Little Wood River
Total Maximum Daily Load Implementation Plan for Agriculture

Developed for the Idaho Department of Environmental Quality
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In Cooperation With:
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Introduction

PURPOSE
The Little Wood River subbasin Total Maximum Daily Load (TMDL) Implementation Plan for Agriculture outlines an adaptive management approach for implementation of best management practices (BMPs) and resource management systems (RMS) on agricultural lands to meet the requirements of the Little Wood River subbasin TMDL.

GOALS AND OBJECTIVES
The goal of this plan is to provide a strategy for agriculture that assists and/or complements other watershed efforts in restoring and protecting beneficial uses for water quality impaired streams in the Little Wood River subbasin. These water quality impaired stream segments and pollutants are identified in the Idaho Department of Environmental Quality (IDEQ) [1998] 303(d) list for the Little Wood River subbasin (Table 1, Figure 2). This list has since been superseded by the IDEQ [2002] 303(d)/305(b) integrated report, as well as the IDEQ [2008] 303(d)/305(b) integrated report. See tables 13 and 14 in Appendix A for a summary of these reports. This implementation plan addresses the [1998] 303(d) list because this was the list outlined in the Little Wood River Subbasin Assessment and Total Maximum Daily Load document (IDEQ, 2005).

Table 1. [1998] 303(d) listed segments in the Little Wood River Subbasin

Water Body Name	**Assessment Units**	**1998 303(d) Boundaries**	**Pollutants**
Little Wood River #4 (lower)	ID17040221SK001_05 ID17040221SK001_05a ID17040221SK001_05b	Richfield (town) to Big Wood River	BAC, DO, NUT, SED, QALT, TEMP
Little Wood River #4 (upper)	ID17040221SK002_05	Silver Creek to Richfield (town)	NUT, SED, TEMP
Little Wood River #3	ID17040221SK010_05a ID17040221SK003_05	East Canal Diversion to Silver Creek	NUT, SED, TEMP
Little Wood River Reservoir	ID17040221SK012L_0L		BAC, DO, NUT, SED, QALT
Dry Creek	ID17040221SK022_02 ID17040221SK022_03	Headwaters to Little Wood River	BAC, DO, NUT, SED, QALT
Fish Creek (below)	ID17040221SK006_03 ID17040221SK006_04	Fish Creek Reservoir to Carey Lake	BAC, DO, NUT, SED, QALT

Fish Creek Reservoir	ID17040221SK005L_0L		BAC, DO, NUT, SED, QALT
Muldoon Creek	ID17040221SK014_04	South Fork Muldoon Creek to Little Wood River	UNK
Muldoon Creek	ID17040221SK014_04 ID17040221SK014_03 ID17040221SK014_02	Headwaters to Little Wood River	TEMP
Loving Creek	ID17040221SK023_02	Headwaters to Silver Creek	TEMP
Fish Creek (above)	ID17040221SK008_02 ID17040221SK008_03 ID17040221SK008_04	Headwaters to Fish Creek Reservoir	BAC, DO, NUT, SED, QALT
Pollutants Key: BAC = Bacteria, DO = Dissolved Oxygen, NUT = Nutrients, SED = Sediment, QALT = Flow Alteration, UNK = Unknown, TEMP = Temperature			

This implementation plan will provide guidance to the Blaine and Gooding Soil Conservation Districts, Wood River and North Side Soil and Water Conservation Districts, and agricultural producers in the Little Wood River subbasin to identify BMPs necessary to meet the requirements of the TMDLs on 303(d) listed streams. The objective of this plan is to reduce the amount of pollutants entering these water bodies from agricultural-related practices. Agricultural pollutant reductions will be achieved by on-farm conservation planning with individual operators and application of BMPs in critical areas of agriculture. This plan recommends BMPs to meet TMDL targets in the Little Wood River subbasin and suggests alternatives for reducing surface and groundwater quality problems from agricultural related activities.

Background

PROJECT SETTING

The Little Wood River subbasin is located in south central Idaho and is approximately 781,178 acres in size (Figure 1). The headwaters of the Little Wood River originate in the Pioneer Mountains and the northernmost border of the watershed follows the Blaine County line. The subbasin extends southeast along the Pioneer Mountain Range and then proceeds in a southwest direction south of the towns of Carey and Richfield. The boundary runs southeast of Dietrich to encompass Star Lake and moves west through Lincoln and Gooding Counties to the mouth of the Little Wood River. From the mouth, the border of the subbasin extends east, north of the river, and then runs north along the Cottonwood Slough. The border encompasses the Silver Creek drainage and continues north between Gannet and Bellevue to meet the Blaine County line above the headwaters (IDEQ, 2005).

The ecoregions included in the Little Wood River subbasin are Northern Rockies, Snake River Plain/High Deserts, and transitional zones between the two ecoregions. 59% of the subbasin

occurs at an elevation of less than 5,000 feet, while 34.1% of the area is found at elevations between 5,000 and 7,000 feet. The remaining 6.9% sits at elevations higher than 7,000 feet (IDEQ, 2005).

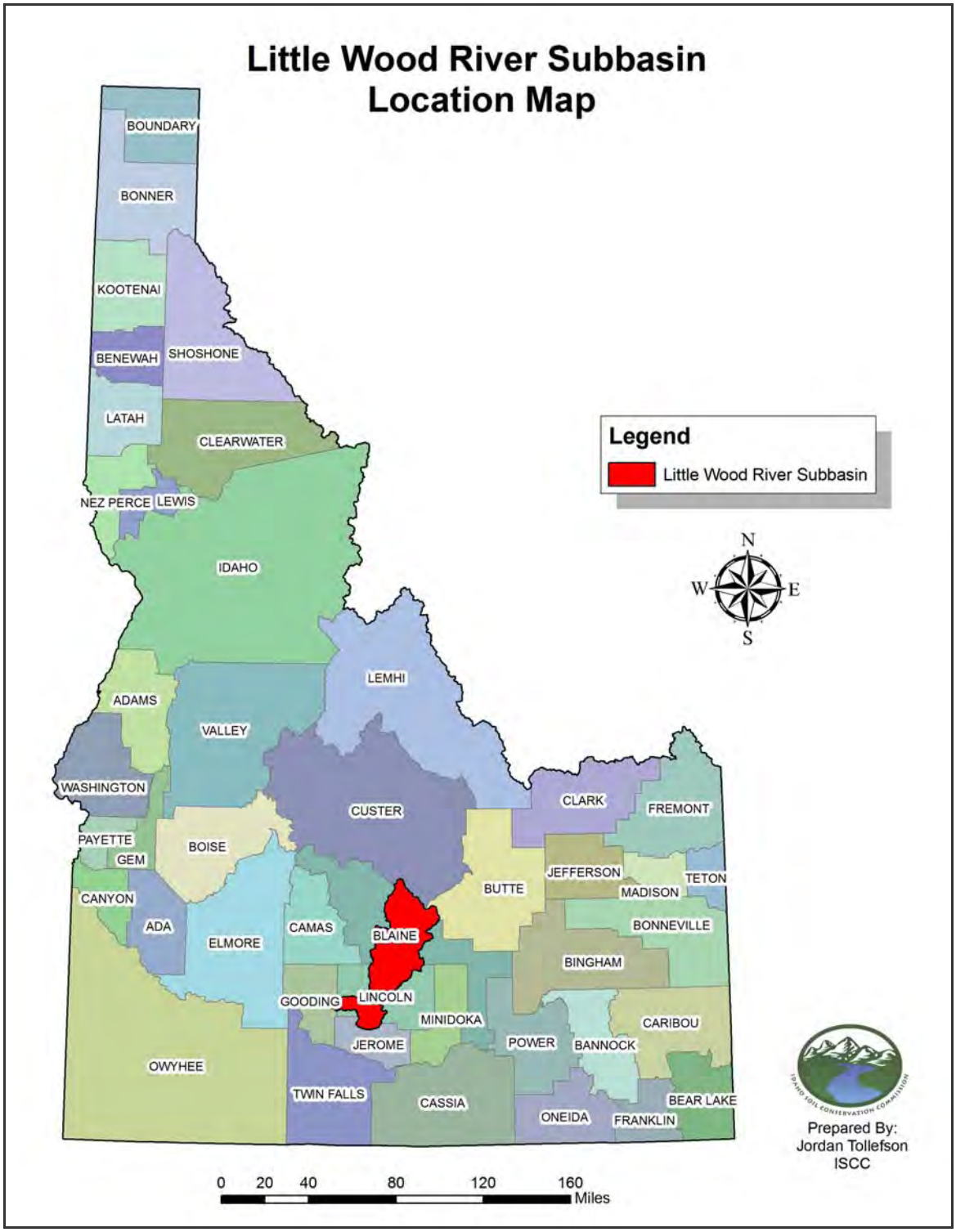

Figure 1. Location of the Little Wood River Subbasin in Idaho

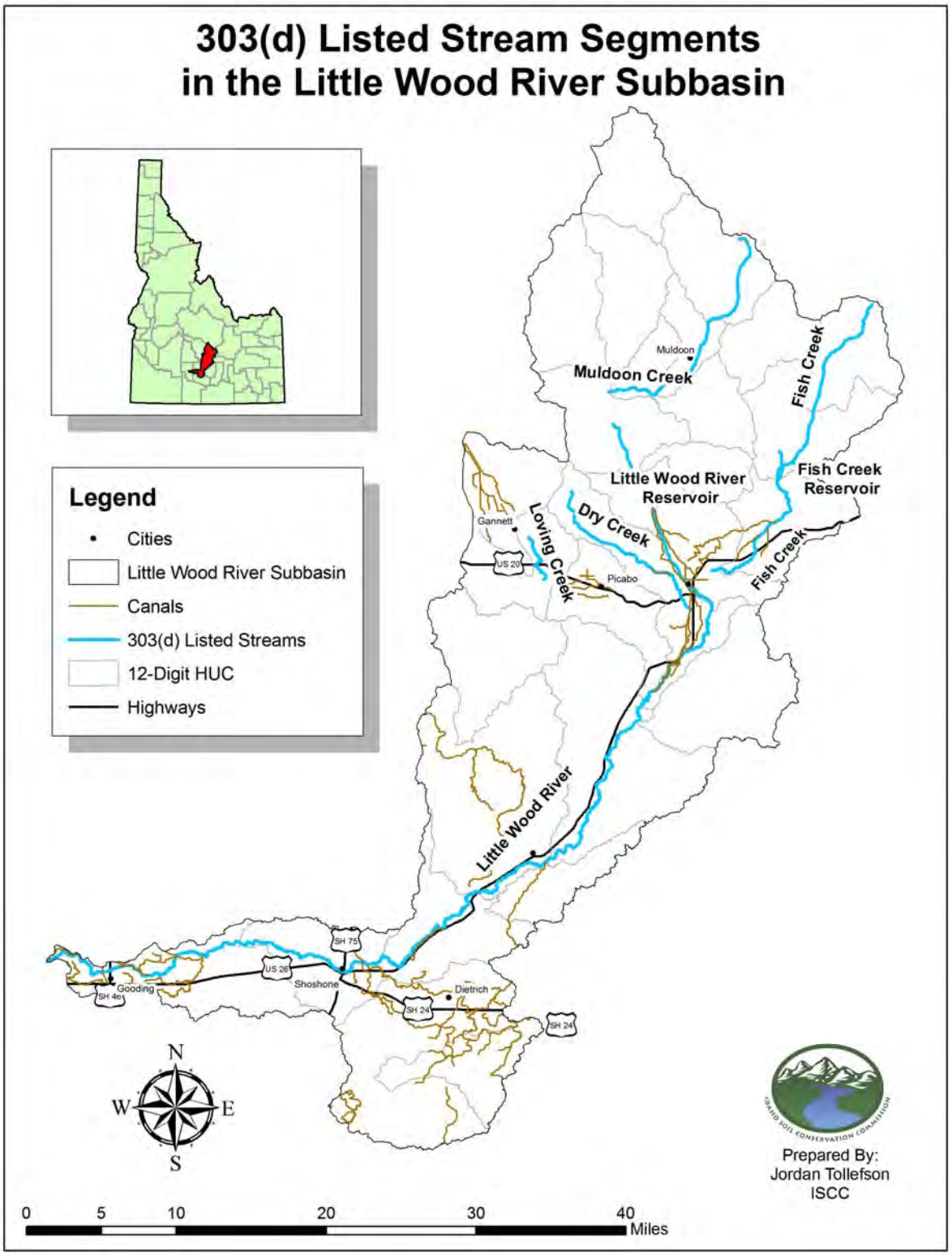

Figure 2. [1998] 303(d) listed stream segments found within the Little Wood River Subbasin

Barren rock, urban/developed, water, riparian, wetlands, and disturbed vegetation account for about 3.9% of the Little Wood River subbasin area. Shrubland is the largest vegetation cover for the subbasin (57.8% of the area). Agriculture and grassland vegetation cover is similar in coverage (16.4% and 13.8% of the area). Forested vegetation makes up the last vegetation type (7.9% of the area) and occurs in the northernmost areas of the subbasin (IDEQ, 2005).

The weighted mean precipitation for the Little Wood River subbasin, based on the elevation ranges, is 14.66 inches. Most of the precipitation occurs in the winter and spring months. The estimated annual average total snowfall for the low, middle, and high elevations of the subbasin is 43.3, 61.4, and 182.8 inches respectively. The annual evaporation ranges from 6 to 12 mm, with the majority occurring between May and September (IDEQ, 2005).

There are many natural and anthropogenic activities occurring in the Little Wood River subbasin that impact the hydrology of the subbasin. The Silver Creek drainage that lies in the middle portion of the subbasin is a spring-fed system. Additionally, there are several reservoirs/lakes, including Carey Lake, Little Wood River Reservoir, and Fish Creek Reservoir. The waters of the Little Wood River subbasin are a major contributor to irrigation in the lower portions of the subbasin. Reservoir storage and irrigation demands greatly influence the hydrology of the river downstream (IDEQ, 2005). Figure 3 identifies the subbasin water sources that contribute to the flow of the Little Wood River.

There are three geomorphology types in the Little Wood River subbasin. The lower elevations are plateau, the foothills area fluvial, and the high elevations alpine glacial (erosional). Predominate geologic formations within the subbasin are silicic and basaltic volcanic ejecta flows, basalt flows, and lava flows (Figure 4). The majority of the soils found in the subbasin can be described as easily to moderately detached, with low to moderate runoff. Areas with more erosive soils occur along the Little Wood River above the reservoir, above the city of Shoshone, and along Muldoon and Fish Creeks near the reservoir (IDEQ, 2005).

SUBWATERSHEDS

The Little Wood River subbasin consists of ten subwatersheds (Table 2, Figure 5). Each of these watersheds drains into the tributaries of the Little Wood River or into the Little Wood River itself, with the exception of Dry Creek and its tributaries. Dry Creek currently does not connect with the Little Wood River directly. However, it does flow into the West Canal of the Little Wood River Irrigation District, which does flow into the Little Wood River. A detailed map of each subwatershed can be found in Appendix A (Figures 11-20).

Table 2. Subwatersheds of the Little Wood River Subbasin, 303(d) listed creeks, and identified pollutants

Subwatershed	**Associated [1998] 303(d) Creek**	**Listed Pollutants**
Lower Little Wood River	Little Wood River #4	BAC, DO, NUT, SED, QALT, TEMP
Main Canal	Little Wood River #3	NUT, SED, TEMP
Middle Little Wood River	Little Wood River #4	NUT, SED, TEMP

Silver Creek	Loving Creek	TEMP
Little Wood River Reservoir	Little Wood River #1,#2 and Reservoir, Dry Creek	BAC, DO, NUT, SED, QALT
Upper Little Wood River	Muldoon Creek	UNK
Muldoon Creek	Muldoon Creek	TEMP
Friedman Creek	None	None
Fish Creek Reservoir	Fish Creek (above) and Reservoir	BAC, DO, NUT, SED, QALT
Fish Creek	Fish Creek (below)	BAC, DO, NUT, SED, QALT
Pollutants Key: BAC = Bacteria, DO = Dissolved Oxygen, NUT = Nutrients, SED = Sediment, QALT = Flow Alteration, UNK = Unknown, TEMP = Temperature		

LAND USE

The land use accounting for the largest amount of acreage (71.6% of the area) in the Little Wood River subbasin is rangeland. Cropland and pasture make up 19.2% of the subbasin area, while forested land amounts to 4.7% and rock amounts to 4.5% of the total acreage (Table 3, Figure 6).

Table 3. Land use in the Little Wood River Subbasin

Land Use Category	**Area (Acres)**	**% of Subbasin**
Rangeland 559,700.0		71.6
Cropland/Pasture 149,667.7		19.2
Forest	36,532.3	4.7
Rock	35,278.0	4.5
Total: 781,178.0		100

LAND OWNERSHIP

The majority of the Little Wood River subbasin is either publicly owned and managed by the BLM (49.7%) or privately owned (35.1%). Smaller portions are publicly owned and managed by the US Forest Service (9.2%) and the State of Idaho (5.8%). The remainder of the area (0.2%) is open water (Table 4, Figure 7).

Table 4. Land ownership in the Little Wood River Subbasin.

Land Owner	**Area (Acres)**	**% of Subbasin**
Bureau of Land Management	388,206.1 49.7	
Private 274,558.5		35.1
U.S. Forest Service	71,813.5	9.2
State of Idaho	45,203.7	5.8
Open water	1,396.2	0.2
Total: 781,178.0		100

