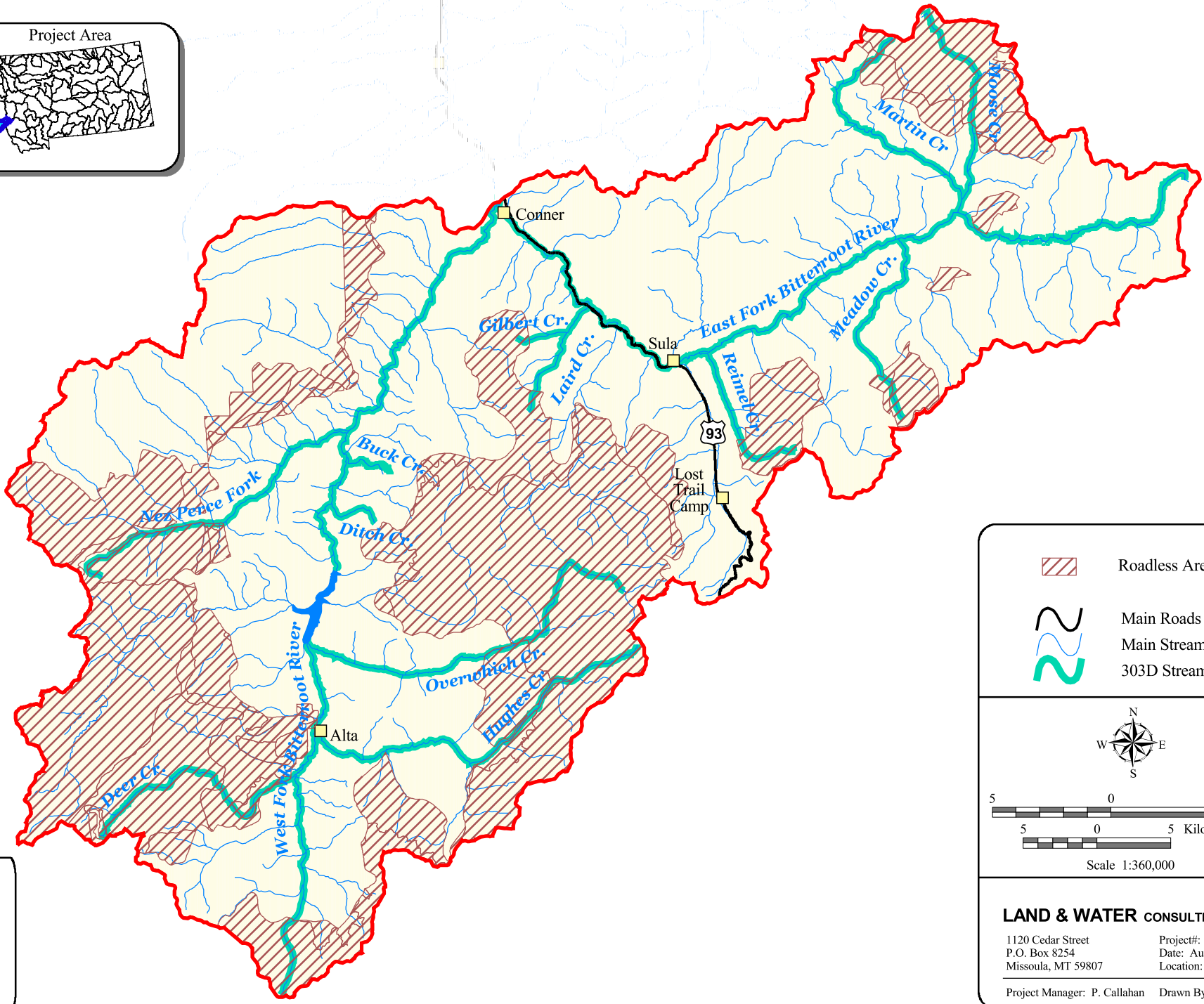
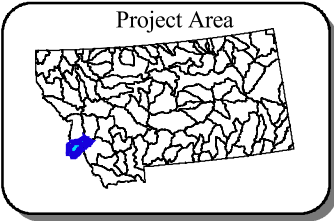
Figure A-13
Land Use & Land Cover
Bitterroot Headwaters
TMDL Planning Area





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-  Roadless Areas
-  Main Roads
-  Main Streams
-  303D Streams