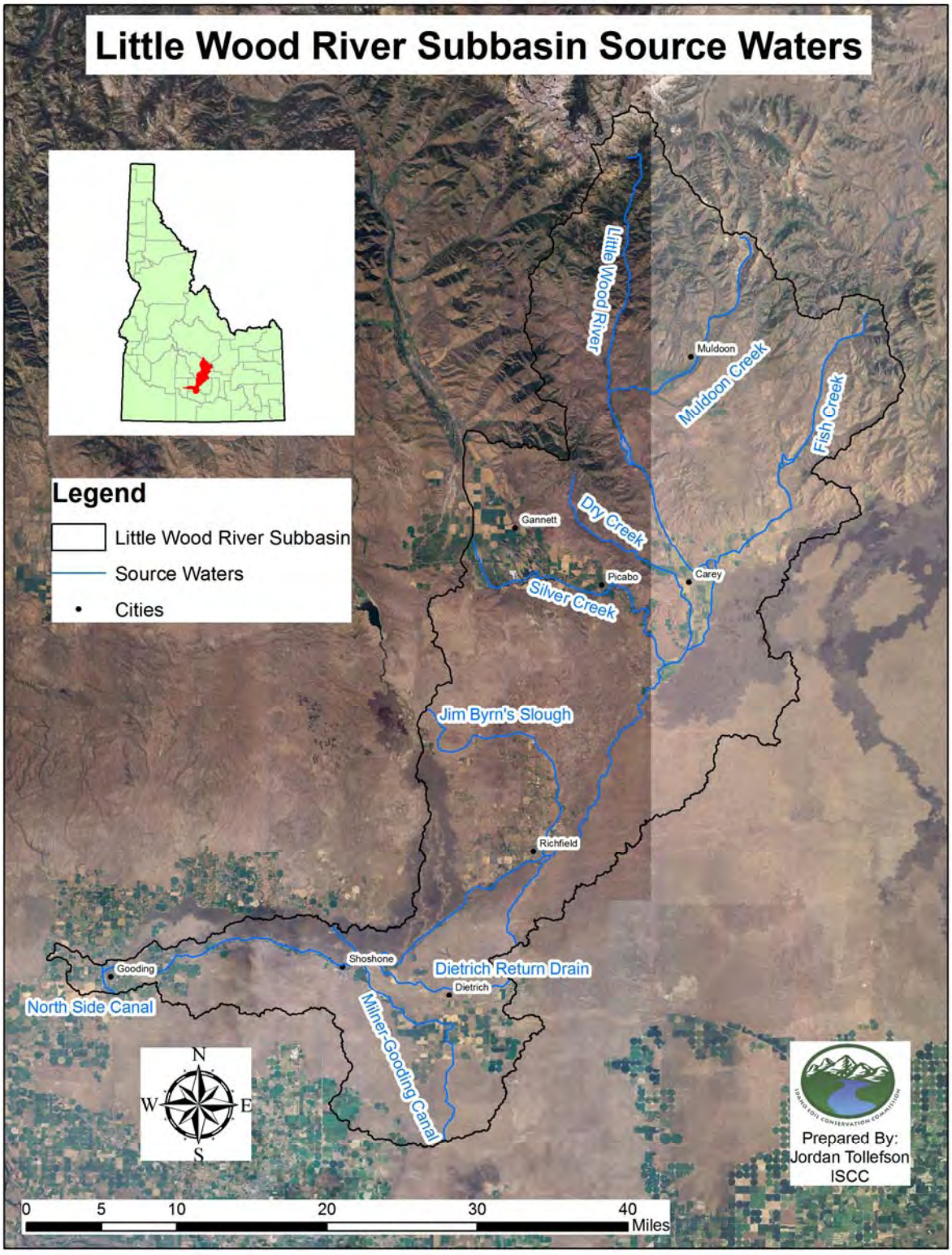

Figure 3. Major source water contributors to the Little Wood River Subbasin

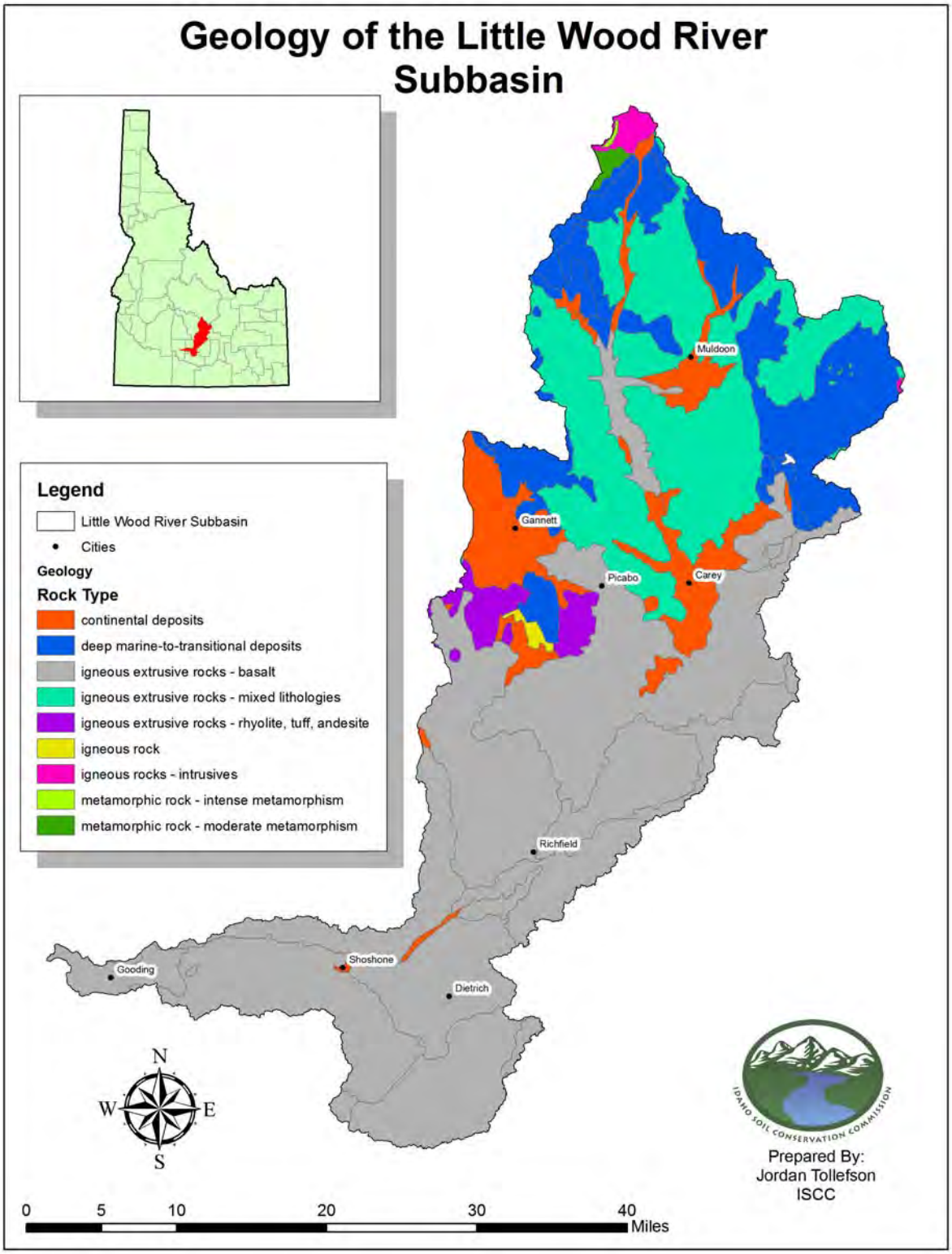

Figure 4. Geology of the Little Wood River Subbasin

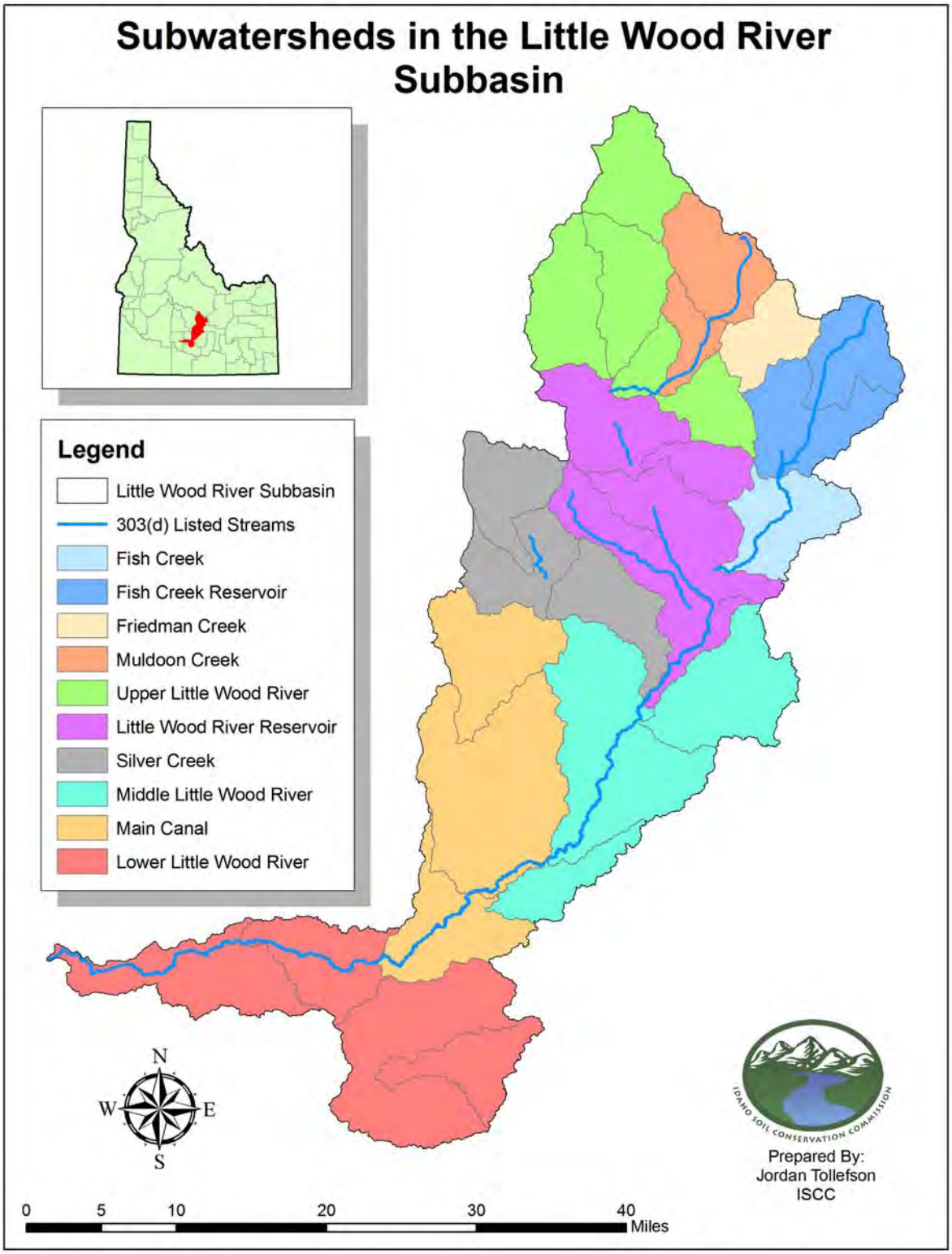

Figure 5. Subwatersheds within the Little Wood River Subbasin

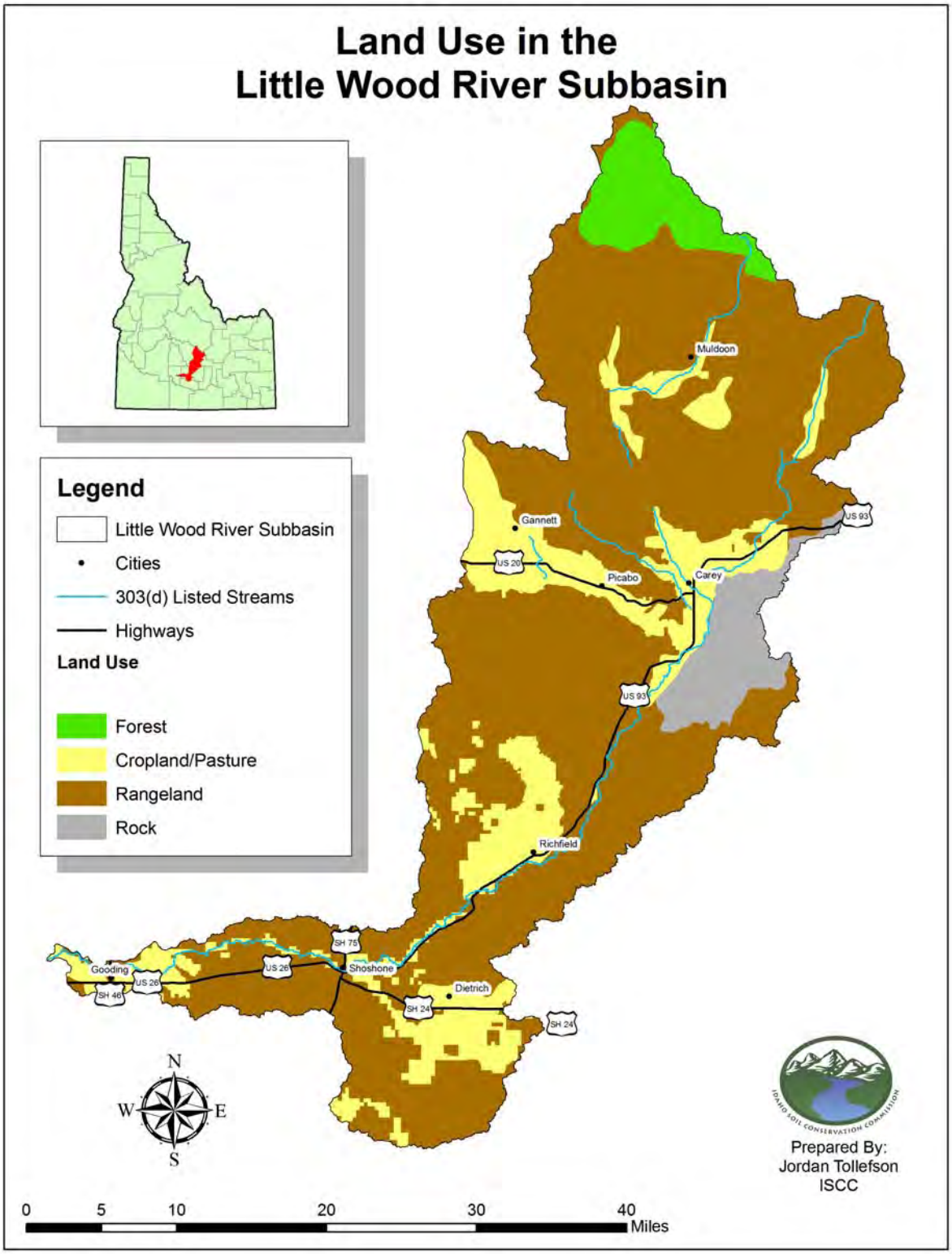

Figure 6. Land use types of the Little Wood River Subbasin

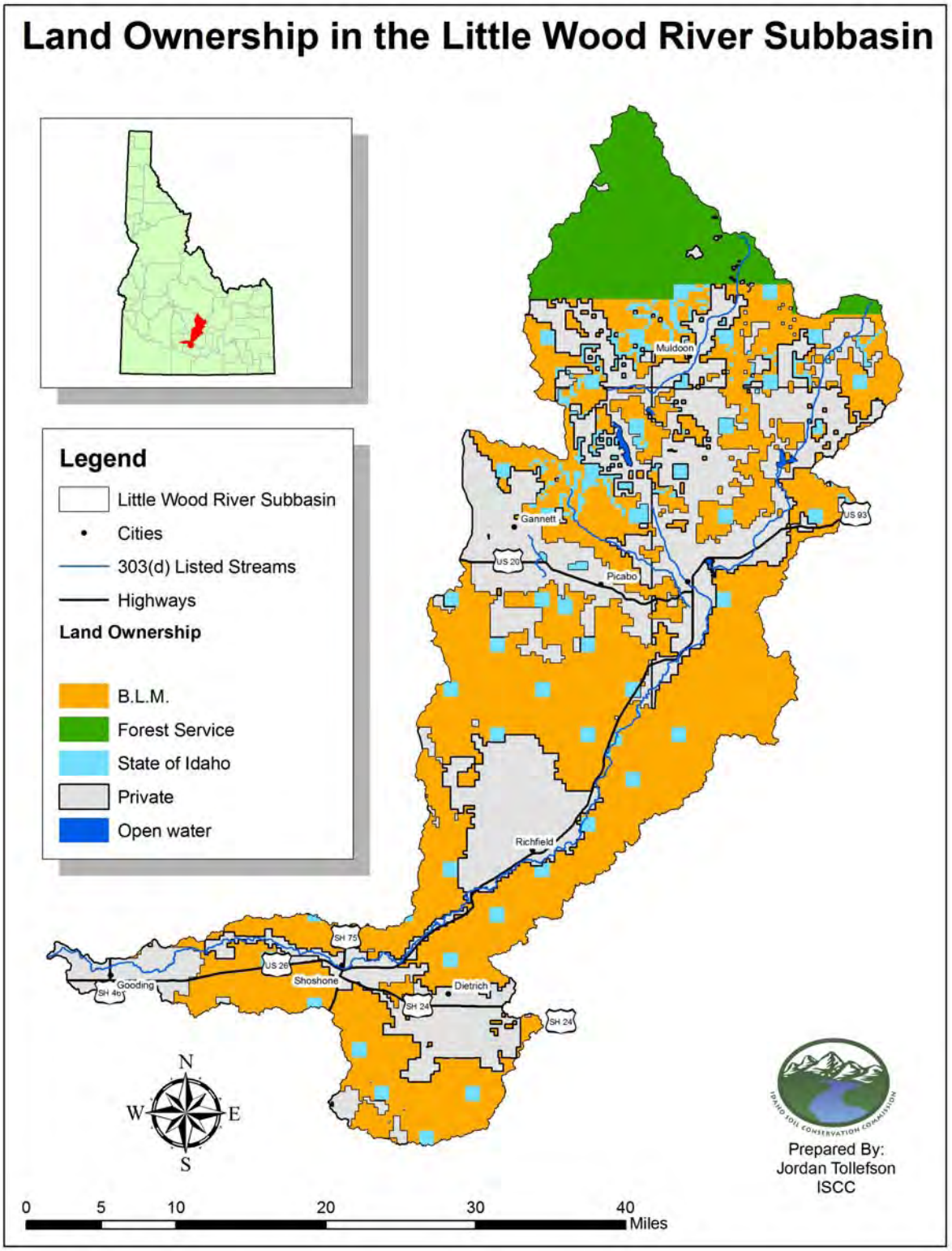

Figure 7. Land ownership in the Little Wood River Subbasin

CONSERVATION ACCOMPLISHMENTS

Working in cooperation with landowners, the Blaine Soil Conservation District, Gooding Soil Conservation District, North Side Soil and Water Conservation District, Wood River Soil and Water Conservation District, Natural Resources Conservation Service, Idaho Soil Conservation Commission, and the Idaho Association of Soil Conservation Districts have planned and implemented many projects to improve water quality in the Little Wood River subbasin. These projects include the installation of Best Management Practices (BMPs) that range from riparian fencing and livestock watering systems, to converting cropland and pasture from flood irrigation to sprinkler irrigation.

Over the past 5 years (2004-2008), approximately $4,092,519.64 has been spent on the implementation of these Best Management Practices in the Little Wood River subbasin. Approximately 35% of this cost has been provided in the form of cost-share incentives through various state and federal programs. These programs include the Environmental Quality Incentives Program (EQIP), Conservation Technical Assistance (CTA), the Conservation Reserve Program (CRP), the Wildlife Habitat Incentives Program (WHIP), Conservation Improvement Grants (CIG), and the Water Quality Program for Agriculture (WQPA). EQIP, CTA, CRP, and WHIP are all programs offered through the Natural Resources Conservation Service, while CIG and WQPA are programs offered through the Idaho Soil Conservation Commission. The remaining 65% of money spent on the implementation of these BMPs has been provided by the landowners involved in these projects. A list of the BMPs installed as well as the approximate cost for each BMP is shown in Table 5.

Table 5. BMPs implemented in the Little Wood River Subbasin in the last 5 years (2004-2008)

BMP	Amount	Units	Cost-Share	Producer Cost	Total BMP Cost	Project/Program	Year
Conservation Cover	656	ac	N/A	$74,784.00	$74,784.00	CTA	2005
	316	ac	$18,012.00	$18,012.00	$36,024.00	EQIP	2004
Total	***972***	***ac***	***$18,012.00***	***$92,796.00***	***$110,808.00***		
Prescribed Grazing	657	ac	$1,314.00	$1,314.00	$2,628.00	CRP	2008
	250	ac	$500.00	$500.00	$1,000.00	EQIP	2008
	421	ac	$842.00	$842.00	$1,684.00	EQIP	2007
	219	ac	N/A	$876.00	$876.00	CTA	2005
	1,500	ac	N/A	$6,000.00	$6,000.00	CTA	2004
	3,852	ac	$7,704.00	$7,704.00	$15,408.00	EQIP	2004
Total	***6,899***	***ac***	***$10,360.00***	***$17,236.00***	***$27,596.00***		
Use Exclusion	126	ac	$4,284.00	$4,284.00	$8,568.00	CRP	2008
	15	ac	N/A	$1,020.00	$1,020.00	CTA	2007
	640	ac	$21,760.00	$21,760.00	$43,520.00	WHIP	2007
	10	ac	N/A	$680.00	$680.00	CTA	2005
	15	ac	$510.00	$510.00	$1,020.00	EQIP	2005
Total	***806***	***ac***	***$26,554.00***	***$28,254.00***	***$54,808.00***		
Conservation Crop Rotation	197 ac		N/A	$0.00	$0.00	CTA	2008
	131 ac		N/A	$0.00	$0.00	EQIP	2008

	920	ac	N/A	$0.00	$0.00	CTA	2006
	942	ac	N/A	$0.00	$0.00	CTA	2005
	434	ac	N/A	$0.00	$0.00	EQIP	2005
	641	ac	N/A	$0.00	$0.00	CTA	2004
	13	ac	N/A	$0.00	$0.00	EQIP	2004
Total	***3,278***	***ac***	***N/A***	***$0.00***	***$0.00***		

Pest Management	126	ac	$1,890.00	$1,890.00	$3,780.00	CRP	2008
	237	ac	N/A	$7,110.00	$7,110.00	CTA	2006
	521	ac	N/A	$15,630.00	$15,630.00	CTA	2005
	2,060	ac	N/A	$61,800.00	$61,800.00	CTA	2004
Total	***2,944***	***ac***	***$1,890.00***	***$86,430.00***	***$88,320.00***		

Upland Wildlife Habitat Management	5 ac		N/A	$100.00	$100.00	CTA	2008
	5 ac		$50.00	$50.00	$100.00	WHIP	2008
	10	ac	N/A	$200.00	$200.00	CTA	2007
	30	ac	$300.00	$300.00	$600.00	WHIP	2007
	902	ac	N/A	$18,040.00	$18,040.00	CTA	2006
	412	ac	N/A	$8,240.00	$8,240.00	CTA	2005
	159	ac	$1,590.00	$1,590.00	$3,180.00	EQIP	2005
	480	ac	N/A	$9,600.00	$9,600.00	CTA	2004
	779	ac	$7,790.00	$7,790.00	$15,580.00	EQIP	2004
Total	***2,782***	***ac***	***$9,730.00***	***$45,910.00***	***$55,640.00***		

Irrigation Reservoir	1,613	cuyd	$7,129.46	$7,129.46	$14,258.92	EQIP	2008
	1,613	cuyd	$7,129.46	$7,129.46	$14,258.92	EQIP	2007
	3,226	cuyd	N/A	$28,517.84	$28,517.84	CTA	2006
	3,226	cuyd	$14,258.92	$14,258.92	$28,517.84	EQIP	2006
	350	cuyd	$250.00	$250.00	$500.00	WQPA	2004
Total	***10,028***	***cuyd***	***$28,767.84***	***$57,285.68***	***$86,053.52***		

Irrigation System, Sprinkler	324	ac	$102,060.00	$102,060. 00	$204,120.00	EQIP	2008
	15	ac	N/A	$9,450.00	$9,450.00	CTA	2007
	596	ac	$187,740.00	$187,740.00	$375,480.00	EQIP	2007
	60	ac	$10,000.00	$41,760.00	$51,760.00	CIG	2007
	60	ac	N/A	$37,800.00	$37,800.00	CTA	2006
	564	ac	$177,660.00	$177,660.00	$355,320.00	EQIP	2006
	38	ac	$24,950.00	$6,084.00	$31,034.00	CIG	2006
	346	ac	N/A	$217,980.00	$217,980.00	CTA	2005
	1,429	ac	$450,135.00	$450,135.00	$900,270.00	EQIP	2005
	65	ac	$20,000.00	$42,028.00	$62,028.00	CIG	2005
	5	ac	N/A	$3,150.00	$3,150.00	CTA	2004
	6	ac	$1,890.00	$1,890.00	$3,780.00	EQIP	2004
	429	ac	$64,337.00	$82,043.00	$146,380.00	WQPA	2004
Total	***3,937***	***ac***	***$1,038,772.00***	***$1,359,780.00***	***$2,398,552.00***		

Irrigation Water Conveyance, Pipeline,	2,726 ft		$10,576.88	$10,576.88	$21,153.76	EQIP	2008
	1,200 ft		N/A	$9,312.00	$9,312.00	CTA	2007

High Pressure, Underground, Plastic	7,882 ft		$30,582.16	$30,582.16	$61,164.32	EQIP	2007
	3,900 ft		$0.00	$48,341.00	$48,341.00	CIG	2007
	2,600	ft	N/A	$20,176.00	$20,176.00	CTA	2006
	3,580	ft	$13,890.40	$13,890.40	$27,780.80	EQIP	2006
	792	ft	$5,408.00	$6,588.00	$11,996.00	CIG	2006
	8,520	ft	N/A	$66,115.20	$66,115.20	CTA	2005
	6,192	ft	$24,024.96	$24,024.96	$48,049.92	EQIP	2005
	941	ft	N/A	$7,302.16	$7,302.16	CTA	2004
	1,300	ft	$5,044.00	$5,044.00	$10,088.00	EQIP	2004
	5,743	ft	$11,978.00	$17,073.00	$29,051.00	WQPA	2004
Total	***45,376***	***ft***	***$101,504.40***	***$259,025.76***	***$360,530.16***		

Irrigation Water Conveyance, Pipeline, Low Pressure, Underground, Plastic	300 ft		$915.00	$915.00	$1,830.00	EQIP	2008
	800 ft		N/A	$4,880.00	$4,880.00	CTA	2007
	6,005 ft		$18,315.25	$18,315.25	$36,630.50	EQIP	2007
	1,750 ft		N/A	$10,675.00	$10,675.00	CTA	2005
	2,300	ft	$5,581.00	$9,961.00	$15,542.00	WQPA	2004
Total	***11,155***	***ft***	***$24,811.25***	***$44,746.25***	***$69,557.50***		

Pasture and Hay Planting	136	ac	$16,592.00	$16,592.00	$33,184.00	EQIP	2008
	192	ac	N/A	$46,848.00	$46,848.00	CTA	2005
	370	ac	$45,140.00	$45,140.00	$90,280.00	EQIP	2005
Total	***698***	***ac***	***$61,732.00***	***$108,580.00***	***$170,312.00***		

Pond 1		no	$4,350.00	$4,350.00	$8,700.00	EQIP	2008
	1	no	$4,350.00	$4,350.00	$8,700.00	EQIP	2006
	1	no	$4,350.00	$4,350.00	$8,700.00	EQIP	2004
Total	***3***	***no***	***$13,050.00***	***$13,050.00***	***$26,100.00***		

Pumping Plant	2	no	$8,000.00	$8,000.00	$16,000.00	EQIP	2008
	5	no	$20,000.00	$20,000.00	$40,000.00	EQIP	2007
	2	no	N/A	$16,000.00	$16,000.00	CTA	2006
	3	no	$12,000.00	$12,000.00	$24,000.00	EQIP	2006
	1	no	$5,675.00	$911.00	$6,586.00	CIG	2006
	1	no	N/A	$8,000.00	$8,000.00	CTA	2005
	5	no	$20,000.00	$20,000.00	$40,000.00	EQIP	2005
	1	no	N/A	$8,000.00	$8,000.00	CTA	2004
	3	no	$14,905.00	$16,561.00	$31,466.00	WQPA	2004
Total	***23***	***no***	***$80,580.00***	***$109,472.00***	***$190,052.00***		

Water Well	1	no	$4,500.00	$4,500.00	$9,000.00	EQIP	2008
Total	***1***	***no***	***$4,500.00***	***$4,500.00***	***$9,000.00***		

Riparian Herbaceous Cover	10	ac $2,250.0	0	$2,250.00	$4,500.00 W	HIP	2008
	10	ac	N/A	$4,500.00	$4,500.00	CTA	2005
Total	***20***	***ac***	***$2,250.00***	***$6,750.00***	***$9,000.00***		