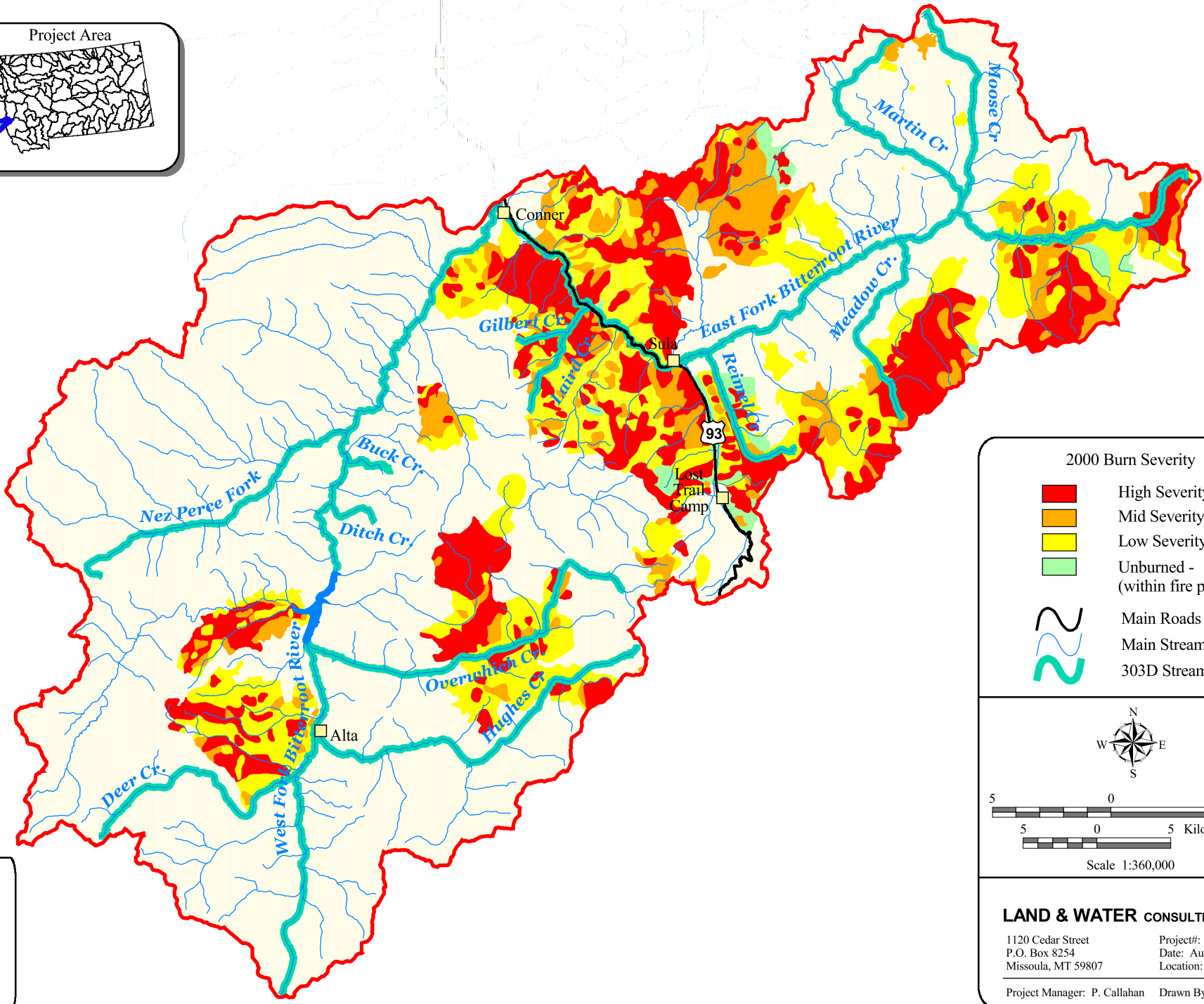
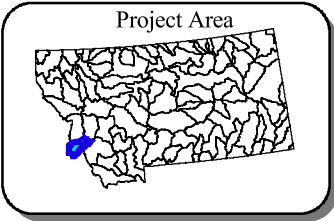