Wetland Wildlife Habitat	5	ac	$50.00	$50.00	$100.00	WHIP	2008

Management	25 ac		N/A	$500.00	$500.00	CTA	2005
	5	ac	$50.00	$50.00	$100.00	EQIP	2005
Total	***35***	***ac***	***$100.00***	***$600.00***	***$700.00***		

Irrigation Water Management	22 ac		N/A	$220.00	$220.00	CTA	2007
	921 ac		N/A	$9,210.00	$9,210.00	CTA	2006
	73	ac	$365.00	$365.00	$730.00	EQIP	2006
	942	ac	N/A	$9,420.00	$9,420.00	CTA	2005
	229	ac	$1,145.00	$1,145.00	$2,290.00	EQIP	2005
	734	ac	N/A	$7,340.00	$7,340.00	CTA	2004
	13	ac	$65.00	$65.00	$130.00	EQIP	2004
Total	***2,934***	***ac***	***$1,575.00***	***$27,765.00***	***$29,340.00***		

Residue Management, Mulch Till	83 ac		N/A	$2,490.00	$2,490.00	CTA	2007
	298 ac		N/A	$8,940.00	$8,940.00	CTA	2006
	496	ac	N/A	$14,880.00	$14,880.00	CTA	2005
	480	ac	N/A	$14,400.00	$14,400.00	CTA	2004
Total	***1,357***	***ac***	***$0.00***	***$40,710.00***	***$40,710.00***		

Residue Management, Seasonal	28 ac		N/A	$0.00	$0.00	CTA	2007
	348 ac		N/A	$0.00	$0.00	CTA	2006
	399	ac	N/A	$0.00	$0.00	CTA	2005
	386	ac	$0.00	$0.00	$0.00	EQIP	2005
	118	ac	N/A	$0.00	$0.00	CTA	2004
	13	ac	$0.00	$0.00	$0.00	EQIP	2004
Total	***1,292***	***ac***	***$0.00***	***$0.00***	***$0.00***		

Fence 1,	736	ft	$3,003.28	$3,003.28	$6,006.56	EQIP	2007
	715	ft	$1,236.95	$1,236.95	$2,473.90	EQIP	2006
Total	***2,451***	***ft***	***$4,240.23***	***$4,240.23***	***$8,480.46***		

Structure for Water Control	3	no	$4,995.00	$4,995.00	$9,990.00	EQIP	2007
	2	no	N/A	$6,660.00	$6,660.00	CTA	2005
Total	***5***	***no***	***$4,995.00***	***$11,655.00***	***$16,650.00***		

Comprehensive Nutrient Management Plan	1 no		N/A	$6,000.00	$6,000.00	CTA	2006
	1 no		N/A	$6,000.00	$6,000.00	CTA	2005
Total	***2***	***no***	***$0.00***	***$12,000.00***	***$12,000.00***		

Nutrient Management	46	ac	N/A	$460.00	$460.00	CTA	2006
	184	ac	$920.00	$920.00	$1,840.00	EQIP	2006
	307	ac	N/A	$3,070.00	$3,070.00	CTA	2005
	589	ac	N/A	$5,890.00	$5,890.00	CTA	2004
Total	***1,126***	***ac***	***$920.00***	***$10,340.00***	***$11,260.00***		

Surface Roughening	447	ac	N/A	$0.00	$0.00	CTA	2006
	174	ac	N/A	$0.00	$0.00	CTA	2005
	159	ac	$0.00	$0.00	$0.00	EQIP	2005

	150	ac	N/A	$0.00	$0.00	CTA	2004
Total	***930***	***ac***	***$0.00***	***$0.00***	***$0.00***		
Waste Storage Facility	1	no	N/A $165,0	00.00	$165,000.00 CTA		2006
Total	***1***	***no***	***$0.00***	***$165,000.00***	***$165,000.00***		
Cover Crop	307	ac	N/A	$15,350.00	$15,350.00	CTA	2005
Total	***307***	***ac***	***$0.00***	***$15,350.00***	***$15,350.00***		
Filter Strip	10	ac	N/A	$1,300.00 $1,300.	00 CTA		2005
Total	***10***	***ac***	***$0.00***	***$1,300.00***	***$1,300.00***		
Irrigation System, Surface and Subsurface	31	ac	N/A	$4,650.00	$4,650.00	CTA	2005
Total	***31***	***ac***	***$0.00***	***$4,650.00***	***$4,650.00***		
Riparian Forest Buffer	35	ac	N/A	$78,750.00	$78,750.00	CTA	2005
Total	***35***	***ac***	***$0.00***	***$78,750.00***	***$78,750.00***		
Stream Habitat Improvement and Management 25		ac	N/A	$52,000.00	$52,000.00	CTA	2005
Total	***25***	***ac***	***$0.00***	***$52,000.00***	***$52,000.00***		

Water Quality Problems

BENEFICIAL USE STATUS

Idaho water quality standards require that beneficial uses of all water bodies be protected. Beneficial uses are defined as existing, designated, or presumed existing. Designated uses are uses officially recognized by the state. In cases where designated uses have not been established by the state for a given water body, IDEQ has established presumed existing uses that support cold water aquatic life and either primary or secondary contact recreation. Beneficial uses for water bodies on the 303(d) list in the Little Wood River subbasin are listed below in Table 6.

Table 6. Beneficial uses for [1998] 303(d) listed stream segments in the Little Wood River Subbasin.

Water Body	**Boundaries**	**Assessment Unit ID#**	**Beneficial Uses**	**Support Status**
Little Wood River Reservoir		ID17040221SK012L_0L	Existing/presumed: CW, SS, SCR	Not supporting
Little Wood River #4	Silver Creek to Richfield	ID17040221SK002_05	Designated: CW, SS, PCR	Not supporting

Little Wood River #3	East Canal Diversion to Silver Creek	ID17040221SK010_05a ID17040221SK003_05	Designated: CW, SS, PCR	Not supporting
Little Wood River #2	Reservoir to East Canal Diversion		Designated: CW, SS, PCR	Supporting
Little Wood River #1	Headwaters to Reservoir		Designated: CW, SS, PCR	Supporting
Fish Creek (above)	Reservoir to mouth	ID17040221SK008_02 ID17040221SK008_03 ID17040221SK008_04	Existing/presumed: CW, SCR	Not supporting
Fish Creek (below)	Headwaters to Reservoir	ID17040221SK006_03 ID17040221SK006_04	Existing/presumed: CW, SS, SCR	Not supporting
Dry Creek	Headwaters to mouth	ID17040221SK022_02 ID17040221SK022_03	Existing/presumed: CW, SCR	Not supporting
Muldoon Creek	Headwaters to mouth	ID17040221SK014_04 ID17040221SK014_03 ID17040221SK014_02	Existing/presumed: CW, SS, SCR	Not supporting
Loving Creek	Headwaters to mouth	ID17040221SK023_02	Existing/presumed: CW, SS, SCR	Not supporting
Beneficial Uses Key: CW = Cold Water Aquatic Life; SS = Salmonid Spawning; PCR = Primary Contact Recreation; SCR = Secondary Contact Recreation; SRW = Special Resource Water				

POLLUTANTS

Predominate sources of pollutants to the Little Wood River subbasin include road bridges, livestock access to riparian areas, cropland and pasture adjacent to canals and streams, Animal Feeding Operations (AFOs), and Confined Animal Feeding Operations (CAFOs). Major concerns to water quality are off-site nutrient transport from agricultural fields, industrial waste applications, municipal wastewater treatment plants, urban runoff and storm water, and flow alteration due to irrigation diversion structures and hydroelectric plants.

Load allocations are determined for specific pollutants on impaired water bodies. The following equation is used to conduct a loading analysis: LC = MOS + NB + FG + LA + WLA = TMDL. "The load capacity (LC) is a value that estimates the quantity of pollutant the water body can assimilate and still meet water quality standards" (IDEQ, 2005). The load capacity is then broken down into components: the necessary margin of safety (MOS) – representing 10% of the load capacity that accounts for uncertainty, the natural background (NB) – a quantity that designates load not subject to control, future growth – representing 5% of the load capacity, as set by the Wood River Watershed Advisory Group, to account for future development within the watershed, and the remainder (LA/WLA) is apportioned between point and nonpoint sources of

pollutants. For the purposes of this report, focus will be placed on nonpoint source allocations as they pertain to agricultural land practices. Land use and subwatershed characteristics are typically used to estimate nonpoint source loads (IDEQ, 2005). Table 7 lists identified pollutants, load allocations, and recommended reduction to meet TMDL requirements. These figures are also represented in the TMDL stream segment map (Figure 8).

Table 7. [1998] 303(d) listed stream segments: identified pollutants and required reductions.

Water Body	**303(d) Listed Pollutants**	**Load Allocation**		**Required % Reduction to meet TMDL**
Little Wood River #4 (lower)	BAC, DO, NUT, SED, QALT, TEMP	SED TEMP NUT	420.7 tons/yr 3,295,488.5 kWh/day 3.94 lbs/day	45.1 5.9 82.5
Little Wood River #4 (upper)	NUT, SED, TEMP	SED TEMP NUT	420.7 tons/yr 3,295,488.5 kWh/day 14.71 lbs/day	45.1 5.9 8.3
Little Wood River #3	NUT, SED, TEMP			
Little Wood River Reservoir	BAC, DO, NUT, SED, QALT			
*Little Wood River #1	TEMP TEMP		1,196,752.1 kWh/day	1.9
Fish Creek Reservoir	BAC, DO, NUT, SED, QALT			
Fish Creek (below)	BAC, DO, NUT, SED, QALT	NUT SED TEMP	16.48 lbs/day 36.2 tons/yr 420,792.5 kWh/day	16.0 67.1 21.5
Fish Creek (above)	BAC, DO, NUT, SED, QALT	BAC NUT SED TEMP	485.5 cfu/100ml 4.22 lbs/day 82.9 tons/yr 238,629.6 kWh/day	85.3 32.4 86.3 20.5
Dry Creek	BAC, DO, NUT, SED, QALT	SED 40.7 tons/yr		81.9
Muldoon Creek	TEMP	535,774.9 kWh/day		13.7
Loving Creek	TEMP	477,328.1 kWh/day		17.3

The Little Wood River #1 segment is not on the [1998] 303(d)* listed stream segments list, but recently has had a TMDL completed for temperature.

WATER QUALITY MONITORING

Idaho Department of Environmental Quality

The Idaho Department of Environmental Quality monitored the water quality of the streams in the Little Wood River subbasin monthly from 2001 to 2003. Figure 9 identifies Beneficial Use Reconnaissance Program monitoring sites from 1993 to 2008. Total phosphorus and total inorganic nitrogen were measured and a TMDL completed for impaired waters on all of Fish Creek (including the Reservoir) and the Little Wood River from Silver Creek to the mouth. Sediment was measured as total suspended solids and as percent fines. The stream bank erosion TMDLs include Dry Creek, all of Fish Creek, and the Little Wood River from Silver Creek to the mouth. Escherichia coli (*E. coli*) colony forming units (cfu) were measured and found to be exceeding water quality standards for beneficial uses on Fish Creek above the Reservoir. A bacteria TMDL was completed for this section of stream. Canopy cover was measured on streams were water temperature was elevated. Temperature TMDLs were completed for Loving Creek, Muldoon Creek, all of Fish Creek, and the Little Wood River. Flow alterations that left a period of stream dry for the majority to all of the year were also identified as pollution. Segments impacted by these alterations includes: Dry Creek, Little Wood River #3 and #4 segments, and Fish Creek from the Reservoir to Carey Lake.

Idaho Association of Soil Conservation Districts

In 2004, Idaho Association of Soil Conservation Districts (IASCD) began monitoring 10 sites in the Middle Little Wood River that corresponded to monitoring points in 1988, 1994 and 2000. Three sites were on the River, while seven irrigation return drains were sampled near their confluence with the Little Wood River. Samples measured total suspended solids (TSS), volatile suspended solids (VSS), total phosphorus (TP), ortho phosphorus (ortho P), and *E. coli*. Stream discharge (Q), dissolved oxygen (DO), pH, and specific conductivity were also recorded. A short irrigation season restricted sampling to the months of May and June and, in order to compare results from 1988, 1994 and 2000, previous data was averaged during corresponding months. Five of the seven irrigation return drains contained runoff from agricultural land between the Jim Byrn's and Cottonwood Slough. These lands were a priority focus for BMPs implemented through the Mid Little Wood SAWQP (State Agricultural Water Quality Program).

Monitoring showed that, although flow in the Jim Byrn's and Cottonwood Sloughs increased as the season progressed, "combined runoff returning to the Little Wood River decreased from 19.6 cfs in 1988-1994 to 7.6 cfs in 2004" (Dallon, 2005). Likewise, TSS concentrations dropped from 1988-1994 to 2004. Previous to 2004, the SAWQP implemented the construction of a bypass at the Dietrich Canal diversion to divert water from the Jim Byrn's Slough into the canal, thus reducing the discharge of canal water to the Little Wood River. The monitoring sites on the Little Wood River below the bypass showed TP concentrations to be increasing downstream at a lower rate than in the previous monitoring periods. Three of the five sampled drains showed significant decreases in TP, while two remained high. However, when concentrations were combined, levels had decreased by 69% from 1988-1994 to 2004. Ortho phosphorus accounted for >50% of total phosphorus and showed an increase from 1988-1994 to 2004. Fecal coliform levels were reported on samples taken in 1988 and 1994. *E. coli* was added to the list for analysis in 2000. In 2004, samples were only analyzed for *E. coli*. The analysis depicted high levels and exceeded state standards at various monitoring times

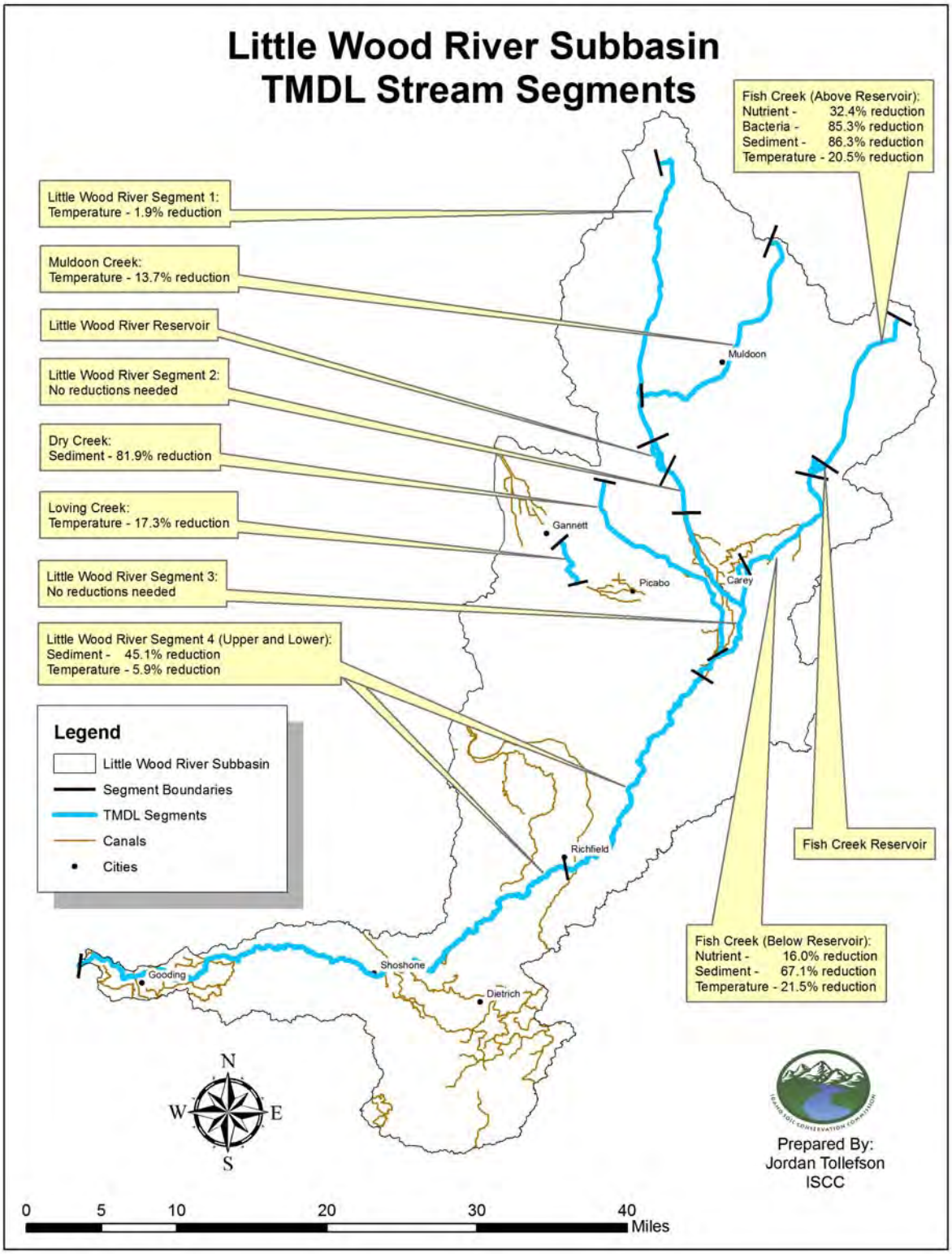

Figure 8. TMDL designated stream segments and their associated reductions in the Little Wood River Subbasin

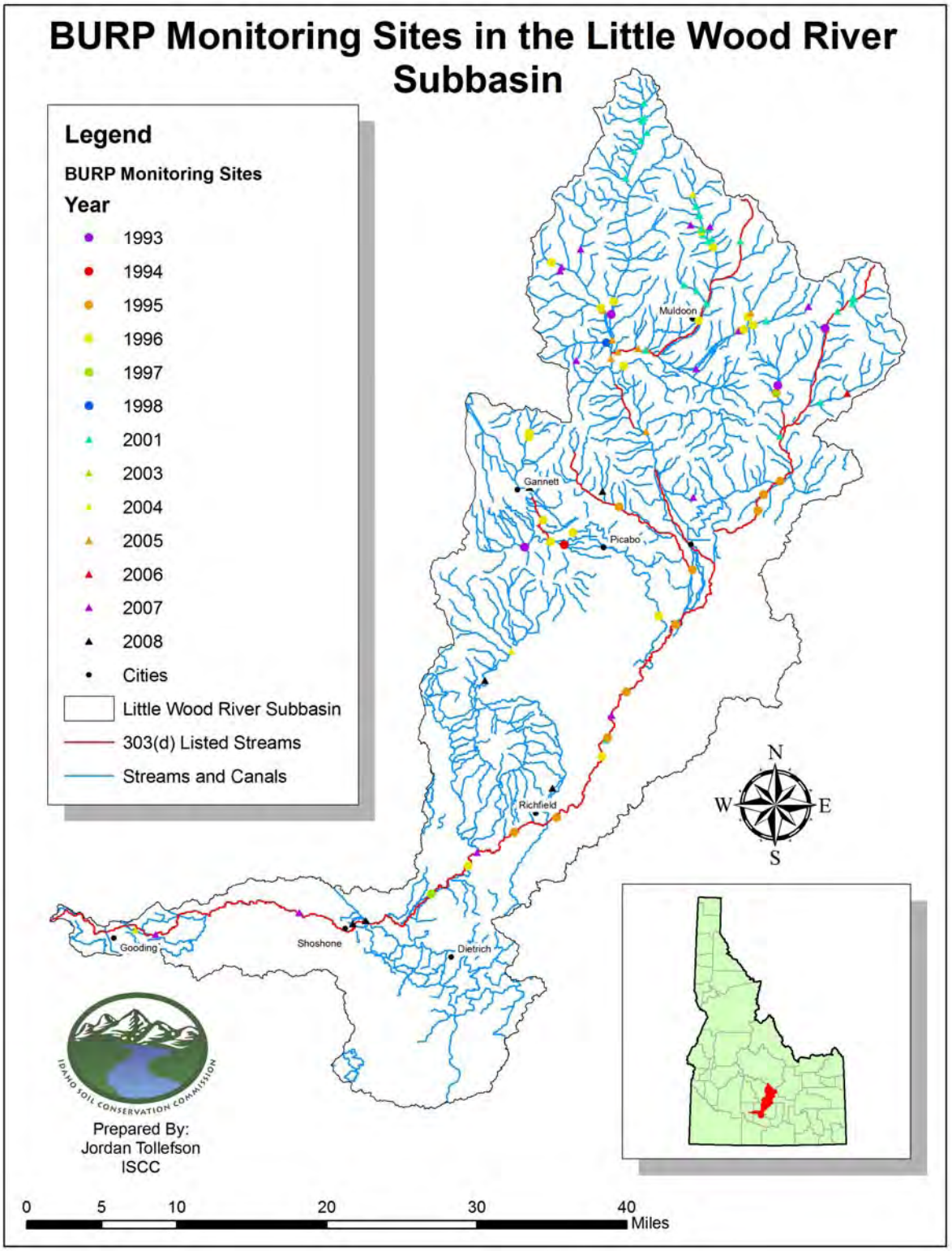

Figure 9. IDEQ BURP monitoring sites in the Little Wood River Subbasin

A study of water quality in the Jim Byrn's Slough (JBS), a 17 mile diversion, was conducted in 2006 in response to a lack of existing data for the area. The Jim Byrn's Slough is classified by IDEQ as a "non-designated stream". Water quality standards do not apply to this class, but because the slough contributes nutrients, bacteria and sediment to the Little Wood River (a 303(d) listed stream), TMDL standards should be considered. Samples were collected during the 2006 irrigation season (April – October) for suspended sediment concentrations (SSC), TP, ortho P, and *E. coli*. Measurements of flow, temperature, DO, conductivity, and pH were also recorded. Monitoring locations included three sites on the Jim Byrn's Slough, four on lateral drains entering the slough, and two sites on drains emptying into the Little Wood River below the town of Richfield. "Monitoring data suggest that water entering the Jim Byrn's Slough [at JBS6] is meeting the water quality standards established by the Little Wood River TMDL for all pollutants throughout the entire irrigation seasons. However, inputs from lateral drains and adjacent fields that slope towards the slough have had detrimental impact on water quality in the JBS, water quality declines" (Monek 2006). Sediment and phosphorus seem to be of highest priority; bacteria levels were exceeding in several drains, but concentrations in the JBS did not exceed state instantaneous water quality standards.

During the 2007 irrigation season (May-Aug), IASCD conducted water quality monitoring on the Jim Byrn's Slough, Dietrich Canal, and Little Wood River surrounding the bypass structure. "Monitoring was performed to determine the ongoing efficiency of the diversion structure located at the confluence of the three waterbodies" (Monek, 2007). Water samples were collected and sent to the Analytical Lab in Boise, ID to measure SSC, TP, ortho P, and *E. coli*. Other field measurements included temperature, dissolved oxygen (DO), conductivity, pH, discharge (Q), and a visual assessment of turbidity.

Results showed that the discharge on the Little Wood River above and below the bypass stayed relatively constant throughout the irrigation season. Flow through the Jim Byrn's Slough, and subsequently the Dietrich Canal, increased as the irrigation demands intensified. Suspended sediment concentrations in the Jim Byrn's Slough and Dietrich Canal were approximately 5 to 6 times higher than the concentrations in the Little Wood River site below the bypass. Average concentrations below the bypass were also much lower. "Sediment concentration remains nearly unchanged between the Little Wood River sites above and below the bypass" (Monek, 2007). Phosphorus concentrations mirrored sediment concentrations and remained relatively steady on the Little Wood River throughout the monitoring season. It was concluded that the bypass has been functioning efficiently to divert canal water away from the Little Wood River. Nitrate concentrations were consistently low for four monitoring events at all locations and sampling for this nutrient was stopped in June. Bacteria levels on the Little Wood River were well below the state standard set in the TMDL. Areas of concern included temperature and dissolved oxygen. Temperature documentation showed that four out of nine times, at both sites on the Little Wood River, temperature exceeded requirements for a cold water salmonid fishery. Likewise, DO levels fell below the standard three times on the Little Wood River site above the bypass.