 5 0 5 Miles
 5 0 5 Kilometers
 Scale 1:360,000

Figure A-14
 Roadless Areas
 Bitterroot Headwaters
 TMDL Planning Area

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2000 Burn Severity

- High Severity
- Mid Severity
- Low Severity
- Unburned - (within fire perimeter)

- Main Roads
- Main Streams
- 303D Streams

Scale 1:360,000

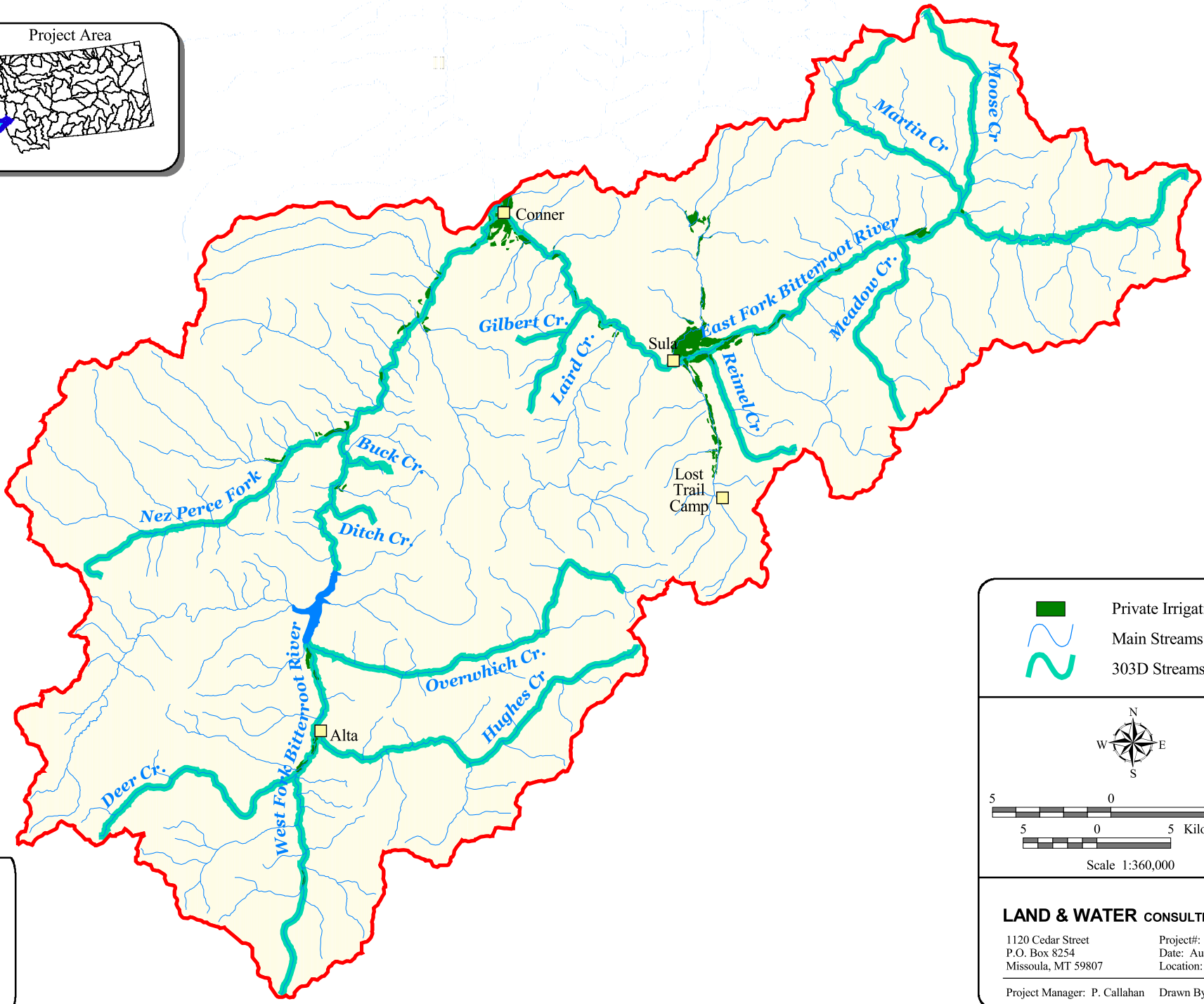
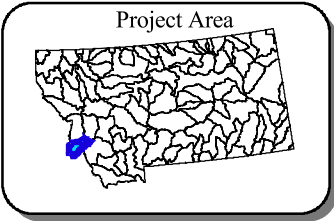
Figure A-15
 2000 Burn Severity
 Bitterroot Headwaters
 TMDL Planning Area