AGRICULTURAL WATER QUALITY INVENTORY AND EVALUATION

Cropland/Pasture

Cropland and Pastureland are the designated land use for 149,667.7 acres or 19.2% of the land found within the Little Wood River subbasin. Of this amount, 58,320.3 acres (39%) are sprinkler irrigated, 90,877.7 acres (61%) are gravity/flood irrigated, and 469.7 acres (< 1%) are non-irrigated. Figure 10 shows the location and designation of irrigated cropland/pasture in the Little Wood River subbasin. The amount of cropland and pastureland was calculated from data received from the USDA Farm Service Agency, and field evaluations. The designation of the type of irrigation was determined using aerial photography, as well as field evaluations.

Areas of resource concern are the gravity/flood irrigated fields, as well as fields with slopes greater than 3% and fields with highly erodible soils. Due to the nature of gravity/flood irrigation, there is always a high potential for irrigation-induced runoff. This runoff typically contains excess amounts of nutrients, sediment, bacteria, and pesticides which eventually are transported to the nearest downstream receiving waterbody through agricultural return drains. Conversion from gravity/flood irrigation to sprinkler irrigation should greatly reduce runoff and improve overall water quality. Sprinkler irrigation, when properly managed, should have no runoff from the associated agricultural fields. This is not always the case however, and fields with improper irrigation water management will produce some runoff.

Common crop rotations in the lower portion of the Little Wood River subbasin (Lower Little Wood River, Main Canal, and Middle Little Wood River subwatersheds) consist of: Wheat/Barley – Corn – Sugar Beets – Alfalfa (4-5 years), while common crop rotations in the middle portion of the Little Wood River subbasin (Silver Creek, Little Wood River Reservoir, and Fish Creek subwatersheds) consist of: Alfalfa (4-5 years) – Wheat/Barley. Pastureland is found throughout the Little Wood River subbasin interspersed among the cropland, but is more dominant in the upper portion of the Little Wood River subbasin (Upper Little Wood River, Muldoon Creek, and Fish Creek Reservoir subwatersheds). The Friedman Creek subwatershed contains no cropland or pasture. Low residue row crops are the most critical crops to water quality and can be mitigated for by implementing supporting conservation practices such as residue management, contour farming, filter strips, cover crop, and conservation tillage.

Rangeland

Prepared by: Bob Josaitis, NRCS Rangeland Management Specialist, Gooding.

Rangeland is the designated land use for 559,700 acres or 71.7% of the land found within the Little Wood River subbasin. Of this rangeland, the majority is publicly owned and managed by the U.S. Bureau of Land Management (BLM). 131,895.6 acres, or approximately 23.5% of the rangeland found within the Little Wood River subbasin is privately owned.

For range discussion purposes the Little Wood River subbasin is divided into upper, middle, and lower watershed sections. The upper watershed section consists of rangelands above the Little Wood and Fish Creek Reservoirs. The middle section extends from the reservoirs down to the town of Richfield, and the lower section from Richfield to the Little Wood River's confluence with the Big Wood River near the town of Gooding.

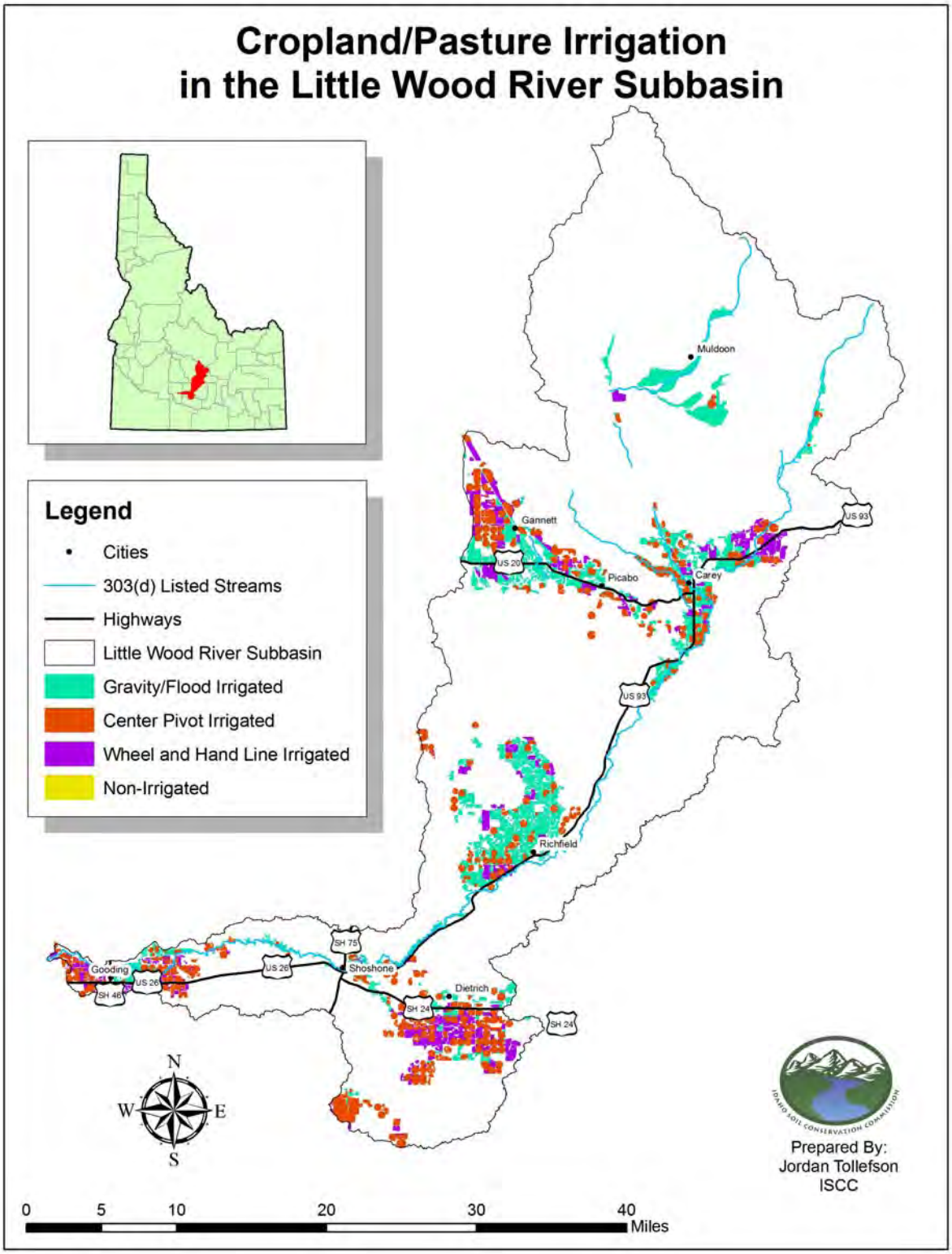

Figure 10. Types of Cropland/Pasture irrigation in the Little Wood River Subbasin

Annual precipitation in the Little Wood River basin ranges from 40 inches in the upper section of the Pioneer Mountains to 8 inches in the cold desert of the Snake River Plain near Gooding. The majority of the precipitation in the watershed comes in the form of winter snow and spring rains. Most of the annual precipitation in the middle and lower sections falls outside the growing season. Rangeland vegetation in the upper section foothills and mountains above 5000 feet elevation is dominated by mountain big sagebrush (*Artemisia tridentata vaseyana*) communities. Wyoming big sagebrush (*A. tridentata wyomingensis*) communities dominate the middle and lower sections. Throughout the watershed low sagebrush (*A. arbuscula*, *A. longiloba*) communities intersperse with big sagebrush communities on shallower soils. Elevations in the watershed range from above 10,000 feet in the Pioneer Mountains to 3500 feet near Gooding. Average frost free period in the middle and lower sections ranges from 80 to 140 days. Soils vary widely in texture and depth. Predominant soils are gravelly loams and loams on the foothills and mountains and sandy loams to silt loams on the basalt plains of the Snake River Plain.

Similarity index, rangeland health, and trend assessments and terminology are the standards today for rangeland characterization discussion. Similarity index relates the existing plant community of an ecological site to its historic climax plant community. Similarity index has replaced the long-used "condition" class nomenclature that rated rangelands using "poor", "fair", "good", or "excellent" modifiers. Similarity index and the traditional range condition class nomenclature system are based on identical methods. For traditional purposes the old but better-understood condition class nomenclature is used in this discussion to describe Little Wood River watershed rangelands. For reference, "poor" condition rangeland has similarity indices between 0-25%; "fair" condition has similarity indices between 25-50%; "good" condition has similarity indices between 50-75%; and "excellent" condition rangelands are those with similarity indices of 75% or higher.

Rangeland health determinations assess 17 physical and biological attributes for a given ecological site and relate their departure from the historic climax plant community. These 17 attributes are further lumped and integral with three functional categories: soil/site stability, hydrologic function, and biotic integrity. These 3 functional categories provide qualitative insight for the ability of rangelands to produce pollutants within watersheds.

Rangeland trend assesses direction of ecological change in the site in relation to the historic climax plant community.

Upper watershed section:
A minority of rangelands in the upper Little Wood River watershed above the Little Wood and Fish Creek Reservoirs are privately owned. Private rangelands here do envelop significant stream bottom reaches, however, and are generally in good condition. Public rangelands vary from good to excellent condition with excellent condition ranges in the higher elevations. Both private and public rangelands in this upper section are generally in good health with steady trends and are thought to contribute very little sediment to streams in the watershed. No accurate assessment of sediment production from rangelands, however, is known to exist here. Considerably less than one ton per acre is estimated for an annual erosion rate by water or wind erosion. Wildfires may lead to localized high but temporary sediment pollution rates here, but are currently not known to be a problem. Streams running through privately-owned rangelands in the

foothills show light to moderate bank degradation but are functionally not at risk. Direct access to streams by both cattle and sheep with associated bacterial inputs may be the largest pollutant concern here.

Middle watershed section:
Rangelands in the middle or central watershed section are generally in fair condition with low to moderate health and stable to downward trends. The majority of the Wyoming big sagebrush sites here have lost their native bluebunch wheatgrass (*Pseudoroegnaria spicata*) and associated native forb understory components. Conversion of native sagebrush-grass range sites to cheatgrass (*Bromus tectorum*) by fire is a major rangeland concern here, particularly east of Highway 93 in the desert areas. The North Magic Valley Local Sage Grouse Working Group has also identified annual grass conversion by fire as a major threat to sage grouse in this area. Increased fire frequencies move sagebrush-dominated sites over environmental thresholds to annual grass states that are irreversible and not generally considered restorable to native cool season grasses and forbs without extreme and costly measures. These converted rangelands may vary widely in stability on an annual basis but with the threat of continually-increasing fire frequencies yield higher risks accordingly of contributing sediments to streams relative to native unconverted range sites. However, sediment pollution potential does not always translate to sediment delivery if the proximity of these rangelands to the Little Wood River and tributaries are minimal or zero. Much of the Little Wood River per se in this section is incised or armored with basalt rock or hedged with hydrophytic brush and therefore stable and not easily accessed or damaged by livestock seeking water.

Lower watershed section:
Rangelands in the lower reaches of the Little Wood River have higher conversion potentials to cheatgrass due to lower elevations. Private rangelands here are also used for concentrated and dispersed winter feeding and spring calving pastures. Accordingly, rangelands in the Gooding vicinity of the Snake River Plain are commonly in poor condition with low health. Trends are commonly stable if sagebrush and/or seedings of introduced grasses are intact. Trends are downward if the site is undergoing or has undergone conversion to cheatgrass or if noxious weeds such as rush skeleton weed (*Chondrilla juncea*) or knapweed (*Centaurea* spp.) are invading. The historical livestock traditions of the area today combined with invasive species factors promulgates little or no chance for restoration of these ranges back to healthy and diverse native sites without major inputs in combination with revised cultural practices by dedicated individuals.

Rangeland Summary and Conservation Practice Solutions:
Rangelands in the Little Wood River subbasin are thought to deliver relatively little sediment pollutants to streams. Bacterial pollutants to streams from direct access by livestock may be the most significant concern, particularly in the upper portions of the watershed where fencing practices on streams are limited due to cost, practicality, and wildlife concerns including sage grouse and antelope movements. Where possible, fencing remains the most effective practice for eliminating direct access of livestock to water, particularly for range cattle in foothill and mountain systems not managed daily by a rider. However, with said limitations and concerns above, fencing is a very limited option and when applied must be appropriately planned and be associated with additional practices that account for off-site water development for livestock.

Grazing prescriptions tailored to each individual livestock operation remain the most appropriate way to mitigate stream and riparian concerns here. Programs providing cost-share incentives to install practices and/or management actions to accomplish such prescriptions are necessary due to the perceived and/or real profit margin losses associated with costs to implement management changes.

Natural Resources Conservation Service practices applicable for management of rangelands and associated riparian/stream systems in the Little Wood River watershed include (in alphabetical order with practice standard number): Brush Management (314); Channel Stabilization (584); Critical Area Planting (314); Fence (382); Heavy Use Area Protection (561); Pest Management (595); Pipeline (516); Pond (378); Prescribed Burning (338); Prescribed Grazing (528); Pumping Plant (533); Range Planting (550); Restoration and Management of Rare or Declining Habitats (643); Riparian Forest Buffer (391); Spring Development (574); Stream Crossing (578); Stream Habitat Improvement and Management (395); Streambank and Shoreline Protection (580); Structure for Water Control (587); Tree/Shrub Establishment (612); Upland Wildlife Habitat Management (645); Water Harvesting Catchment (636); Water Well (642); and Watering Facility (614).

Riparian

There are 5,070.6 acres of privately owned riparian land found within the Little Wood River subbasin. This was calculated by placing a 100 ft. buffer around all perennial streams, and considering all land found within that buffer to be riparian zone. There are multiple land uses found within the riparian zones, and they include, but are not limited to: cropland, pasture, rangeland, urban, and Animal Feeding Operations.

For stream channels above the Little Wood River and Fish Creek Reservoirs the Stream Visual Assessment Protocol (SVAP) was used. These channels display natural stream conditions with high and low flow characteristics. The procedure evaluates stream conditions based on 15 qualitative factors and applies a numeric value to rate the condition. The protocol is used to assess riparian ecosystem condition and identify opportunities to enhance biological value. It also provides information on stream function and emphasizes the need to protect and enhance riparian conditions.

The Little Wood River below the East and West Canals becomes a water conveyance for irrigation purposes. Because the channels do not display natural stream flow characteristics, a combination of protocols were used to evaluate the system. Evaluations included: Protocol #8, SVAP, Rosgen stream classification, and Streambank Erosion Condition Inventory (SECI). Protocol #8 includes stream classification, green line, Solar Pathfinder, streambank stability, photo points, and channel cross-sections. The Rosgen stream classification is based on a method that breaks streams into sub-categories. Sub-categories were derived from geomorphic and morphological descriptions that include stream pattern, slope, shape, bankfull width/depth, floodplain width, channel materials, and sinuosity. The SECI uses lateral recession rates applied to bank heights and lengths to determine erosion rates. Stream banks are rated based on bank stability, condition, and cover, as well as channel shape, bottom and deposition.

The Silver Creek drainage is a spring fed nonwadeable system and does not display changing flow levels. Therefore, visual assessments (using the above listed evaluation tools) were conducted streamside where accessible and in office by satellite interpretation.

Information derived from evaluation protocols was used to designate critical areas, treatment units, and priorities for BMP implementation in the Little Wood River subbasin. The riparian condition varies throughout the watershed as well as the resource concerns for riparian areas.

In the upper portions of the watershed (above Fish Creek and Little Wood Reservoirs) the major resource concern is direct livestock access to riparian areas and concentrated winter feeding operations located in riparian areas. Below the reservoirs, the main resource concern is flow alteration due to irrigation diversions. Due to this, there are many times when the Little Wood River, Fish Creek, and Dry Creek do not contribute any in-stream flow to the lower portions of the watershed. During the irrigation season, the lower portions of the Little Wood River are made up of almost exclusively water from Silver Creek and irrigation return drains.

The middle portion of the watershed (Silver Creek to Richfield) has generally good riparian condition due to the geology of the area. For the majority of this section, the riparian areas are primarily made up of basalt and therefore sediment contributions are minimal. The establishment of riparian vegetation however, is more difficult due to this basalt. Irrigation return drains are the primary contributor of sediment and nutrients to this portion of the watershed.

The lower portion of the watershed displays the poorest riparian health, and according to stream assessments, this area should be the primary focus for the implementation of BMPs. There are numerous gravity/flood irrigated pastures and crop fields located directly adjacent to the Little Wood River, and the return flows off of these fields flow directly into the river. These pastures also provide direct access to the riparian areas for livestock. There are also places where a "mixing" of water from other watersheds occurs via the extensive canal systems. Some portions of the Lower Little Wood River subwatershed are receiving water from the Big Wood River via the Richfield Canal and also water from the Snake River via the Milner-Gooding Canal and X-Canal. This mixing makes it hard to identify if the source of pollutants is coming from an upstream source or another watershed.

Possible BMPs to implement include: Fence, Wetland Wildlife Habitat Management, Watering Facility, Access Control, Channel Vegetation, Pest Management, Channel Stabilization, Streambank and Shoreline Protection, Heavy Use Area Protection, Riparian Forest Buffer, Riparian Herbaceous Cover, Tree/Shrub Establishment, Pipeline, Pumping Plant.

Animal Feeding Operations

Rules and regulations affecting beef cattle animal feeding operations came about from the Clean Water Act of 1972. The Environmental Protection Agency (EPA), Idaho State Department of Agriculture (ISDA), Natural Resources Conservation Service (NRCS), Idaho Soil Conservation Commission (SCC), and University of Idaho Cooperative Extension (U of I) and cattle producers from around the state have provided significant input to the development of the Environmental

Enhancement Program. The size of the operation, as well as the type of livestock being fed, determines who is regulated.

Animal Feeding Operation (AFO):
In Idaho, a beef cattle ***animal feeding operation*** (AFO) is regulated by the Idaho State Department of Agriculture.

Confined Animal Feeding Operation (CAFO):
EPA regulates ***Confined Animal Feeding Operations*** (CAFOs) under the Clean Water Act (CWA), while the Idaho State Department of Agriculture (ISDA) (under the Idaho Beef Cattle Environmental Control Act) inspects Idaho CAFOs. CAFOs are considered to be a "point-source pollutant," and are therefore required to apply for coverage under a National Pollutant Discharge Elimination System (NPDES) permit from the EPA. Under EPA's CAFO regulations, CAFOs are defined as follows:

1. **Small CAFO** (designated by the appropriate authority) – An AFO that is designated as a CAFO, and is not a Medium CAFO (less than 299 head of cattle)

2. **Medium CAFO** – An AFO is defined as a Medium CAFO if it confines or stables:
300 to 999 cattle (including but not limited to heifers, steers, bulls, and cow/calf pairs), and either one of the following conditions are met:

- Pollutants are discharged into waters of the United States through a man-made ditch, flushing system, or other similar man-made device; or

- Pollutants are discharged directly into waters of the United States, which originate outside or pass over, across, or through the facility or otherwise come into direct contact with the animals confined in the operation.

3. **Large CAFO** – An AFO is defined as a Large CAFO if it stables or confines 1,000 cattle (including but not limited to heifers, steers, bulls, and cow/calf pairs), or 700 mature dairy cows (milked or dry)

As of 2005, new and existing operations must have Nutrient Management Plans (NMP) in place. Cattle in winter feeding or grazing areas or pastures—those areas that are not confined—are not regulated under the AFO/CAFO regulations. Attempts are made to provide technical assistance, and improvements to winter feeding areas, or even relocating some operations away from live water sources.

Animal Feeding Operations (AFOs) and Confined Animal Feeding Operations (CAFOs) generally contribute pollutants such as sediment, nutrients, bacteria, and temperature. In order to determine BMPs, facilities can be assessed for potential runoff from animal waste reaching water bodies, animal access to a waterbody, plant growth within the lot, and number of feeding days within a year. Suggested BMPs include but are not limited to: fencing, runoff containment, nutrient management applications, and offsite watering facilities.

There are 44 documented Animal Feeding Operations and Confined Animal Feeding Operations found throughout the Little Wood River subbasin. The approximate size and location of these Animal Feeding Operations can be found below in table 8.

Table 8. Approximate size and location of Animal Feeding Operations by subwatershed.

AFO/CAFO Size and Locations

Subwatershed	Small AFO	Medium AFO	Large AFO	Dairy (CAFO)	Unregulated AFO	Unknown AFO	Total
Lower LWR	0 4		2	12	1	4	**23**
Main Canal	0 1		0	10	0	1	**12**
Middle LWR	0 0		0	0	0	0	**0**
Silver Creek	1 0		2	0	0	0	**3**
LWR Reservoir	3 0		0	0	0	0	**3**
Upper LWR	0 0		0	0	0	0	**0**
Muldoon Creek	0 0		0	0	0	0	**0**
Freidman Creek	0 0		0	0	0	0	**0**
Fish Creek Reservoir	1 0		0	0	0	0	**1**
Fish Creek	2 0		0	0	0	0	**2**
Total	**7**	**5**	**4**	**22**	**1**	**5**	**44**

Threatened and Endangered Species

There are six federally listed aquatic plants and animals that will be influenced by actions suggested in this TMDL implementation plan. Table 13, found in the appendix, identifies listed and sensitive species within the counties containing the Little Wood River subbasin. Agricultural conservation planning will be coordinated with other species recovery and protection efforts in the subbasin to improve listed species' habitats and address any potential impacts from BMP implementation.

Improvements in water quality, achieved from BMPs installed on agricultural lands, are not expected to adversely affect these listed species and should improve or enhance their habitat. Any BMP implementation that will affect T&E species or habitat will follow Endangered Species Act (ESA) consultation requirements.

Treatment

CRITICAL AREAS

Areas of agricultural lands that contribute excessive pollutants to water bodies are defined as critical areas for BMP implementation. These areas have been divided into land uses of crop/pasture, range, and Animal Feeding Operations. Riparian areas are also considered critical for maintaining or enhancing water quality. Critical areas are prioritized high, moderate, or low for treatment based on their location to a water body of concern and the potential for pollutant transport and delivery to the receiving water body. Critical areas are those areas in which treatment is considered necessary to address resource concerns affecting water quality. Critical

areas were selected based on in-office satellite imagery. In the field visual assessments were used to prioritize stream segments based on the need for BMPs.

TREATMENT UNITS (TUs)

The following Treatment Units (TUs) describe areas in the Little Wood River subbasin with similar land uses, soils, productivity, resource concerns, and treatment needs (Table 9). Treatment Units were delineated by subwatershed. These TUs not only provide a method for delineating and describing land use, but are also used to evaluate land use impacts to water quality and in the formulation of alternatives for solving water quality problems. BMPs to improve water quality are suggested for critical areas within each treatment unit.