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-  Private Irrigation
-  Main Streams
-  303D Streams




 Scale 1:360,000

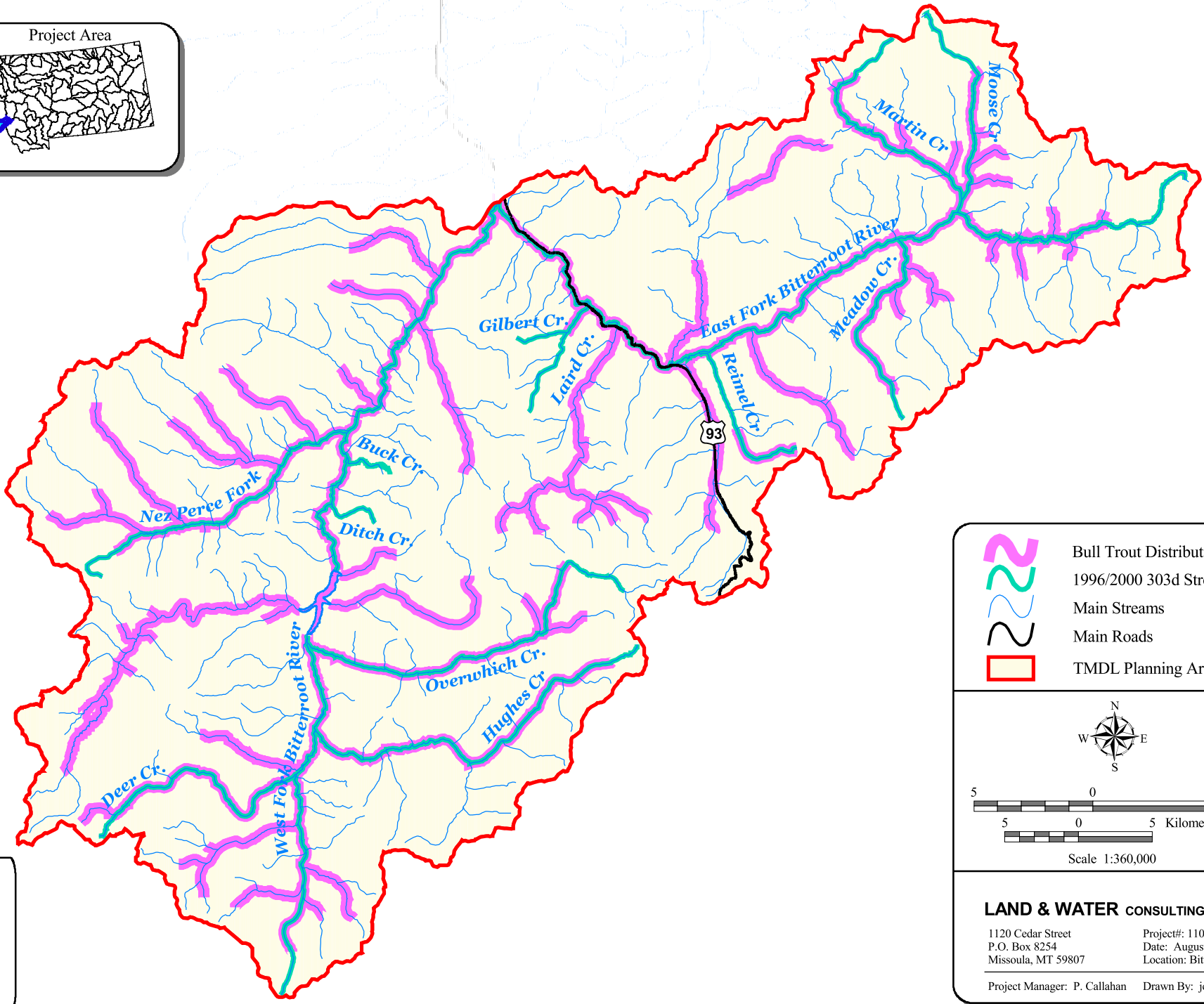
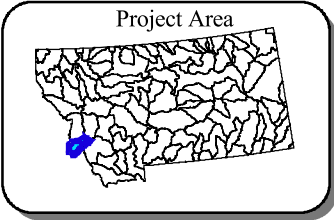
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Figure A-16
 Water Rights
 Bitterroot Headwaters
 TMDL Planning Area