Table 9. Treatment Units and Critical Acres by subwatershed

Treatment Unit 1 – Irrigated Cropland/Pasture

Treatment Unit 1 includes all irrigated cropland and pastureland found within the Little Wood River subbasin. This treatment unit has been subdivided into 9 parts (a-i), correlating to the 9 subwatersheds in which these critical acres occur. Critical acres were determined by calculating the number of acres in gravity/flood irrigation, as these acres pose the greatest impact to water quality. Refer to figure 10 for a map showing the location of these areas.

Treatment Unit #1a - Treatment Unit: Irrigated Cropland/Pasture Subwatershed: Lower Little Wood River				
Total Acres	Critical Areas Included	Est. Critical Acres	Soils	Resource Problems
42,070.7	-Gravity/flood irrigated cropland and pasture are the most critical acres for water quality	16,344.9	**Quencheroo-Burch-Dryck:** Well drained and very deep soils; on stream terraces. Average annual precipitation: 9-13” **Sidlake-Paulville-Starbuck:** Well drained soils that are shallow, moderately deep to a hardpan, and very deep and have a loamy surface layer; on basalt plains and buttes. Average annual precipitation: 9-11”	- Soil Condition-organic matter depletion - Water Quality-excessive nutrients & organics in ground water - Water Quality-harmful levels of pesticides in groundwater - Water Quality-excessive suspended sediment and turbidity in surface water - Soil Erosion- irrigation induced - Water Quantity-inefficient water use on irrigated land - Water Quantity-aquifer overdraft

Treatment Unit #1b - Treatment Unit: Irrigated Cropland/Pasture Subwatershed: Main Canal				
Total Acres	Critical Areas Included	Est. Critical Acres	Soils	Resource Problems
29,844.9	-Gravity/flood irrigated cropland and pasture are the most critical acres for water quality	21,507.0	**Marley-Bailing-Kinzie:** Well drained soils that are moderately deep and deep to a hardpan and have a dark colored surface layer and a fine textured or moderately fine textured subsoil; on basalt plains and buttes. Average annual precipitation: 11-13"	- Soil Condition-organic matter depletion - Water Quality-excessive nutrients & organics in ground water - Water Quality-harmful levels of pesticides in groundwater - Water Quality-excessive suspended sediment and turbidity in surface water - Soil Erosion- irrigation induced - Water Quantity-inefficient water use on irrigated land - Water Quantity-aquifer overdraft

Treatment Unit #1c - Treatment Unit: Irrigated Cropland/Pasture Subwatershed: Middle Little Wood River				
Total Acres	Critical Areas Included	Est. Critical Acres	Soils	Resource Problems
691.7	-Gravity/flood irrigated cropland and pasture are the most critical acres for water quality	7.8	**Vining-Kecko-Rock outcrop:** Well drained soils that are moderately deep, deep to a hardpan, and very deep and are moderately coarse textured, and rock outcrop; on basalt plains. Average annual precipitation: 9-11"	- Soil Condition-organic matter depletion - Water Quality-excessive nutrients & organics in ground water - Water Quality-harmful levels of pesticides in groundwater - Water Quality-excessive suspended sediment and turbidity in surface water - Soil Erosion- irrigation induced - Water Quantity-inefficient water use on irrigated land - Water Quantity-aquifer overdraft

Treatment Unit #1d - Treatment Unit: Irrigated Cropland/Pasture Subwatershed: Silver Creek				
Total Acres	Critical Areas Included	Est. Critical Acres	Soils	Resource Problems
33,530.0	-Gravity/flood irrigated cropland and pasture are the most critical acres for water quality	20,308.2	**Little Wood-Balaam-Adamson:** Very deep, well drained to somewhat excessively drained soils that formed in alluvium. Average annual precipitation: 12-18” **Picabo-Hapur-Bickett:** Very deep, somewhat poorly drained to very poorly drained soils that formed in alluvium. Average annual precipitation: 12-16”	- Water Quality-excessive nutrients & organics in ground water - Water Quality-harmful levels of pesticides in groundwater - Water Quality-excessive suspended sediment and turbidity in surface water - Soil Erosion- irrigation induced - Water Quantity-inefficient water use on irrigated land

Treatment Unit #1e - Treatment Unit: Irrigated Cropland/Pasture Subwatershed: Little Wood River Reservoir				
Total Acres	Critical Areas Included	Est. Critical Acres	Soils	Resource Problems
23,466.4	-Gravity/flood irrigated cropland and pasture are the most critical acres for water quality	17,033.7	**Little Wood-Balaam-Adamson:** Very deep, well drained to somewhat excessively drained soils that formed in alluvium. Average annual precipitation: 12-18”	- Water Quality-excessive nutrients & organics in ground water - Water Quality-harmful levels of pesticides in groundwater - Water Quality-excessive suspended sediment and turbidity in surface water - Soil Erosion- irrigation induced - Water Quantity-inefficient water use on irrigated land

Treatment Unit #1f - Treatment Unit: Irrigated Cropland/Pasture Subwatershed: Upper Little Wood River				
Total Acres	Critical Areas Included	Est. Critical Acres	Soils	Resource Problems
8,165.3	-Gravity/flood irrigated cropland and pasture are the most critical acres for water quality	7,749.3	**Peevywell-Muldoon-Simonton:** Moderately deep to very deep, well drained soils that formed in alluvium. Average annual precipitation: 12-16"	- Water Quality-excessive nutrients & organics in ground water - Water Quality-harmful levels of pesticides in groundwater - Water Quality-excessive suspended sediment and turbidity in surface water - Soil Erosion- irrigation induced - Water Quantity-inefficient water use on irrigated land

Treatment Unit #1g - Treatment Unit: Irrigated Cropland/Pasture Subwatershed: Muldoon Creek				
Total Acres	Critical Areas Included	Est. Critical Acres	Soils	Resource Problems
2,323.8	-Gravity/flood irrigated cropland and pasture are the most critical acres for water quality	2,323.8	**Peevywell-Muldoon-Simonton:** Moderately deep to very deep, well drained soils that formed in alluvium. Average annual precipitation: 12-16"	- Water Quality-excessive nutrients & organics in ground water - Water Quality-harmful levels of pesticides in groundwater - Water Quality-excessive suspended sediment and turbidity in surface water - Soil Erosion- irrigation induced - Water Quantity-inefficient water use on irrigated land

Treatment Unit #1h - Treatment Unit: Irrigated Cropland/Pasture Subwatershed: Fish Creek Reservoir				
Total Acres	Critical Areas Included	Est. Critical Acres	Soils	Resource Problems
3,264.1	-Gravity/flood irrigated cropland and pasture are the most critical acres for water quality	3,130.6	**Carey Lake-Bringmee:** Very deep, well drained soils that formed in alluvium. Average annual precipitation: 12-16"	- Water Quality-excessive nutrients & organics in ground water - Water Quality-harmful levels of pesticides in groundwater - Water Quality-excessive suspended sediment and turbidity in surface water - Soil Erosion- irrigation induced - Water Quantity-inefficient water use on irrigated land

Treatment Unit #1i - Treatment Unit: Irrigated Cropland/Pasture Subwatershed: Fish Creek				
Total Acres	Critical Areas Included	Est. Critical Acres	Soils	Resource Problems
6,310.7	-Gravity/flood irrigated cropland and pasture are the most critical acres for water quality	2,472.4	**Carey Lake-Bringmee:** Very deep, well drained soils that formed in alluvium. Average annual precipitation: 12-16"	- Water Quality-excessive nutrients & organics in ground water - Water Quality-harmful levels of pesticides in groundwater - Water Quality-excessive suspended sediment and turbidity in surface water - Soil Erosion- irrigation induced - Water Quantity-inefficient water use on irrigated land

Treatment Unit 2 – Privately Owned Rangeland

Treatment Unit 2 includes all privately owned rangeland found within the Little Wood River subbasin. This treatment unit has been subdivided into 9 parts (a-i), correlating to the 9 subwatersheds in which these critical acres occur. Critical acres include areas of rangeland on slopes greater than 10% and with highly erodible soils, areas adjacent to streams, livestock winter feeding areas, and areas with low plant productivity that are being overgrazed. Individual on-site field evaluations and planning are needed to determine the exact amount of critical acres, but it is estimated that 25% of the total acres of privately owned rangeland is critical.

Treatment Unit #2a – Treatment Unit: Privately Owned Rangeland Subwatershed: Lower Little Wood River				
Total Acres	Critical Areas Included	Est. Critical Acres	Soils	Resource Problems
15,753.5	-Areas of rangeland with slopes greater than 10% on highly erodible soils -Areas adjacent to streams -Winter livestock feeding areas -Areas where overgrazing is occurring and there is low plant productivity	3,938.4	**Sidlake-Paulville-Starbuck:** Well drained soils that are shallow, moderately deep to a hardpan, and very deep and have a loamy surface layer; on basalt plains and buttes. Average annual precipitation: 9-11” **Wendell-Wako-Ackelton:** Well drained soils that are moderately deep and deep to a hardpan and have a coarse textured surface layer; on basalt plains and buttes. Average annual precipitation: 9-11”	- Soil Erosion-hoof shear - Water Quality-excessive nutrients, organics, suspended sediment, and turbidity in surface water, harmful temperatures of surface water - Plant Condition-noxious and invasive plants, loss of productivity, loss of health and vigor - T&E Species- impacts to declining species and species of concern - Livestock-inadequate quantities and quality of feed and forage, inadequate stock water

Treatment Unit #2b – Treatment Unit: Privately Owned Rangeland Subwatershed: Main Canal				
Total Acres	Critical Areas Included	Est. Critical Acres	Soils	Resource Problems
19,427.0	-Areas of rangeland with slopes greater than 10% on highly erodible soils -Areas adjacent to streams -Winter livestock feeding areas -Areas where overgrazing is occurring and there is low plant productivity	4,856.8	**Deerhorn-Rehfield-Rock outcrop:** Moderately deep and very deep soils that formed in eolian material over basalt and in eolian-influenced alluvium, and rock outcrop. Average annual precipitation: 11-13” **Marley-Bailing-Kinzie:** Well drained soils that are moderately deep and deep to a hardpan and have a dark colored surface layer and a fine textured or moderately fine textured subsoil; on basalt plains and buttes. Average annual precipitation: 11-13”	- Soil Erosion-hoof shear - Water Quality-excessive nutrients, organics, suspended sediment, and turbidity in surface water, harmful temperatures of surface water - Plant Condition-noxious and invasive plants, loss of productivity, loss of health and vigor - T&E Species- impacts to declining species and species of concern - Livestock-inadequate quantities and quality of feed and forage, inadequate stock water

Treatment Unit #2c – Treatment Unit: Privately Owned Rangeland Subwatershed: Middle Little Wood River				
Total Acres	Critical Areas Included	Est. Critical Acres	Soils	Resource Problems
5,930.7	-Areas of rangeland with slopes greater than 10% on highly erodible soils -Areas adjacent to streams -Winter livestock feeding areas -Areas where overgrazing is occurring and there is low plant productivity	1,482.7	**Deerhorn-Rehfield-Rock outcrop:** Moderately deep and very deep soils that formed in eolian material over basalt and in eolian-influenced alluvium, and rock outcrop. Average annual precipitation: 11-13” **Vining-Kecko-Rock outcrop:** Well drained soils that are moderately deep, deep to a hardpan, and very deep and are moderately coarse textured, and rock outcrop; on basalt plains. Average annual precipitation: 9-11”	- Soil Erosion-hoof shear - Water Quality-excessive nutrients, organics, suspended sediment, and turbidity in surface water, harmful temperatures of surface water - Plant Condition-noxious and invasive plants, loss of productivity, loss of health and vigor - T&E Species- impacts to declining species and species of concern - Livestock-inadequate quantities and quality of feed and forage, inadequate stock water

Treatment Unit #2d – Treatment Unit: Privately Owned Rangeland Subwatershed: Silver Creek				
Total Acres	Critical Areas Included	Est. Critical Acres	Soils	Resource Problems
10,645.4	-Areas of rangeland with slopes greater than 10% on highly erodible soils -Areas adjacent to streams -Winter livestock feeding areas -Areas where overgrazing is occurring and there is low plant productivity	2,661.4	**Friedman-Elksel-Starhope:** Moderately deep and deep soils that formed in colluvium and residuum derived from volcanic rock. Average annual precipitation 12-22”	- Soil Erosion-hoof shear - Water Quality-excessive nutrients, organics, suspended sediment, and turbidity in surface water, harmful temperatures of surface water - Plant Condition-noxious and invasive plants, loss of productivity, loss of health and vigor - T&E Species- impacts to declining species and species of concern - Livestock-inadequate quantities and quality of feed and forage, inadequate stock water

Treatment Unit #2e – Treatment Unit: Privately Owned Rangeland Subwatershed: Little Wood River Reservoir				
Total Acres	Critical Areas Included	Est. Critical Acres	Soils	Resource Problems
31,035.0	-Areas of rangeland with slopes greater than 10% on highly erodible soils -Areas adjacent to streams -Winter livestock feeding areas -Areas where overgrazing is occurring and there is low plant productivity	7,758.8	**Friedman-Elksel-Starhope:** Moderately deep and deep soils that formed in colluvium and residuum derived from volcanic rock. Average annual precipitation 12-22”	- Soil Erosion-hoof shear - Water Quality-excessive nutrients, organics, suspended sediment, and turbidity in surface water, harmful temperatures of surface water - Plant Condition-noxious and invasive plants, loss of productivity, loss of health and vigor - T&E Species- impacts to declining species and species of concern - Livestock-inadequate quantities and quality of feed and forage, inadequate stock water

Treatment Unit #2f – Treatment Unit: Privately Owned Rangeland Subwatershed: Upper Little Wood River				
Total Acres	Critical Areas Included	Est. Critical Acres	Soils	Resource Problems
15,640.5	-Areas of rangeland with slopes greater than 10% on highly erodible soils -Areas adjacent to streams -Winter livestock feeding areas -Areas where overgrazing is occurring and there is low plant productivity	3,910.1	**Friedman-Elksel-Starhope:** Moderately deep and deep soils that formed in colluvium and residuum derived from volcanic rock. Average annual precipitation 12-22”	- Soil Erosion-hoof shear - Water Quality-excessive nutrients, organics, suspended sediment, and turbidity in surface water, harmful temperatures of surface water - Plant Condition-noxious and invasive plants, loss of productivity, loss of health and vigor - T&E Species- impacts to declining species and species of concern - Livestock-inadequate quantities and quality of feed and forage, inadequate stock water

Treatment Unit #2g – Treatment Unit: Privately Owned Rangeland Subwatershed: Muldoon Creek				
Total Acres	Critical Areas Included	Est. Critical Acres	Soils	Resource Problems
6,129.4	-Areas of rangeland with slopes greater than 10% on highly erodible soils -Areas adjacent to streams -Winter livestock feeding areas -Areas where overgrazing is occurring and there is low plant productivity	1,532.4	**Friedman-Elksel-Starhope:** Moderately deep and deep soils that formed in colluvium and residuum derived from volcanic rock. Average annual precipitation 12-22”	- Soil Erosion-hoof shear - Water Quality-excessive nutrients, organics, suspended sediment, and turbidity in surface water, harmful temperatures of surface water - Plant Condition-noxious and invasive plants, loss of productivity, loss of health and vigor - T&E Species- impacts to declining species and species of concern - Livestock-inadequate quantities and quality of feed and forage, inadequate stock water

Treatment Unit #2h – Treatment Unit: Privately Owned Rangeland Subwatershed: Fish Creek Reservoir				
Total Acres	Critical Areas Included	Est. Critical Acres	Soils	Resource Problems
22,902.2	-Areas of rangeland with slopes greater than 10% on highly erodible soils -Areas adjacent to streams -Winter livestock feeding areas -Areas where overgrazing is occurring and there is low plant productivity	5,725.6	**Friedman-Elksel-Starhope:** Moderately deep and deep soils that formed in colluvium and residuum derived from volcanic rock. Average annual precipitation 12-22” **Vitale-Lavacreek-Blackspar:** Shallow to deep soils that formed in colluvium and in tephra over colluvium. Average annual precipitation 12-24”	- Soil Erosion-hoof shear - Water Quality-excessive nutrients, organics, suspended sediment, and turbidity in surface water, harmful temperatures of surface water - Plant Condition-noxious and invasive plants, loss of productivity, loss of health and vigor - T&E Species- impacts to declining species and species of concern - Livestock-inadequate quantities and quality of feed and forage, inadequate stock water

Treatment Unit #2i – Treatment Unit: Privately Owned Rangeland Subwatershed: Fish Creek				
Total Acres	Critical Areas Included	Est. Critical Acres	Soils	Resource Problems
4,431.9	-Areas of rangeland with slopes greater than 10% on highly erodible soils -Areas adjacent to streams -Winter livestock feeding areas -Areas where overgrazing is occurring and there is low plant productivity	1,108.0	**Friedman-Elksel-Starhope:** Moderately deep and deep soils that formed in colluvium and residuum derived from volcanic rock. Average annual precipitation 12-22” **Vitale-Lavacreek-Blackspar:** Shallow to deep soils that formed in colluvium and in tephra over colluvium. Average annual precipitation 12-24”	- Soil Erosion-hoof shear - Water Quality-excessive nutrients, organics, suspended sediment, and turbidity in surface water, harmful temperatures of surface water - Plant Condition-noxious and invasive plants, loss of productivity, loss of health and vigor - T&E Species- impacts to declining species and species of concern - Livestock-inadequate quantities and quality of feed and forage, inadequate stock water

Treatment Unit 3 – Privately Owned Riparian

Treatment Unit 3 includes all privately owned riparian land found within the Little Wood River subbasin. This was calculated by placing a 100 ft. buffer around all perennial streams, and considering all land found within that buffer to be riparian zone. There are multiple land uses found within the riparian zones, and they include, but are not limited to: cropland, pasture, rangeland, urban, and Animal Feeding Operations. This treatment unit has been subdivided into 9 parts (a-i), correlating to the 9 subwatersheds in which these critical acres occur. Critical acres include areas of riparian zone found adjacent to a 303(d) listed stream. Additional critical acres may exist, but additional on-site planning and evaluation is needed to determine the exact amount of critical acres.

Treatment Unit #3a – Treatment Unit: Privately Owned Riparian Subwatershed: Lower Little Wood River				
Total Acres Total Feet	Critical Areas Included	Est. Critical Acres Critical Feet	Soils Resource	Problems
713.2 acres 156,546.6 feet	-Areas in proximity to a §303(d) listed stream	713.2 acres 156,546.6 feet	**Quencheroo-Burch-Dryck:** Well drained and very deep soils; on stream terraces. Average annual precipitation: 9-13"	- Overgrazing- streamside vegetation removal - Stream Channel-straightening and evolution - Soil Erosion-hoof shear - Water Quality-excessive nutrients and sediment in surface water - Forage production-loss of hay/pasture - Livestock-loss of shelter - Habitat-loss of shelter, forage, etc. for wildlife and fish habitat - Ecological Condition-reduced quality

Treatment Unit #3b – Treatment Unit: Privately Owned Riparian Subwatershed: Main Canal				
Total Acres Total Feet	Critical Areas Included	Est. Critical Acres Critical Feet	Soils Resource	Problems
443.3 acres 96,064.2 feet	-Areas in proximity to a §303(d) listed stream	443.3 acres 96,064.2 feet	**Vining-Kecko-Rock outcrop:** Well drained soils that are moderately deep, deep to a hardpan, and very deep and are moderately coarse textured, and rock outcrop; on basalt plains. Average annual precipitation: 9-11"	- Overgrazing- streamside vegetation removal - Stream Channel-straightening and evolution - Soil Erosion-hoof shear - Water Quality-excessive nutrients and sediment in surface water - Forage production-loss of hay/pasture - Livestock-loss of shelter - Habitat-loss of shelter, forage, etc. for wildlife and fish habitat - Ecological Condition-reduced quality

Treatment Unit #3c – Treatment Unit: Privately Owned Riparian Subwatershed: Middle Little Wood River				
Total Acres Total Feet	Critical Areas Included	Est. Critical Acres Critical Feet	Soils Resource	Problems
162.9 acres 34,122.9 feet	-Areas in proximity to a §303(d) listed stream	162.9 acres 34,122.9 feet	**Vining-Kecko-Rock outcrop:** Well drained soils that are moderately deep, deep to a hardpan, and very deep and are moderately coarse textured, and rock outcrop; on basalt plains. Average annual precipitation: 9-11”	- Overgrazing- streamside vegetation removal - Stream Channel-straightening and evolution - Soil Erosion-hoof shear - Water Quality-excessive nutrients and sediment in surface water - Forage production-loss of hay/pasture - Livestock-loss of shelter - Habitat-loss of shelter, forage, etc. for wildlife and fish habitat - Ecological Condition-reduced quality

Treatment Unit #3d – Treatment Unit: Privately Owned Riparian Subwatershed: Silver Creek				
Total Acres Total Feet	Critical Areas Included	Est. Critical Acres Critical Feet	Soils Resource	Problems
786.9 acres 172,421.9 feet	-Areas in proximity to a §303(d) listed stream	97.6 acres 20,902.5 feet	**Little Wood-Balaam-Adamson:** Very deep, well drained to somewhat excessively drained soils that formed in alluvium. Average annual precipitation: 12-18” **Picabo-Hapur-Bickett:** Very deep, somewhat poorly drained to very poorly drained soils that formed in alluvium. Average annual precipitation: 12-16”	- Overgrazing- streamside vegetation removal - Stream Channel-straightening and evolution - Soil Erosion-hoof shear - Water Quality-excessive nutrients and sediment in surface water - Forage production-loss of hay/pasture - Livestock-loss of shelter - Habitat-loss of shelter, forage, etc. for wildlife and fish habitat - Ecological Condition-reduced quality

Treatment Unit #3e – Treatment Unit: Privately Owned Riparian Subwatershed: Little Wood River Reservoir				
Total Acres Total Feet	Critical Areas Included	Est. Critical Acres Critical Feet	Soils Resource	Problems
1,169.3 acres 256,067.8 feet	-Areas in proximity to a §303(d) listed stream	708.6 acres 153,976.5 feet	**Little Wood-Balaam-Adamson:** Very deep, well drained to somewhat excessively drained soils that formed in alluvium. Average annual precipitation: 12-18” **Friedman-Elksel-Starhope:** Moderately deep and deep soils that formed in colluvium and residuum derived from volcanic rock. Average annual precipitation 12-22”	- Overgrazing- streamside vegetation removal - Stream Channel-straightening and evolution - Soil Erosion-hoof shear - Water Quality-excessive nutrients and sediment in surface water - Forage production-loss of hay/pasture - Livestock-loss of shelter - Habitat-loss of shelter, forage, etc. for wildlife and fish habitat - Ecological Condition-reduced quality

Treatment Unit #3f – Treatment Unit: Privately Owned Riparian Subwatershed: Upper Little Wood River				
Total Acres Total Feet	Critical Areas Included	Est. Critical Acres Critical Feet	Soils Resource	Problems
622.7 acres 136,774.8 feet	-Areas in proximity to a §303(d) listed stream	66.3 acres 14,185.4 feet	**Peevywell-Muldoon-Simonton:** Moderately deep to very deep, well drained soils that formed in alluvium. Average annual precipitation: 12-16” **Friedman-Elksel-Starhope:** Moderately deep and deep soils that formed in colluvium and residuum derived from volcanic rock. Average annual precipitation 12-22”	- Overgrazing- streamside vegetation removal - Stream Channel-straightening and evolution - Soil Erosion-hoof shear - Water Quality-excessive nutrients and sediment in surface water - Forage production-loss of hay/pasture - Livestock-loss of shelter - Habitat-loss of shelter, forage, etc. for wildlife and fish habitat - Ecological Condition-reduced quality