-  Bull Trout Distribution
-  1996/2000 303d Streams
-  Main Streams
-  Main Roads
-  TMDL Planning Area

Scale 1:360,000

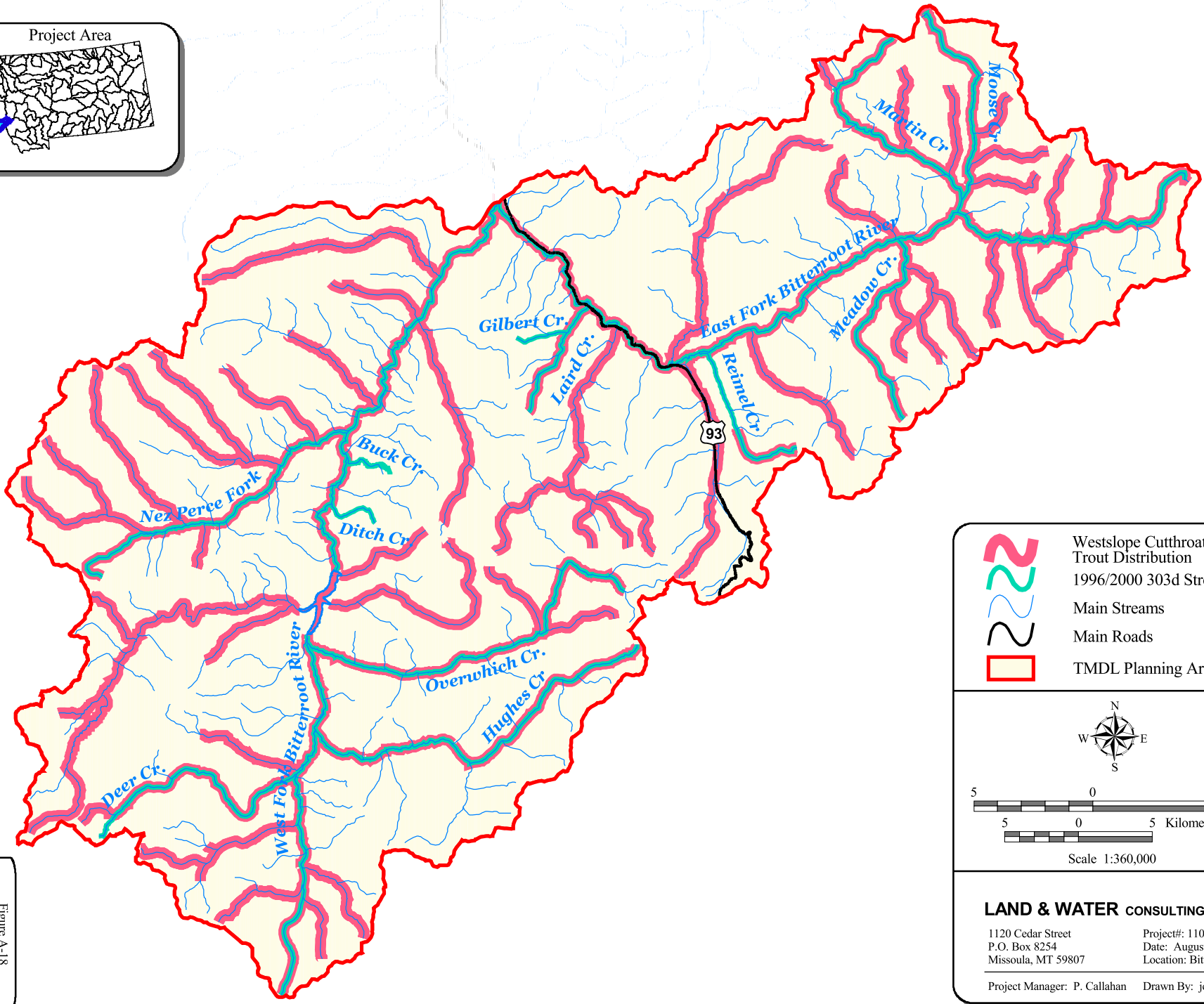
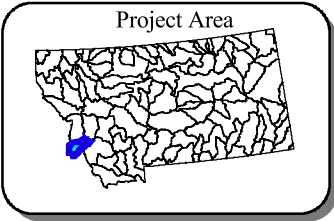
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Figure A-17
Bull Trout Distribution
Bitterroot Headwaters
TMDL Planning Area