Treatment Unit #3g – Treatment Unit: Privately Owned Riparian Subwatershed: Muldoon Creek				
Total Acres Total Feet	Critical Areas Included	Est. Critical Acres Critical Feet	Soils Resource	Problems
319.9 acres 69,901.5 feet	-Areas in proximity to a §303(d) listed stream	239.1 acres 51,838.6 feet	**Peevywell-Muldoon-Simonton:** Moderately deep to very deep, well drained soils that formed in alluvium. Average annual precipitation: 12-16” **Little Wood-Balaam-Adamson:** Very deep, well drained to somewhat excessively drained soils that formed in alluvium. Average annual precipitation: 12-18”	- Overgrazing- streamside vegetation removal - Stream Channel-straightening and evolution - Soil Erosion-hoof shear - Water Quality-excessive nutrients and sediment in surface water - Forage production-loss of hay/pasture - Livestock-loss of shelter - Habitat-loss of shelter, forage, etc. for wildlife and fish habitat - Ecological Condition-reduced quality

Treatment Unit #3h – Treatment Unit: Privately Owned Riparian Subwatershed: Fish Creek Reservoir				
Total Acres Total Feet	Critical Areas Included	Est. Critical Acres Critical Feet	Soils Resource	Problems
616.3 acres 134,589.2 feet	-Areas in proximity to a §303(d) listed stream	319.7 acres 69,054.7 feet	**Friedman-Elksel-Starhope:** Moderately deep and deep soils that formed in colluvium and residuum derived from volcanic rock. Average annual precipitation 12-22” **Vitale-Lavacreek-Blackspar:** Shallow to deep soils that formed in colluvium and in tephra over colluvium. Average annual precipitation 12-24” **Carey Lake-Bringmee:** Very deep, well drained soils that formed in alluvium. Average annual precipitation: 12-16”	- Overgrazing- streamside vegetation removal - Stream Channel-straightening and evolution - Soil Erosion-hoof shear - Water Quality-excessive nutrients and sediment in surface water - Forage production-loss of hay/pasture - Livestock-loss of shelter - Habitat-loss of shelter, forage, etc. for wildlife and fish habitat - Ecological Condition-reduced quality

Treatment Unit #3i – Treatment Unit: Privately Owned Riparian Subwatershed: Fish Creek				
Total Acres Total Feet	Critical Areas Included	Est. Critical Acres Critical Feet	Soils Resource	Problems
236.1 acres 51,547.3 feet	-Areas in proximity to a §303(d) listed stream	236.1 acres 51,547.3 feet	**Peevywell-Muldoon-Simonton:** Moderately deep to very deep, well drained soils that formed in alluvium. Average annual precipitation: 12-16” **Carey Lake-Bringmee:** Very deep, well drained soils that formed in alluvium. Average annual precipitation: 12-16”	- Overgrazing- streamside vegetation removal - Stream Channel-straightening and evolution - Soil Erosion-hoof shear - Water Quality-excessive nutrients and sediment in surface water - Forage production-loss of hay/pasture - Livestock-loss of shelter - Habitat-loss of shelter, forage, etc. for wildlife and fish habitat - Ecological Condition-reduced quality

Treatment Unit 4 – Animal Feeding Operations

Treatment Unit 4 includes all Animal Feeding Operations (AFO) and Confined Animal Feeding Operations (CAFO) found within the Little Wood River subbasin. Feeding operations located on or adjacent to a downstream receiving waterbody and areas where livestock have direct access to a downstream receiving waterbody are considered critical. The level of management of these Animal Feeding Operations varies, and therefore further on-site evaluation and planning is needed to estimate the number of critical Animal Feeding Operations.

Treatment Unit #4 – (CAFO)	Treatment Unit: Animal Feeding Operations (AFO), and Confined Animal Feeding Operations Subwatershed: Entire Little Wood River Subbasin			
Total Number	Critical Areas Included	Est. Critical	Soils	Resource Problems
44	-Feeding operations located on or adjacent to a downstream receiving waterbody	Further on-site evaluation and planning is needed to estimate the number of critical Animal Feeding Operations	Soil type will vary by site location	- Overgrazing- streamside vegetation removal - Soil Erosion-hoof shear - Water Quality-excessive nutrients, sediment, and bacteria in surface water due to runoff from corrals - Water Quality-livestock access to streams - Water Quality-excessive nutrients, sediment, and bacteria in groundwater from waste storage sites

RECOMENDED BMPs AND ESTIMATED COSTS

BMPs appropriate for the reduction of agricultural impacts to water quality in the Little Wood River subwatersheds and their installation costs are listed below in Table 10. Individual conservation planning for willing landowners will determine the most appropriate BMPs to install on a case by case basis. The information included in Table 10 provides an estimate only of the BMPs recommended for critical acres in the subbasin and their approximate costs. A more precise estimate of quantities of each BMP recommended to install will be determined at the time of conservation planning for a particular landowner. The total estimated cost of implementation of the recommended BMPs in the entire Little Wood River subbasin is found in Table 11.

Table 10. Recommended BMPs and estimated costs by subwatershed

Treatment Unit 1 – Irrigated Cropland/Pasture

Treatment Unit #1a : Irrigated Cropland/Pasture - Lower Little Wood River Subwatershed

Conservation Practice	NRCS Practice Code	Average Cost	Unit	Amount	Total Funds
Conservation Crop Rotation 328		$0.00	acre	16,344.9	$0.00
Irrigation Water Management 449		$5.00	acre	16,344.9	$81,724.50
Nutrient Management	590	$5.00	acre	16,344.9	$81,724.50
Pest Management	595	$15.00	acre	16,344.9	$245,173.50
Surface Roughening	609	$0.00	acre	16,344.9	$0.00
Upland Wildlife Habitat Management 645		$10.00	acre	4,903.5	$49,034.70
Irrigation System, Sprinkler 442		$630.00	acre	16,344.9	$10,297,287.00
Residue Management, Seasonal 344		$0.00	acre	16,344.9	$0.00

Pasture and Hay Planting	512	$244.00	acre	4,903.5	$1,196,446.68
Prescribed Grazing	528	$5.00	acre	4,903.5	$24,517.35
Watering Facility	614	$1,910.00	each	123	$234,930.00
Fence 382		$2.46	foot	Site Specific	
PAM - Anionic Polyacrylamide Erosion Control 450		$40.00	acre	Site Specific	
Tree/Shrub Establishment	612	$1.50	each	Site Specific	
Pipeline 516		$3.76	foot	Site Specific	
Heavy Use Area Protection	561	$1.36	sqft.	Site Specific	
Structure for Water Control	587	Site Specific	each	Site Specific	
Rigid Gated Pipeline	430	Site Specific foot		Site Specific	
Irrigation Water Conveyance, Pipeline	430	Site Specific foot		Site Specific	
Pumping Plant	533	Site Specific HP		Site Specific	
Total					**$12,210,838.23**

Treatment Unit #1b : Irrigated Cropland/Pasture - Main Canal Subwatershed

Conservation Practice	NRCS Practice Code	Average Cost	Unit	Amount	Total Funds
Conservation Crop Rotation 328		$0.00	acre	21,507.0	$0.00
Irrigation Water Management 449		$5.00	acre	21,507.0	$107,535.00
Nutrient Management	590	$5.00	acre	21,507.0	$107,535.00
Pest Management	595	$15.00	acre	21,507.0	$322,605.00
Surface Roughening	609	$0.00	acre	21,507.0	$0.00
Upland Wildlife Habitat Management 645		$10.00	acre	6,452.1	$64,521.00
Irrigation System, Sprinkler 442		$630.00	acre	21,507.0	$13,549,410.00
Residue Management, Seasonal 344		$0.00	acre	21,507.0	$0.00
Pasture and Hay Planting	512	$244.00	acre	6,452.1	$1,574,312.40
Prescribed Grazing	528	$5.00	acre	6,452.1	$32,260.50
Watering Facility	614	$1,910.00	each	161	$307,510.00
Fence 382		$2.46	foot	Site Specific	
PAM - Anionic Polyacrylamide Erosion Control 450		$40.00	acre	Site Specific	
Tree/Shrub Establishment	612	$1.50	each	Site Specific	
Pipeline 516		$3.76	foot	Site Specific	
Heavy Use Area Protection	561	$1.36	sqft.	Site Specific	
Structure for Water Control	587	Site Specific	each	Site Specific	
Rigid Gated Pipeline	430	Site Specific foot		Site Specific	
Irrigation Water Conveyance, Pipeline	430	Site Specific foot		Site Specific	
Pumping Plant	533	Site Specific HP		Site Specific	
Total					**$16,065,688.90**

Treatment Unit #1c : Irrigated Cropland/Pasture - Middle Little Wood River Subwatershed

Conservation Practice	NRCS Practice Code	Average Cost	Unit	Amount	Total Funds
Conservation Crop Rotation	328	$0.00	acre	7.8	$0.00
Irrigation Water Management 449		$5.00	acre	7.8	$39.00
Nutrient Management	590	$5.00	acre	7.8	$39.00
Pest Management	595	$15.00	acre	7.8	$117.00
Upland Wildlife Habitat Management 645		$10.00	acre	7.8	$78.00
Irrigation System, Sprinkler	442	$630.00	acre	7.8	$4,914.00
Residue Management, Seasonal 344		$0.00	acre	7.8	$0.00
Pasture and Hay Planting	512	$244.00	acre	7.8	$1,903.20
Prescribed Grazing	528	$5.00	acre	7.8	$39.00
Watering Facility	614	$1,910.00	each	1	$1,910.00
Fence 382		$2.46	foot	Site Specific	
PAM - Anionic Polyacrylamide Erosion Control 450		$40.00	acre	Site Specific	
Tree/Shrub Establishment	612	$1.50	each	Site Specific	
Pipeline 516		$3.76	foot	Site Specific	
Heavy Use Area Protection	561	$1.36	sqft.	Site Specific	
Structure for Water Control	587	Site Specific	each	Site Specific	
Rigid Gated Pipeline	430	Site Specific foot		Site Specific	
Irrigation Water Conveyance, Pipeline	430	Site Specific foot		Site Specific	
Pumping Plant	533	Site Specific HP		Site Specific	
Total					**$9,039.20**

Treatment Unit #1d : Irrigated Cropland/Pasture - Silver Creek Subwatershed

Conservation Practice	NRCS Practice Code	Average Cost	Unit	Amount	Total Funds
Conservation Crop Rotation 328		$0.00	acre	20,308.2	$0.00
Irrigation Water Management 449		$5.00	acre	20,308.2	$101,541.00
Nutrient Management	590	$5.00	acre	20,308.2	$101,541.00
Pest Management	595	$15.00	acre	20,308.2	$304,623.00
Surface Roughening	609	$0.00	acre	20,308.2	$0.00
Upland Wildlife Habitat Management 645		$10.00	acre	6,092.5	$60,924.60
Irrigation System, Sprinkler 442		$630.00	acre	20,308.2	$12,794,166.00
Residue Management, Seasonal 344		$0.00	acre	20,308.2	$0.00
Pasture and Hay Planting	512	$244.00	acre	6,092.5	$1,486,560.24
Prescribed Grazing	528	$5.00	acre	6,092.5	$30,462.30
Watering Facility	614	$1,910.00	each	152	$290,320.00
Fence 382		$2.46	foot	Site Specific	

PAM - Anionic Polyacrylamide Erosion Control 450		$40.00	acre	Site Specific	
Tree/Shrub Establishment	612	$1.50	each	Site Specific	
Pipeline 516		$3.76	foot	Site Specific	
Heavy Use Area Protection	561	$1.36	sqft.	Site Specific	
Structure for Water Control	587	Site Specific	each	Site Specific	
Rigid Gated Pipeline	430	Site Specific	foot	Site Specific	
Irrigation Water Conveyance, Pipeline	430	Site Specific	foot	Site Specific	
Pumping Plant	533	Site Specific	HP	Site Specific	
Total					**$15,170,138.14**

Treatment Unit #1e : Irrigated Cropland/Pasture - Little Wood River Reservoir Subwatershed

Conservation Practice	NRCS Practice Code	Average Cost	Unit	Amount	Total Funds
Conservation Crop Rotation 328		$0.00	acre	17,033.7	$0.00
Irrigation Water Management 449		$5.00	acre	17,033.7	$85,168.50
Nutrient Management	590	$5.00	acre	17,033.7	$85,168.50
Pest Management	595	$15.00	acre	17,033.7	$255,505.50
Surface Roughening	609	$0.00	acre	17,033.7	$0.00
Upland Wildlife Habitat Management 645		$10.00	acre	5,110.1	$51,101.10
Irrigation System, Sprinkler 442		$630.00	acre	17,033.7	$10,731,231.00
Residue Management, Seasonal 344		$0.00	acre	17,033.7	$0.00
Pasture and Hay Planting	512	$244.00	acre	5,110.1	$1,246,866.84
Prescribed Grazing	528	$5.00	acre	5,110.1	$25,550.55
Watering Facility	614	$1,910.00	each	128	$244,480.00
Fence 382		$2.46	foot	Site Specific	
PAM - Anionic Polyacrylamide Erosion Control 450		$40.00	acre	Site Specific	
Tree/Shrub Establishment	612	$1.50	each	Site Specific	
Pipeline 516		$3.76	foot	Site Specific	
Heavy Use Area Protection	561	$1.36	sqft.	Site Specific	
Structure for Water Control	587	Site Specific	each	Site Specific	
Rigid Gated Pipeline	430	Site Specific	foot	Site Specific	
Irrigation Water Conveyance, Pipeline	430	Site Specific	foot	Site Specific	
Pumping Plant	533	Site Specific	HP	Site Specific	
Total					**$12,725,071.99**

Treatment Unit #1f : Irrigated Cropland/Pasture - Upper Little Wood River Subwatershed

Conservation Practice	NRCS Practice Code	Average Cost	Unit	Amount	Total Funds
Conservation Crop Rotation	328	$0.00	acre	7,749.3	$0.00
Irrigation Water Management 449		$5.00	acre	7,749.3	$38,746.50
Nutrient Management	590	$5.00	acre	7,749.3	$38,746.50
Pest Management	595	$15.00	acre	7,749.3	$116,239.50
Upland Wildlife Habitat Management 645		$10.00	acre	7,749.3	$77,493.00
Irrigation System, Sprinkler	442	$630.00	acre	7,749.3	$4,882,059.00
Residue Management, Seasonal 344		$0.00	acre	7,749.3	$0.00
Pasture and Hay Planting	512	$244.00	acre	7,749.3	$1,890,829.20
Prescribed Grazing	528	$5.00	acre	7,749.3	$38,746.50
Watering Facility	614	$1,910.00	each	194	$370,540.00
Fence 382		$2.46	foot	Site Specific	
PAM - Anionic Polyacrylamide Erosion Control 450		$40.00	acre	Site Specific	
Tree/Shrub Establishment	612	$1.50	each	Site Specific	
Pipeline 516		$3.76	foot	Site Specific	
Heavy Use Area Protection	561	$1.36	sqft.	Site Specific	
Structure for Water Control	587	Site Specific	each	Site Specific	
Rigid Gated Pipeline	430	Site Specific foot		Site Specific	
Irrigation Water Conveyance, Pipeline	430	Site Specific foot		Site Specific	
Pumping Plant	533	Site Specific HP		Site Specific	
Total					**$7,453,400.20**

Treatment Unit #1g : Irrigated Cropland/Pasture - Muldoon Creek Subwatershed

Conservation Practice	NRCS Practice Code	Average Cost	Unit	Amount	Total Funds
Conservation Crop Rotation 328		$0.00	acre	2,323.8	$0.00
Irrigation Water Management 449		$5.00	acre	2,323.8	$11,619.00
Nutrient Management	590	$5.00	acre	2,323.8	$11,619.00
Pest Management	595	$15.00	acre	2,323.8	$34,857.00
Upland Wildlife Habitat Management 645		$10.00	acre	2,323.8	$23,238.00
Irrigation System, Sprinkler 442		$630.00	acre	2,323.8	$1,463,994.00
Residue Management, Seasonal 344		$0.00	acre	2,323.8	$0.00
Pasture and Hay Planting	512	$244.00	acre	2,323.8	$567,007.20
Prescribed Grazing	528	$5.00	acre	2,323.8	$11,619.00
Watering Facility	614	$1,910.00	each	58	$110,780.00
Fence 382		$2.46	foot	Site Specific	

PAM - Anionic Polyacrylamide Erosion Control 450		$40.00	acre	Site Specific	
Tree/Shrub Establishment	612	$1.50	each	Site Specific	
Pipeline 516		$3.76	foot	Site Specific	
Heavy Use Area Protection	561	$1.36	sqft.	Site Specific	
Structure for Water Control	587	Site Specific	each	Site Specific	
Rigid Gated Pipeline	430	Site Specific	foot	Site Specific	
Irrigation Water Conveyance, Pipeline	430	Site Specific	foot	Site Specific	
Pumping Plant	533	Site Specific	HP	Site Specific	
Total					**$2,234,733.20**

Treatment Unit #1h : Irrigated Cropland/Pasture - Fish Creek Reservoir Subwatershed

Conservation Practice	NRCS Practice Code	Average Cost	Unit	Amount	Total Funds
Conservation Crop Rotation 328		$0.00	acre	3,130.6	$0.00
Irrigation Water Management 449		$5.00	acre	3,130.6	$15,653.00
Nutrient Management	590	$5.00	acre	3,130.6	$15,653.00
Pest Management	595	$15.00	acre	3,130.6	$46,959.00
Upland Wildlife Habitat Management 645		$10.00	acre	3,130.6	$31,306.00
Irrigation System, Sprinkler 442		$630.00	acre	3,130.6	$1,972,278.00
Residue Management, Seasonal 344		$0.00	acre	3,130.6	$0.00
Pasture and Hay Planting	512	$244.00	acre	3,130.6	$763,866.40
Prescribed Grazing	528	$5.00	acre	3,130.6	$15,653.00
Watering Facility	614	$1,910.00	each	78	$148,980.00
Fence 382		$2.46	foot	Site Specific	
PAM - Anionic Polyacrylamide Erosion Control 450		$40.00	acre	Site Specific	
Tree/Shrub Establishment	612	$1.50	each	Site Specific	
Pipeline 516		$3.76	foot	Site Specific	
Heavy Use Area Protection	561	$1.36	sqft.	Site Specific	
Structure for Water Control	587	Site Specific	each	Site Specific	
Rigid Gated Pipeline	430	Site Specific	foot	Site Specific	
Irrigation Water Conveyance, Pipeline	430	Site Specific	foot	Site Specific	
Pumping Plant	533	Site Specific	HP	Site Specific	
Total					**$3,010,348.40**

Treatment Unit #1i : Irrigated Cropland/Pasture - Fish Creek Subwatershed

Conservation Practice	NRCS Practice Code	Average Cost	Unit	Amount	Total Funds
Conservation Crop Rotation 328		$0.00	acre	2,472.4	$0.00
Irrigation Water Management 449		$5.00	acre	2,472.4	$12,362.00
Nutrient Management	590	$5.00	acre	2,472.4	$12,362.00
Pest Management	595	$15.00	acre	2,472.4	$37,086.00
Surface Roughening	609	$0.00	acre	2,472.4	$0.00
Upland Wildlife Habitat Management 645		$10.00	acre	741.7	$7,417.20
Irrigation System, Sprinkler 442		$630.00	acre	2,472.4	$1,557,612.00
Residue Management, Seasonal 344		$0.00	acre	2,472.4	$0.00
Pasture and Hay Planting	512	$244.00	acre	741.7	$180,979.68
Prescribed Grazing	528	$5.00	acre	741.7	$3,708.60
Watering Facility	614	$1,910.00	each	19	$36,290.00
Fence 382		$2.46	foot	Site Specific	
PAM - Anionic Polyacrylamide Erosion Control 450		$40.00	acre	Site Specific	
Tree/Shrub Establishment	612	$1.50	each	Site Specific	
Pipeline 516		$3.76	foot	Site Specific	
Heavy Use Area Protection	561	$1.36	sqft.	Site Specific	
Structure for Water Control	587	Site Specific	each	Site Specific	
Rigid Gated Pipeline	430	Site Specific	foot	Site Specific	
Irrigation Water Conveyance, Pipeline	430	Site Specific	foot	Site Specific	
Pumping Plant	533	Site Specific	HP	Site Specific	
Total					**$1,847,817.48**

Treatment Unit 2 – Privately Owned Rangeland

Treatment Unit #2a : Rangeland - Lower Little Wood River Subwatershed

Conservation Practice	NRCS Practice Code	Average Cost	Unit	Amount	Total Funds
Fence 382		$2.46	foot	39,384.0	$96,884.64
Prescribed Grazing	528	$2.00	acre	3,938.4	$7,876.80
Upland Wildlife Habitat Management 645		$10.00	acre	3,938.4	$39,384.00
Watering Facility	614	$1,910.00	each	20	$38,200.00
Pest Management	595	$30.00	acre	393.8	$11,815.20
Range Planting	550	$100.00	acre	393.8	$39,384.00
Spring Development	574	$1,800.00	each	2	$3,600.00
Heavy Use Area Protection 561		$1.36	sqft.	Site Specific	
Pipeline 516		$3.76	foot	Site Specific	
Water Well	642	$13,500.00	each	Site Specific	

Pumping Plant	533	Site Specific HP		Site Specific	
Firebreak	394	Site Specific	acre	Site Specific	

Total **$237,144.64**

Treatment Unit #2b : Rangeland - Main Canal Subwatershed

Conservation Practice	NRCS Practice Code	Average Cost	Unit	Amount	Total Funds
Fence 382		$2.46	foot	48,568.0	$119,477.28
Prescribed Grazing	528	$2.00	acre	4,856.8	$9,713.60
Upland Wildlife Habitat Management 645		$10.00	acre	4,856.8	$48,568.00
Watering Facility	614	$1,910.00	each	24	$45,840.00
Pest Management	595	$30.00	acre	485.7	$14,570.40
Range Planting	550	$100.00	acre	485.7	$48,568.00
Spring Development	574	$1,800.00	each	3	$5,400.00
Heavy Use Area Protection	561	$1.36	sqft.	Site Specific	
Pipeline 516		$3.76	foot	Site Specific	
Water Well	642	$13,500.00	each	Site Specific	
Pumping Plant	533	Site Specific HP		Site Specific	
Firebreak	394	Site Specific	acre	Site Specific	

Total **$292,137.28**

Treatment Unit #2c : Rangeland - Middle Little Wood River Subwatershed

Conservation Practice	NRCS Practice Code	Average Cost	Unit	Amount	Total Funds
Fence 382		$2.46	foot	14,827.0	$36,474.42
Prescribed Grazing	528	$2.00	acre	1,482.7	$2,965.40
Upland Wildlife Habitat Management 645		$10.00	acre	1,482.7	$14,827.00
Watering Facility	614	$1,910.00	each	7	$13,370.00
Pest Management	595	$30.00	acre	148.3	$4,448.10
Range Planting	550	$100.00	acre	148.3	$14,827.00
Spring Development	574	$1,800.00	each	1	$1,800.00
Heavy Use Area Protection 561		$1.36	sqft.	Site Specific	
Pipeline 516		$3.76	foot	Site Specific	
Water Well	642	$13,500.00	each	Site Specific	
Pumping Plant	533	Site Specific HP		Site Specific	
Firebreak	394	Site Specific	acre	Site Specific	

Total **$88,711.92**

Treatment Unit #2d : Rangeland - Silver Creek Subwatershed

Conservation Practice	NRCS Practice Code	Average Cost	Unit	Amount	Total Funds
Fence 382		$2.46	foot	26,614.0	$65,470.44
Prescribed Grazing	528	$2.00	acre	2,661.4	$5,322.80
Upland Wildlife Habitat Management 645		$10.00	acre	2,661.4	$26,614.00

Watering Facility	614	$1,910.00	each	13	$24,830.00
Pest Management	595	$30.00	acre	266.1	$7,984.20
Range Planting	550	$100.00	acre	266.1	$26,614.00
Spring Development	574	$1,800.00	each	2	$3,600.00
Heavy Use Area Protection	561	$1.36	sqft.	Site Specific	
Pipeline 516		$3.76	foot	Site Specific	
Water Well	642	$13,500.00	each	Site Specific	
Pumping Plant	533	Site Specific HP		Site Specific	
Firebreak	394	Site Specific	acre	Site Specific	
Total					**$160,435.44**

Treatment Unit #2e : Rangeland - Little Wood River Reservoir Subwatershed

Conservation Practice	NRCS Practice Code	Average Cost	Unit	Amount	Total Funds
Fence 382		$2.46	foot	77,588.0	$190,866.48
Prescribed Grazing	528	$2.00	acre	7,758.8	$15,517.60
Upland Wildlife Habitat Management 645		$10.00	acre	7,758.8	$77,588.00
Watering Facility	614	$1,910.00	each	39	$74,490.00
Pest Management	595	$30.00	acre	775.9	$23,276.40
Range Planting	550	$100.00	acre	775.9	$77,588.00
Spring Development	574	$1,800.00	each	4	$7,200.00
Heavy Use Area Protection 561		$1.36	sqft.	Site Specific	
Pipeline 516		$3.76	foot	Site Specific	
Water Well	642	$13,500.00	each	Site Specific	
Pumping Plant	533	Site Specific HP		Site Specific	
Firebreak	394	Site Specific	acre	Site Specific	
Total					**$466,526.48**

Treatment Unit #2f : Rangeland - Upper Little Wood River Subwatershed

Conservation Practice	NRCS Practice Code	Average Cost	Unit	Amount	Total Funds
Fence 382		$2.46	foot	39,101.0	$96,188.46
Prescribed Grazing	528	$2.00	acre	3,910.1	$7,820.20
Upland Wildlife Habitat Management 645		$10.00	acre	3,910.1	$39,101.00
Watering Facility	614	$1,910.00	each	20	$38,200.00
Pest Management	595	$30.00	acre	391.0	$11,730.30
Range Planting	550	$100.00	acre	391.0	$39,101.00
Spring Development	574	$1,800.00	each	2	$3,600.00
Heavy Use Area Protection 561		$1.36	sqft.	Site Specific	
Pipeline 516		$3.76	foot	Site Specific	
Water Well	642	$13,500.00	each	Site Specific	
Pumping Plant	533	Site Specific HP		Site Specific	
Firebreak	394	Site Specific	acre	Site Specific	
Total					**$235,740.96**

Treatment Unit #2g : Rangeland - Muldoon Creek Subwatershed

Conservation Practice	NRCS Practice Code	Average Cost	Unit	Amount	Total Funds
Fence 382		$2.46	foot	15,324.0	$37,697.04
Prescribed Grazing	528	$2.00	acre	1,532.4	$3,064.80
Upland Wildlife Habitat Management 645		$10.00	acre	1,532.4	$15,324.00
Watering Facility	614	$1,910.00	each	8	$15,280.00
Pest Management	595	$30.00	acre	153.2	$4,597.20
Range Planting	550	$100.00	acre	153.2	$15,324.00
Spring Development	574	$1,800.00	each	1	$1,800.00
Heavy Use Area Protection	561	$1.36	sqft.	Site Specific	
Pipeline 516		$3.76	foot	Site Specific	
Water Well	642	$13,500.00	each	Site Specific	
Pumping Plant	533	Site Specific HP		Site Specific	
Firebreak	394	Site Specific	acre	Site Specific	
Total					**$93,087.04**

Treatment Unit #2h : Rangeland - Fish Creek Reservoir Subwatershed

Conservation Practice	NRCS Practice Code	Average Cost	Unit	Amount	Total Funds
Fence 382		$2.46	foot	57,256.0	$140,849.76
Prescribed Grazing	528	$2.00	acre	5,725.6	$11,451.20
Upland Wildlife Habitat Management 645		$10.00	acre	5,725.6	$57,256.00
Watering Facility	614	$1,910.00	each	29	$55,390.00
Pest Management	595	$30.00	acre	572.6	$17,176.80
Range Planting	550	$100.00	acre	572.6	$57,256.00
Spring Development	574	$1,800.00	each	3	$5,400.00
Heavy Use Area Protection	561	$1.36	sqft.	Site Specific	
Pipeline 516		$3.76	foot	Site Specific	
Water Well	642	$13,500.00	each	Site Specific	
Pumping Plant	533	Site Specific HP		Site Specific	
Firebreak	394	Site Specific	acre	Site Specific	
Total					**$344,779.76**

Treatment Unit #2i : Rangeland - Fish Creek Subwatershed

Conservation Practice	NRCS Practice Code	Average Cost	Unit	Amount	Total Funds
Fence 382		$2.46	foot	11,080.0	$27,256.80
Prescribed Grazing	528	$2.00	acre	1,108.0	$2,216.00
Upland Wildlife Habitat Management 645		$10.00	acre	1,108.0	$11,080.00
Watering Facility	614	$1,910.00	each	6	$11,460.00
Pest Management	595	$30.00	acre	110.8	$3,324.00
Range Planting	550	$100.00	acre	110.8	$11,080.00
Spring Development	574	$1,800.00	each	1	$1,800.00

Heavy Use Area Protection	561	$1.36	sqft.	Site Specific	
Pipeline 516		$3.76	foot	Site Specific	
Water Well	642	$13,500.00	each	Site Specific	
Pumping Plant	533	Site Specific HP		Site Specific	
Firebreak	394	Site Specific	acre	Site Specific	
Total					**$68,216.80**

Treatment Unit 3 – Privately Owned Riparian

Treatment Unit #3a : Riparian - Lower Little Wood River Subwatershed

Conservation Practice	NRCS Practice Code	Average Cost	Unit	Amount	Total Funds
Fence 382		$2.46	foot	156,546.6	$385,104.64
Wetland Wildlife Habitat Management 645		$10.00	acre	713.2	$7,132.00
Watering Facility	614	$1,910.00	each	18	$34,380.00
Access Control	472	$34.00	acre	356.6	$12,124.40
Channel Vegetation	322	$4.10	foot	78,273.3	$320,920.53
Pest Management	595	$30.00	acre	Site Specific	
Channel Stabilization	584	$37.50	foot	Site Specific	
Streambank and Shoreline Protection 580		$52.50	foot	Site Specific	
Heavy Use Area Protection	561	$1.36	sqft.	Site Specific	
Riparian Forest Buffer	391	$2,250.00	acre	Site Specific	
Riparian Herbaceous Cover	390	$450.00	acre	Site Specific	
Tree/Shrub Establishment	612	$1.50	each	Site Specific	
Pipeline 516		$3.76	foot	Site Specific	
Pumping Plant	533	Site Specific HP		Site Specific	
Total					**$759,661.57**

Treatment Unit #3b : Riparian - Main Canal Subwatershed

Conservation Practice	NRCS Practice Code	Average Cost	Unit	Amount	Total Funds
Fence 382		$2.46	foot	96,064.2	$236,317.93
Wetland Wildlife Habitat Management 645		$10.00	acre	443.3	$4,433.00
Watering Facility	614	$1,910.00	each	11	$21,010.00
Access Control	472	$34.00	acre	221.7	$7,536.10
Channel Vegetation	322	$4.10	foot	48,032.1	$196,931.61
Pest Management	595	$30.00	acre	Site Specific	
Channel Stabilization	584	$37.50	foot	Site Specific	
Streambank and Shoreline Protection 580		$52.50	foot	Site Specific	
Heavy Use Area Protection	561	$1.36	sqft.	Site Specific	
Riparian Forest Buffer	391	$2,250.00	acre	Site Specific	
Riparian Herbaceous Cover	390	$450.00	acre	Site Specific	
Tree/Shrub Establishment	612	$1.50	each	Site Specific	
Pipeline 516		$3.76	foot	Site Specific	
Pumping Plant	533	Site Specific HP		Site Specific	
Total					**$466,228.64**

Treatment Unit #3c : Riparian - Middle Little Wood River Subwatershed

Conservation Practice	NRCS Practice Code	Average Cost	Unit	Amount	Total Funds
Fence 382		$2.46	foot	34,122.9	$83,942.33
Wetland Wildlife Habitat Management 645		$10.00	acre	162.9	$1,629.00
Watering Facility	614	$1,910.00	each	4	$7,640.00
Access Control	472	$34.00	acre	81.5	$2,769.30
Channel Vegetation	322	$4.10	foot	17,061.5	$69,951.95
Pest Management	595	$30.00	acre	Site Specific	
Channel Stabilization	584	$37.50	foot	Site Specific	
Streambank and Shoreline Protection 580		$52.50	foot	Site Specific	
Heavy Use Area Protection	561	$1.36	sqft.	Site Specific	
Riparian Forest Buffer	391	$2,250.00	acre	Site Specific	
Riparian Herbaceous Cover	390	$450.00	acre	Site Specific	
Tree/Shrub Establishment	612	$1.50	each	Site Specific	
Pipeline 516		$3.76	foot	Site Specific	
Pumping Plant	533	Site Specific HP		Site Specific	
Total					**$165,932.58**

Treatment Unit #3d : Riparian - Silver Creek Subwatershed

Conservation Practice	NRCS Practice Code	Average Cost	Unit	Amount	Total Funds
Fence 382		$2.46	foot	20,902.5	$51,420.15
Wetland Wildlife Habitat Management 645		$10.00	acre	97.6	$976.00
Watering Facility	614	$1,910.00	each	2	$3,820.00
Access Control	472	$34.00	acre	48.8	$1,659.20
Channel Vegetation	322	$4.10	foot	10,451.3	$42,850.13
Pest Management	595	$30.00	acre	Site Specific	
Channel Stabilization	584	$37.50	foot	Site Specific	
Streambank and Shoreline Protection 580		$52.50	foot	Site Specific	
Heavy Use Area Protection	561	$1.36	sqft.	Site Specific	
Riparian Forest Buffer	391	$2,250.00	acre	Site Specific	
Riparian Herbaceous Cover	390	$450.00	acre	Site Specific	
Tree/Shrub Establishment	612	$1.50	each	Site Specific	
Pipeline 516		$3.76	foot	Site Specific	
Pumping Plant	533	Site Specific HP		Site Specific	
Total					**$100,725.48**

Treatment Unit #3e : Riparian - Little Wood River Reservoir Subwatershed

Conservation Practice	NRCS Practice Code	Average Cost	Unit	Amount	Total Funds
Fence 382		$2.46	foot	153,976.5	$378,782.19
Wetland Wildlife Habitat Management 645		$10.00	acre	708.6	$7,086.00
Watering Facility	614	$1,910.00	each	18	$34,380.00
Access Control	472	$34.00	acre	354.3	$12,046.20
Channel Vegetation	322	$4.10	foot	76,988.3	$315,651.83
Pest Management	595	$30.00	acre	Site Specific	
Channel Stabilization	584	$37.50	foot	Site Specific	
Streambank and Shoreline Protection 580		$52.50	foot	Site Specific	
Heavy Use Area Protection	561	$1.36	sqft.	Site Specific	
Riparian Forest Buffer	391	$2,250.00	acre	Site Specific	
Riparian Herbaceous Cover	390	$450.00	acre	Site Specific	
Tree/Shrub Establishment	612	$1.50	each	Site Specific	
Pipeline 516		$3.76	foot	Site Specific	
Pumping Plant	533	Site Specific HP		Site Specific	
Total					**$747,946.22**

Treatment Unit #3f : Riparian - Upper Little Wood River Subwatershed

Conservation Practice	NRCS Practice Code	Average Cost	Unit	Amount	Total Funds
Fence 382		$2.46	foot	14,185.4	$34,896.08
Wetland Wildlife Habitat Management 645		$10.00	acre	66.3	$663.00
Watering Facility	614	$1,910.00	each	2	$3,820.00
Access Control	472	$34.00	acre	33.2	$1,127.10
Channel Vegetation	322	$4.10	foot	7,092.7	$29,080.07
Pest Management	595	$30.00	acre	Site Specific	
Channel Stabilization	584	$37.50	foot	Site Specific	
Streambank and Shoreline Protection 580		$52.50	foot	Site Specific	
Heavy Use Area Protection	561	$1.36	sqft.	Site Specific	
Riparian Forest Buffer	391	$2,250.00	acre	Site Specific	
Riparian Herbaceous Cover	390	$450.00	acre	Site Specific	
Tree/Shrub Establishment	612	$1.50	each	Site Specific	
Pipeline 516		$3.76	foot	Site Specific	
Pumping Plant	533	Site Specific HP		Site Specific	
Total					**$69,586.25**

Treatment Unit #3g : Riparian - Muldoon Creek Subwatershed

Conservation Practice	NRCS Practice Code	Average Cost	Unit	Amount	Total Funds
Fence 382		$2.46	foot	51,838.6	$127,522.96
Wetland Wildlife Habitat Management 645		$10.00	acre	239.1	$2,391.00
Watering Facility	614	$1,910.00	each	6	$11,460.00
Access Control	472	$34.00	acre	119.6	$4,064.70
Channel Vegetation	322	$4.10	foot	25,919.3	$106,269.13
Pest Management	595	$30.00	acre	Site Specific	
Channel Stabilization	584	$37.50	foot	Site Specific	
Streambank and Shoreline Protection 580		$52.50	foot	Site Specific	
Heavy Use Area Protection	561	$1.36	sqft.	Site Specific	
Riparian Forest Buffer	391	$2,250.00	acre	Site Specific	
Riparian Herbaceous Cover	390	$450.00	acre	Site Specific	
Tree/Shrub Establishment	612	$1.50	each	Site Specific	
Pipeline 516		$3.76	foot	Site Specific	
Pumping Plant	533	Site Specific HP		Site Specific	
Total					**$251,707.79**

Treatment Unit #3h : Riparian - Fish Creek Reservoir Subwatershed

Conservation Practice	NRCS Practice Code	Average Cost	Unit	Amount	Total Funds
Fence 382		$2.46	foot	69,054.7	$169,874.56
Wetland Wildlife Habitat Management 645		$10.00	acre	319.7	$3,197.00
Watering Facility	614	$1,910.00	each	8	$15,280.00
Access Control	472	$34.00	acre	159.9	$5,434.90
Channel Vegetation	322	$4.10	foot	34,527.4	$141,562.14
Pest Management	595	$30.00	acre	Site Specific	
Channel Stabilization	584	$37.50	foot	Site Specific	
Streambank and Shoreline Protection 580		$52.50	foot	Site Specific	
Heavy Use Area Protection	561	$1.36	sqft.	Site Specific	
Riparian Forest Buffer	391	$2,250.00	acre	Site Specific	
Riparian Herbaceous Cover	390	$450.00	acre	Site Specific	
Tree/Shrub Establishment	612	$1.50	each	Site Specific	
Pipeline 516		$3.76	foot	Site Specific	
Pumping Plant	533	Site Specific HP		Site Specific	
Total					**$335,348.60**

Treatment Unit #3i : Riparian - Fish Creek Subwatershed

Conservation Practice	NRCS Practice Code	Average Cost	Unit	Amount	Total Funds
Fence 382		$2.46	foot	51,547.3	$126,806.36
Wetland Wildlife Habitat Management 645		$10.00	acre	236.1	$2,361.00
Watering Facility	614	$1,910.00	each	6	$11,460.00
Access Control	472	$34.00	acre	118.1	$4,013.70
Channel Vegetation	322	$4.10	foot	25,773.7	$105,671.97
Pest Management	595	$30.00	acre	Site Specific	
Channel Stabilization	584	$37.50	foot	Site Specific	
Streambank and Shoreline Protection 580		$52.50	foot	Site Specific	
Heavy Use Area Protection	561	$1.36	sqft.	Site Specific	
Riparian Forest Buffer	391	$2,250.00	acre	Site Specific	
Riparian Herbaceous Cover	390	$450.00	acre	Site Specific	
Tree/Shrub Establishment	612	$1.50	each	Site Specific	
Pipeline 516		$3.76	foot	Site Specific	
Pumping Plant	533	Site Specific HP		Site Specific	
Total					**$250,313.02**

Treatment Unit 4 – Animal Feeding Operations

Treatment Unit #4 : Treatment Unit: Animal Feeding Operations (AFO), and Confined Animal Feeding Operations (CAFO)

Conservation Practice	NRCS Practice Code	Average Cost	Unit	Amount	Total Funds
Nutrient Management	590	$5.00	acre	1,600.0	$8,000.00
Fence 382		$2.46	foot	13,200.0	$32,472.00
Windbreak/Shelterbelt 380		$1.50	foot	6,600.0	$9,900.00
Waste Storage Facility	313	$30,000.00	each	5	$150,000.00
Watering Facility	614	$1,910.00	each	20	$38,200.00
Access Control	472	$34.00	acre	Site Specific	
Heavy Use Area Protection	561	$1.36	sqft.	Site Specific	
Pipeline 516		$3.76	foot	Site Specific	
Water Well	642	$13,500.00	each	Site Specific	
Pumping Plant	533	Site Specific HP		Site Specific	
Total					**$238,572.00**

Table 11. Total estimated costs for recommended BMPs in the Little Wood River Subbasin

TOTAL ESTIMATED COSTS FOR RECOMMENDED BMPs				
Subwatershed	**Treatment Unit 1**	**Treatment Unit 2**	**Treatment Unit 3**	**Treatment Unit 4**
Lower Little Wood River (a)	$12,210,838.23	$237,144.64	$759,661.57	-
Main Canal (b)	$16,065,688.90	$292,137.28	$466,228.64	-
Middle Little Wood River (c)	$9,039.20	$88,711.92	$165,932.58	-
Silver Creek (d)	$15,170,138.14	$160,435.44	$100,725.48	-
Little Wood River Reservoir (e)	$12,725,071.99	$466,526.48	$747,946.22	-
Upper Little Wood River (f)	$7,453,400.20	$235,740.96	$69,586.25	-
Muldoon Creek (g)	$2,234,733.20	$93,087.04	$251,707.79	-
Fish Creek Reservoir (h)	$3,010,348.40	$344,779.76	$335,348.60	-
Fish Creek (i)	$1,847,817.48	$68,216.80	$250,313.02	-
Total:	**$70,727,075.74**	**$1,986,780.32**	**$3,147,450.15**	**$238,572.00**

TOTAL ESTIMATED BMP COST: $76,099,878.21

Implementation Priority

The TMDL implementation planning process included assessing impacts to water quality in the Little Wood River subbasin from agricultural sources on 303(d) listed streams and recommending a priority for installing BMPs to meet water quality objectives stated in the Little Wood River Subbasin Assessment and TMDL. Data from water quality monitoring, field inventory, SVAP, Protocol #8, Rosgen classification, and SECI evaluations were used to identify critical agricultural areas affecting water quality and set priorities for treatment.

RECOMMENDED PRIORITIES FOR BMP IMPLEMENTATION

Critical area priorities are designated based on documented water quality impairment and adjacent land use practices. Stream segments that are typically dry or intermittent during the irrigation season due to flow alteration such as Little Wood River #3, Dry Creek, and Fish Creek (below the reservoir) have been designated as a lower priority than those severely impaired segments that have water year-round. Table 12 depicts areas of low, moderate, and high priority designation for water bodies in the subbasin.

Table 12. Critical Area priority on [1998] 303(d) listed segments of the Little Wood River Subbasin.

Water Body Name	**TMDL Stream Segments**	**Critical Area Priority**
*Little Wood River #1	Above Little Wood Reservoir	Low
Little Wood River Reservoir		Low
Little Wood River #3	East Canal Diversion to Silver Creek	Low

Fish Creek Reservoir		Low
Muldoon Creek	Headwaters to Little Wood River	Moderate
Dry Creek	Headwaters to Little Wood River	Moderate
Loving Creek	Headwaters to Silver Creek	Moderate
Fish Creek (below)	Fish Creek Reservoir to Carey Lake	Moderate
Fish Creek (above)	Headwaters to Fish Creek Reservoir	High
Little Wood River #4	Silver Creek to Big Wood River	High

The Little Wood River #1 segment is not on the [1998] 303(d)* listed stream segments list, but recently has had a TMDL completed for temperature.

TREATMENT ALTERNATIVES

The local Soil Conservation Districts will continue to evaluate treatment alternatives and recommend implementation activities, with support and cooperation of private landowners and government agencies. Table 12 can be used as a reference when selecting and recommending BMPs.

Alternative 1 – No Action

This alternative would continue utilizing existing conservation programs without additional project activities focusing on more problem areas. Identified problems could continue to negatively impact beneficial uses in the watershed.

Alternative 2- Land Treatment with BMPs on Cropland, Pasture, and Rangeland

This alternative would reduce irrigation-induced erosion and excessive nutrient runoff from cropland areas. Nutrient and bacteria runoff would also be reduced from excessive animal waste and fertilizer applications. Improved grazing management practices and installation of BMPs such as offsite water facilities, will reduce pollutant runoff to the Little Wood River and its tributaries. Voluntary incentive programs can be made available to assist in landowner participation.

Alternative 3- Riparian and Stream Channel Restoration

This alternative would reduce accelerated stream bank erosion. Implemented BMPs would reduce nutrient and bacteria runoff from entering the river and creeks. This alternative improves water quality, riparian vegetation, and aquatic habitat in the Little Wood River and its tributaries.

Alternative 4- Animal Facility Waste Management

This alternative would reduce sediment, nutrient, and bacteria runoff from animal waste storage and application areas. This will improve water quality in the watershed and reduce pollutant loading to the main drainages in the Little Wood River. Existing larger beef operations may be already regulated. All dairy facilities are regulated. Smaller operations will need evaluations and on farm planning to provide cost-effective, beneficial options to improve the resource area.

Nutrient Management planning, in addition to irrigation water management, will be vital to securing optimal results for the goals of the TMDL.

Ongoing efforts from the local Soil Conservation Districts will be critical in providing direction and guidance to local landowners in the implementation of BMPs to meets the water quality standards set forth in the Little Wood River TMDL.

Funding

Financial and technical assistance for installation of BMPs is needed to ensure success of this implementation plan. The local Soil Conservation Districts will actively pursue multiple potential funding sources to implement water quality improvements on private agricultural and grazing lands. Many of these programs can be used in combination with each other to implement BMPs. These sources include (but are not limited to):

CWA 319 – These are Environmental Protection Agency funds allocated to the State of Idaho. The Idaho Department of Environmental Quality (DEQ) administers the Clean Water Act §319 Non-Point Source Management Program. Funds focus on projects to improve water quality and are usually related to the TMDL process. Source: DEQ http://www.deq.idaho.gov/water/prog_issues/surface_water/nonpoint.cfm#management

Water Quality Program for Agriculture (WQPA) – The WQPA is administered by the Idaho Soil Conservation Commission (ISCC). This program is also coordinated with the TMDL process. Source: ISCC http://www.scc.state.id.us/programs.htm

Resource Conservation and Rangeland Development Program (RCRDP) – The RCRDP is a loan program administered by the ISCC for implementation of agricultural and rangeland best management practices or loans to purchase equipment to increase conservation. Source: ISCC http://www.scc.state.id.us/programs.htm

Conservation Improvement Grants – These grants are administered by the ISCC. Source: ISCC http://www.scc.state.id.us/programs.htm

PL-566 – This is the small watershed program administered by the USDA Natural Resources Conservation Service (NRCS).