-  Westslope Cutthroat Trout Distribution
-  1996/2000 303d Streams
-  Main Streams
-  Main Roads
-  TMDL Planning Area

Scale 1:360,000

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Figure A-18
Westslope Cutthroat Trout
Distribution
Bitterroot Headwaters
TMDL Planning Area

Summary of Selected Watershed Characteristics for the 14 303(d) Listed BHPA Watersheds

Selected Watershed Characteristic	Fourteen 303(d) Listed Watersheds in the Bitterroot Headwaters Planning Area													
	Buck Creek	Deer Creek	Ditch Creek	East Fork	Gilbert Creek	Hughes Creek	Laird Creek	Martin Creek	Meadow Creek	Moose Creek	Nez Perce Creek	Overwhich Creek	Reimel Creek	West Fork
Watershed Size (sq mi)	2.4	22.7	1.7	407.3	2.4	59.8	9.4	31.9	32.1	24.9	37.3	50.2	9.2	559.4
Ownership (%)	86.7 USFS 13.3 PVT	99.8 USFS 0.2 PVT	100 USFS	85.6 USFS 8.6 PVT 5.8 DNRC	100 USFS	97.6 USFS 2.4 PVT	98.0 USFS 2.0 PVT	100 USFS	100 USFS	98.2 USFS 1.8 PVT	96.5 USFS 3.5 PVT	99.2 USFS 0.8 PVT	95.8 USFS 4.2 PVT	96.6 USFS 3.1 PVT 0.3 DNRC
Average Elevation (ft)	5,385	6,854	5,629	6,277	5,960	6,747	5,942	6,810	6,888	6,909	6,101	6,675	6,103	6,499
Average Slope (%)	17.9	15.1	18.9	19.1	18.7	10.6	18.5	20.2	19.1	21.8	25.8	17.5	16.6	18.2
Dominant Geology (%)	Calc-alkaline intrusive (92.7)	Meta-siltstone (86.1), Granitic Gneiss (10.3)	Calc-alkaline intrusive (88.2)	Calc-alkaline intrusive (78.0), Alluvium (8.8), Granitic Gneiss (6.6)	Calc-alkaline intrusive (100)	Meta-siltstone (90.1)	Calc-alkaline intrusive (99.2)	Granitic Gneiss (61.5), Calc- alkaline intrusive (38.5)	Calc-alkaline intrusive (100)	Calc-alkaline intrusive (99.9)	Calc-alkaline intrusive (72.3), Meta-siltstone (11.1), Granitic Gneiss (10.0)	Calc-alkaline intrusive (70.3), Meta-siltstone (25.3)	Calc-alkaline intrusive (57.9), Metamorphose d Carbonate & Shale (26.5), Mixed miogeosynclinal (11.2)	Calc-alkaline intrusive (49.8), Meta-siltstone (40.1)
Dominant Soil Series (%)	Ovando-Elkner- Rock Outcrop (99.3)	Ovando- Elkner-Rock Outcrop (35.3), Ovando- Elkner-Shadow (31.1), Winkler- Evaro-Tevis (22.7)	Ovando- Elkner-Rock Outcrop (100)	Ovando- Elkner-Rock Outcrop (33.8), Victor- Yellowbay Family-Como (21.3)	Ovando- Elkner-Rock Outcrop (100)	Winkler-Evaro -Tevis (52.0), Worock-Garlet -Danaher (31.9), Winkler- Perma-Bignell (14.5)	Ovando- Elkner- Rock Outcrop (92.2)	Victor- Yellowbay Family-Como (54.3), Ovando- Elkner-Shadow (29.4), Phillcher -Lolopeak- Rubble Land (14.6)	Ovando- Elkner-Rock Outcrop (65.7), Rock Outcrop- Rubble Land- Lolopeak (18.3), Ovando- Elkner-Shadow (15.0)	Victor- Yellowbay Family-Como (23.3), Winkler -Evaro-Tevis (23.1), Phillcher -Lolopeak- Rubble Land (22.8), Ovando- Elkner-Shadow (16.7), Rock Outcrop- Rubble Land- Lolopeak (12.1)	Ovando- Elkner-Rock Outcrop (44.0), Petty- Lolopeak- Selway (25.7), Rock Outcrop- Rubble Land- Lolopeak (12.0)	Worock-Garlet -Danaher (68.7), Winkler -Perma-Bignell (18.4)	Victor- Yellowbay Family- Como (80.3), Ovando- Elkner-Shadow (12.6)	Ovando- Elkner-Rock Outcrop (26.6), Rock Outcrop- Rubble Land- Lolopeak (12.0), Winkler- Evaro-Tevis (11.7)
Soil Permeability (%) 0.6 to 2.0 in/hr 2.0 to 6.0 in/hr	100 0	59.3 40.7	100 0	67.7 29.0	100 0	98.6 1.4	93.3 6.7	56.0 44.0	66.4 33.6	48.4 51.6	77.5 22.5	88.7 11.3	87.4 12.6	69.0 31.0
Soil K Factor (%) 0.1 to <0.2 0.2 to <0.3 0.3 to <0.4	0 99.3 0.7	31.2 44.8 24.0	0 100 0	22.0 40.8 37.2	0 100 0	0 1.4 98.6	0.3 98.6 1.1	29.4 15.2 55.4	33.6 65.7 0.7	28.8 22.8 48.4	12.6 53.9 33.5	4.6 6.5 88.9	12.6 87.4	18.8 38.6 42.6
Dominant GAP Vegetation	Lodgepole Pine, Ponderosa Pine, Douglas- fir	Lodgepole Pine, Douglas- fir, Mixed Subalpine Forest	Lodgepole Pine, Douglas- fir, Mixed Subalpine Forest	Lodgepole Pine, Douglas- fir, Mixed Subalpine Forest	Lodgepole Pine, Douglas- fir, Mixed Subalpine Forest	Lodgepole Pine, Douglas- fir, Mixed Subalpine Forest	Lodgepole Pine, Douglas- fir, Mixed Subalpine Forest	Lodgepole Pine, Ponderosa Pine, Douglas- fir, Mixed Subalpine Forest	Lodgepole Pine, Douglas- fir, Mixed Subalpine Forest	Lodgepole Pine, Mixed Subalpine Forest	Lodgepole Pine, Douglas- fir, Mixed Subalpine Forest	Lodgepole Pine, Douglas- fir, Mixed Subalpine Forest	Douglas-fir, Mixed Subalpine Forest	Lodgepole Pine, Douglas- fir, Mixed Subalpine Forest
Major Land Resource Area	Northern Rocky Mtns.	Northern Rocky Mtns.	Northern Rocky Mtns.	Northern Rocky Mtns.	Northern Rocky Mtns.	Northern Rocky Mtns.	Northern Rocky Mtns.	Northern Rocky Mtns. & Foothills	Northern Rocky Mtns.	Northern Rocky Mtns.	Northern Rocky Mtns.	Northern Rocky Mtns.	Northern Rocky Mtn. Foothills	Northern Rocky Mtns.
Major Land Use/ Land Cover	Evergreen Forest	Evergreen Forest	Evergreen Forest	Evergreen Forest	Evergreen Forest	Evergreen Forest	Evergreen Forest	Evergreen Forest	Evergreen Forest	Evergreen Forest	Evergreen Forest	Evergreen Forest	Evergreen Forest	Evergreen Forest
Burned in 2000 (%)	0	7.03	0	49.81	83.34	11.44	83.63	2.82	64.54	8.16	0	38.87	57.03	13.36
Percent Roadless (%)	0	93.1	0.6	22.5	37.7	62.5	22.2	31.4	20.9	72.9	46.9	58.8	62.1	46.3
Road Miles (mi)	15.0	7.4	8.3	1,481.8	4.6	87.1	47.4	89.8	81.9	37.7	89.7	77.6	6.4	1,272.3
Road Density (mi/mi ²)	6.2	0.3	4.8	3.6	1.9	1.5	5.0	2.8	2.5	1.5	2.4	1.5	0.7	2.3
Length of Stream (mi)	3.1	12.5	2.7	29.9	2.3	18.7	5.7	11.7	9.7	10.1	14.7	19.1	7.4	39.4