Agricultural Management Assistance (AMA) – The AMA provides cost-share assistance to agricultural producers for constructing or improving water management structures or irrigation structures; planting trees for windbreaks or to improve water quality; and mitigating risk through production diversification or resource conservation practices, including soil erosion control, integrated pest management, or transition to organic farming. Source: NRCS http://www.nrcs.usda.gov/programs/ama/

Conservation Reserve Program (CRP) – The CRP is a land retirement program for blocks of land or strips of land that protect the soil and water resources, such as buffers and grassed waterways. Source: NRCS http://www.nrcs.usda.gov/programs/crp/

Conservation Technical Assistance (CTA) – The CTA provides free technical assistance to help farmers and ranchers identify and solve natural resource problems on their farms and ranches. This might come as advice and counsel, through the design and implementation of a practice or treatment, or as part of an active conservation plan. Source: local Conservation District and NRCS: http://www.nrcs.usda.gov/programs/cta/

Environmental Quality Incentives Program (EQIP) - EQIP offers cost-share and incentive payments and technical help to assist eligible participants in installing or implementing structural and management practices on eligible agricultural land. Source: NRCS http://www.nrcs.usda.gov/programs/eqip/

Wetlands Reserve Program (WRP) – The WRP is a voluntary program offering landowners the opportunity to protect, restore, and enhance wetlands on their property. Easements and restoration payments are offered as part of the program. Source: NRCS http://www.nrcs.usda.gov/programs/wrp/

Wildlife Habitat Incentives Program (WHIP) – WHIP is a voluntary program for people who want to develop and improve wildlife habitat primarily on private land. Cost-share payments for construction or re-establishment of wetlands may be included. Source: NRCS http://www.nrcs.usda.gov/programs/whip/

State Revolving Loan Funds (SRF) – These funds are administered through the ISCC. Source: ISCC http://www.scc.state.id.us/programs.htm

Grassland Reserve Program (GRP) – The GRP is a voluntary program offering landowners the opportunity to protect, restore, and enhance grasslands on their property. Source: NRCS. http://www.nrcs.usda.gov/programs/GRP/

Conservation Security Program (CSP) – CSP is a voluntary program that rewards the Nation's premier farm and ranch land conservationists who meet the highest standards of conservation environmental management. Source: NRCS http://www.nrcs.usda.gov

Grazing Land Conservation Initiative (GLCI) – The GLCI's mission is to provide high quality technical assistance on privately owned grazing lands on a voluntary basis and to increase the awareness of the importance of grazing land resources. Source: http://www.glci.org/

HIP – This is an Idaho Department of Fish and Game program to provide technical and financial assistance to private landowners and public land managers who want to enhance upland game bird and waterfowl habitat. Funds are available for cost sharing on habitat projects in partnership with private landowners, non-profit organizations, and state and federal agencies. Source: IDFG http://fishandgame.idaho.gov/cms/wildlife/hip/default.cfm

Partners for Fish and Wildlife Program in Idaho – This is a U.S. Fish and Wildlife program providing funds for the restoration of degraded riparian areas along streams, and shallow wetland restoration. Source: USFWS http://www.fws.gov/partners/pdfs/ID-needs.pdf

Outreach

Conservation partners in the Little Wood River subbasin will use their combined resources to provide information about BMPs to improve water quality to agricultural landowners and operators within the Little Wood River subbasin. A local outreach plan may be developed. Newspaper articles, Soil Conservation District newsletters, watershed and project tours, landowner meetings, and one-on-one personal contact may be used as outreach tools.

Outreach efforts will:

- Provide information about the TMDL process
- Supply water quality monitoring results
- Accelerate the development of conservation plans and program participation
- Distribute progress reports
- Enhance technology transfer related to BMP implementation
- Increase public understanding of agriculture's contribution to conserve and enhance natural resources
- Improve public appreciation of agriculture's commitment to meeting the TMDL challenge
- Organize an informational tour bringing together irrigation districts' Board of Directors and Soil Conservation Districts' Board of Supervisors.
- Identify and encourage the use of BMPs for recreation activities in the subbasin

Monitoring and Evaluation

FIELD LEVEL

At the field level, annual status reviews will be conducted to insure that the contracts are on schedule and that BMPs are being installed according to standards and specifications. BMP effectiveness monitoring will be conducted on installed projects to determine installation adequacy, operation consistency and maintenance, and the relative effectiveness of implemented BMPs in reducing water quality impacts. This monitoring will also measure the effectiveness of BMPs in controlling agricultural nonpoint-source pollution. These BMP effectiveness evaluations will be conducted according to the protocols outlined in the Agriculture Pollution Abatement Plan and the ISCC Field Guide for Evaluating BMP Effectiveness.

The Revised Universal Soil Loss Equation (RUSLE) and Surface Irrigation Soil Loss Equation (SISL) are used to predict sheet and rill erosion on non-irrigated and irrigated lands. The Alutin Method, Imhoff Cones, and direct-volume measurements are used to determine sheet and rill irrigation-induced and gully erosion. Stream Visual Assessment Protocol (SVAP) and Streambank Erosion Condition Inventory (SECI) are used to assess aquatic habitat, stream bank erosion, and lateral recession rates. The Idaho OnePlan's CAFO/AFO Assessment Worksheet is used to evaluate livestock waste, feeding, storage, and application areas. The Water Quality Indicators Guide is utilized to assess nitrogen, phosphorus, sediment, and bacteria contamination from agricultural land.

WATERSHED LEVEL

At the watershed level, there are many governmental and private groups involved with water quality monitoring. The Idaho Department of Environmental Quality uses the Beneficial Use

Reconnaissance Protocol (BURP) to collect and measure key water quality variables that aid in determining the beneficial use support status of Idaho's water bodies. The determination will tell if a water body is in compliance with water quality standards and criteria. In addition, IDEQ will be conducting five-year TMDL reviews.

Annual reviews for funded projects will be conducted to insure the project is kept on schedule. With many projects being implemented across the state, ISCC developed a software program to track the costs and other details of each BMP installed. This program can show what has been installed by project, by watershed level, and by state level. These project and program reviews will insure that TMDL implementation remains on schedule and on target. Monitoring BMPs and projects will be the key to a successful application of the adaptive watershed planning and implementation process.

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Appendix

Table 13. [2002] 303(d) listed stream segments in the Little Wood River Subbasin.

Water Body Name	**Assessment Units**	**2002 303(d) Boundaries**	**Pollutants**
Little Wood River #4 (lower)	ID17040221SK001_05 ID17040221SK001_05a ID17040221SK001_05b	Richfield (town) to Big Wood River	BAC, DO, NUT, SED, QALT, TEMP
Little Wood River #4 (upper)	ID17040221SK002_05	Carey Lake Outlet to Richfield (town)	NUT, SED, TEMP
Little Wood River #2	ID17040221SK010_05	Little Wood River Reservoir Dam to Carey(town)	BAC, NUT, DO, SED, QALT
Little Wood River #3	ID17040221SK003_05	West Canal (North) to West Canal (South)	BAC, NUT, DO, SED, QALT
Little Wood River Reservoir	ID17040221SK012L_0L		BAC, NUT, DO, SED, QALT
Dry Creek	ID17040221SK022_02 ID17040221SK022_03	Source to Mouth	BAC, NUT, DO, SED, QALT
Fish Creek (below)	ID17040221SK006_03 ID17040221SK006_04	Fish Creek Reservoir Dam to Mouth	BAC, NUT, DO, SED, QALT
Fish Creek Reservoir	ID17040221SK005L_0L		BAC, NUT, DO, SED, QALT
Fish Creek (above)	ID17040221SK008_02 ID17040221SK008_03 ID17040221SK008_04	Source to Fish Creek Reservoir	BAC, NUT, DO, SED, QALT
Muldoon Creek	ID17040221SK014_04 ID17040221SK014_03 ID17040221SK014_02	Headwaters to Little Wood River	TEMP, UNK
Silver Creek	ID17040221SK023_02	Source to Mouth	UNK
West Fork Fish Creek	ID17040221SK009_03	Source to Fish Creek Reservoir	BAC, NUT, DO, SED, QALT
Cold Spring Creek	ID17040221SK020_02A	UNK	
Pollutants Key: BAC = Bacteria, DO = Dissolved Oxygen, NUT = Nutrients, SED = Sediment, QALT = Flow Alteration, UNK = Unknown, TEMP = Temperature			

Table 14. [2008] 303(d) listed segments in the Little Wood River Subbasin

Water Body Name	Assessment Units	2008 303(d) Boundaries	Pollutants
Little Wood River #4 (lower)	ID17040221SK001_05 ID17040221SK001_05a ID17040221SK001_05b	Richfield (town) to Big Wood River	BAC, DO, NUT, SED, QALT, TEMP
Little Wood River #4 (upper)	ID17040221SK002_05	Carey Lake Outlet to Richfield (town)	NUT, SED, TEMP
Little Wood River #2	ID17040221SK010_05	Little Wood River Reservoir Dam to Carey	State determines water quality standard is being met. QALT
Little Wood River #3	ID17040221SK003_05	West Canal (North) to West Canal (South)	State determines water quality standard is being met.
Little Wood River Reservoir	ID17040221SK012L_0L		BAC, DO, NUT, SED, QALT
Dry Creek	ID17040221SK022_02 ID17040221SK022_03	Headwaters to Little Wood River	SED, QALT
Fish Creek (below)	ID17040221SK006_03 ID17040221SK006_04	Fish Creek Reservoir Dam to Mouth	DO, NUT, SED, TEMP, QALT
Fish Creek Reservoir	ID17040221SK005L_0L		State determines water quality standard is being met. QALT
Fish Creek (above)	ID17040221SK008_02 ID17040221SK008_03 ID17040221SK008_04	Source to Fish Creek Reservoir	BAC, DO, NUT, SED, QALT, TEMP
Muldoon Creek	ID17040221SK014_04 ID17040221SK014_03 ID17040221SK014_02	Headwaters to Little Wood River	TEMP
Silver Creek	ID17040221SK023_02	Source to Mouth	TEMP
West Fork Fish Creek	ID17040221SK009_03	Source to Fish Creek Reservoir	QALT
Cold Spring Creek	ID17040221SK020_02A	UNK	
Pollutants Key: BAC = Bacteria, DO = Dissolved Oxygen, NUT = Nutrients, SED = Sediment, QALT = Flow Alteration, UNK = Unknown, TEMP = Temperature			

Table 15. Threatened and Endangered species in the Little Wood River Subbasin.

Species

Listed Species
Canada lynx
Bliss Rapids snail
Ute ladies-tresses
Utah valvata snail
Snake River physa snail

Sensitive Species
Grey wolf
Yuma myotis
Long-eared myotis
Long-legged myotis
Western small-footed myotis
Townsend's big eared bat
Pygmy rabbit
Wolverine
Western pipistrelle
Redband trout
Wood River sculpin
Leatherside chub
Shoshone sculpin
Columbian sharp-tailed grouse
Greater sage-grouse
Yellow-billed cuckoo
White-faced ibis
Trumpeter swan
Northern goshawk
Ferruginous hawk
Black tern
Long billed curlew
Flammulated owl
Boreal owl
Bald Eagle
Three-toed woodpecker
Idaho Dunes tiger beetle
Western toad
Northern leopard frog
Columbia spotted frog
Common garter snake
Short-horned lizard
Mojave black-collared lizard
Slender moonwart
Meadow pussytoes
Mourning milkvetch
Bugleg goldenweed
Obscure phacelia

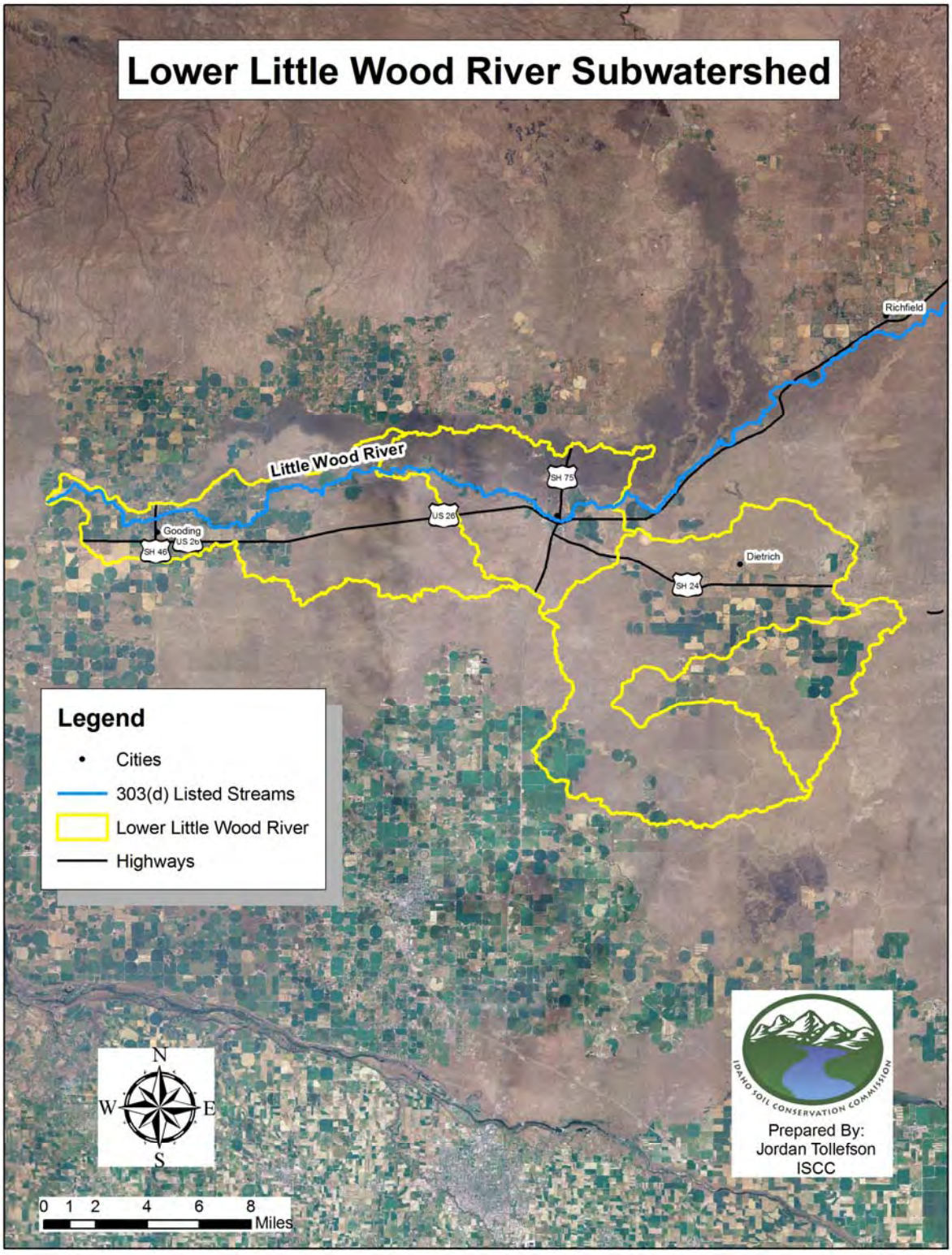

Figure 11. Map of the Lower Little Wood River Subwatershed in the Little Wood River Subbasin

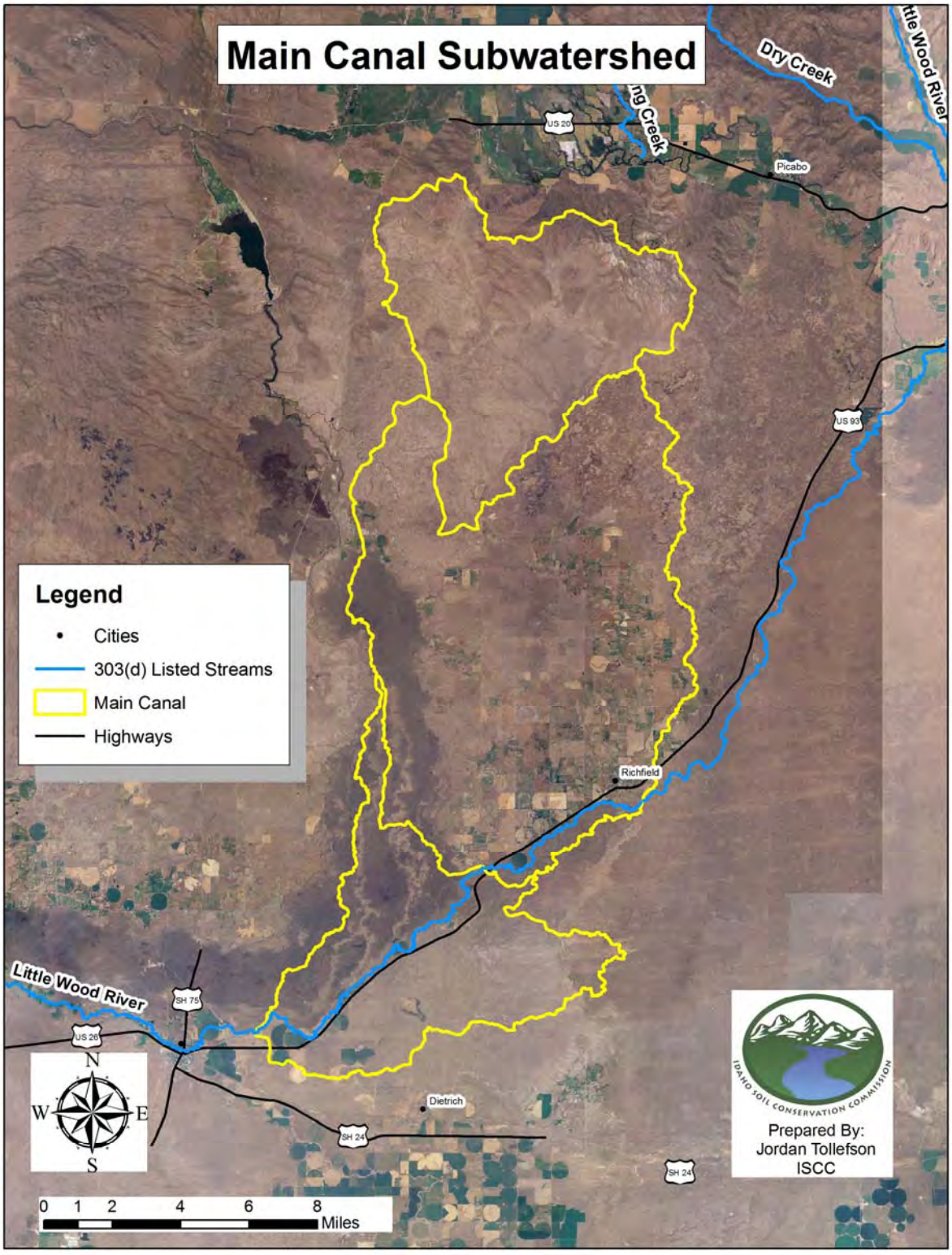

Figure 12. Map of the Main Canal Subwatershed the Little Wood River Subbasin

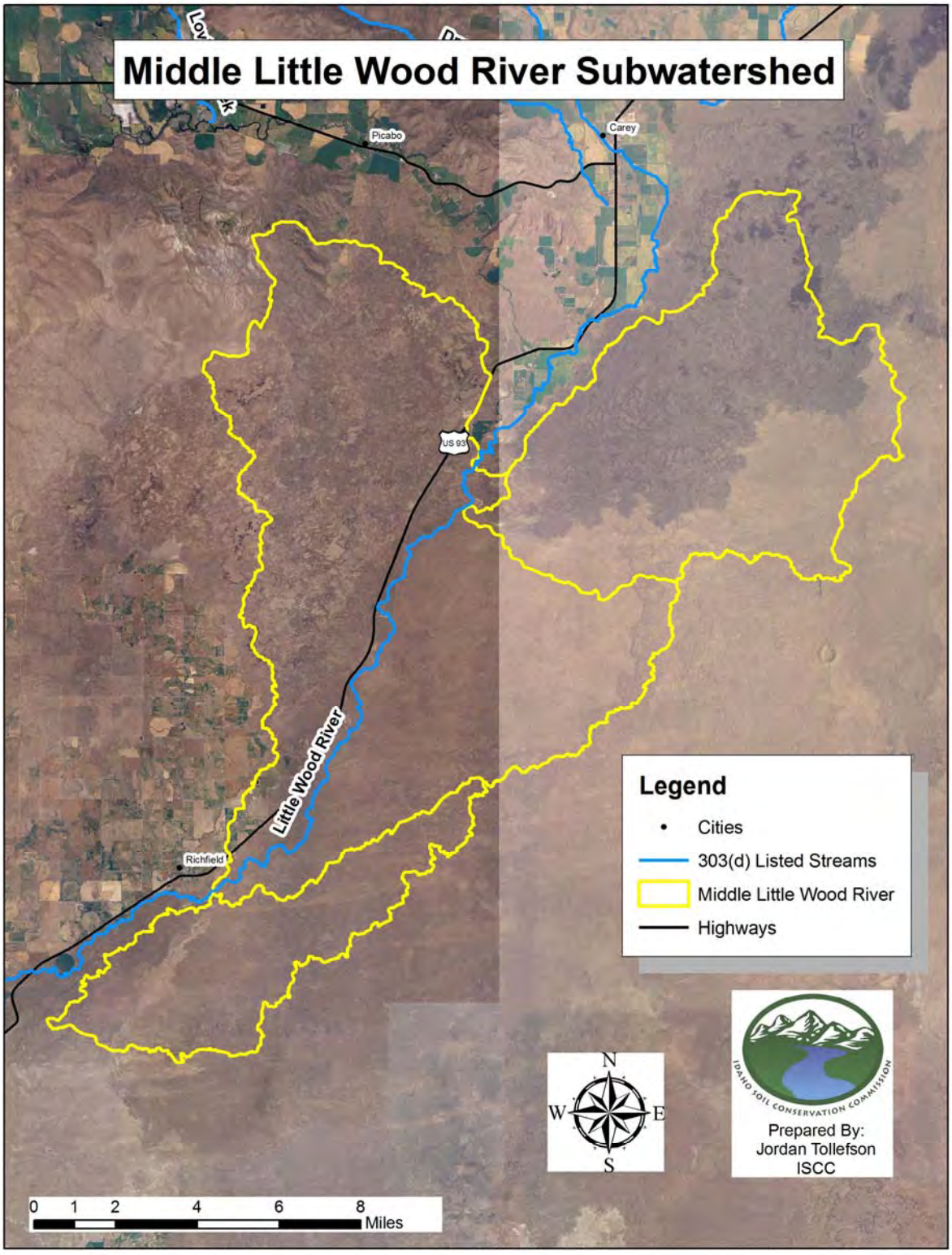

Figure 13. Map of the Middle Little Wood River Subwatershed the Little Wood River Subbasin

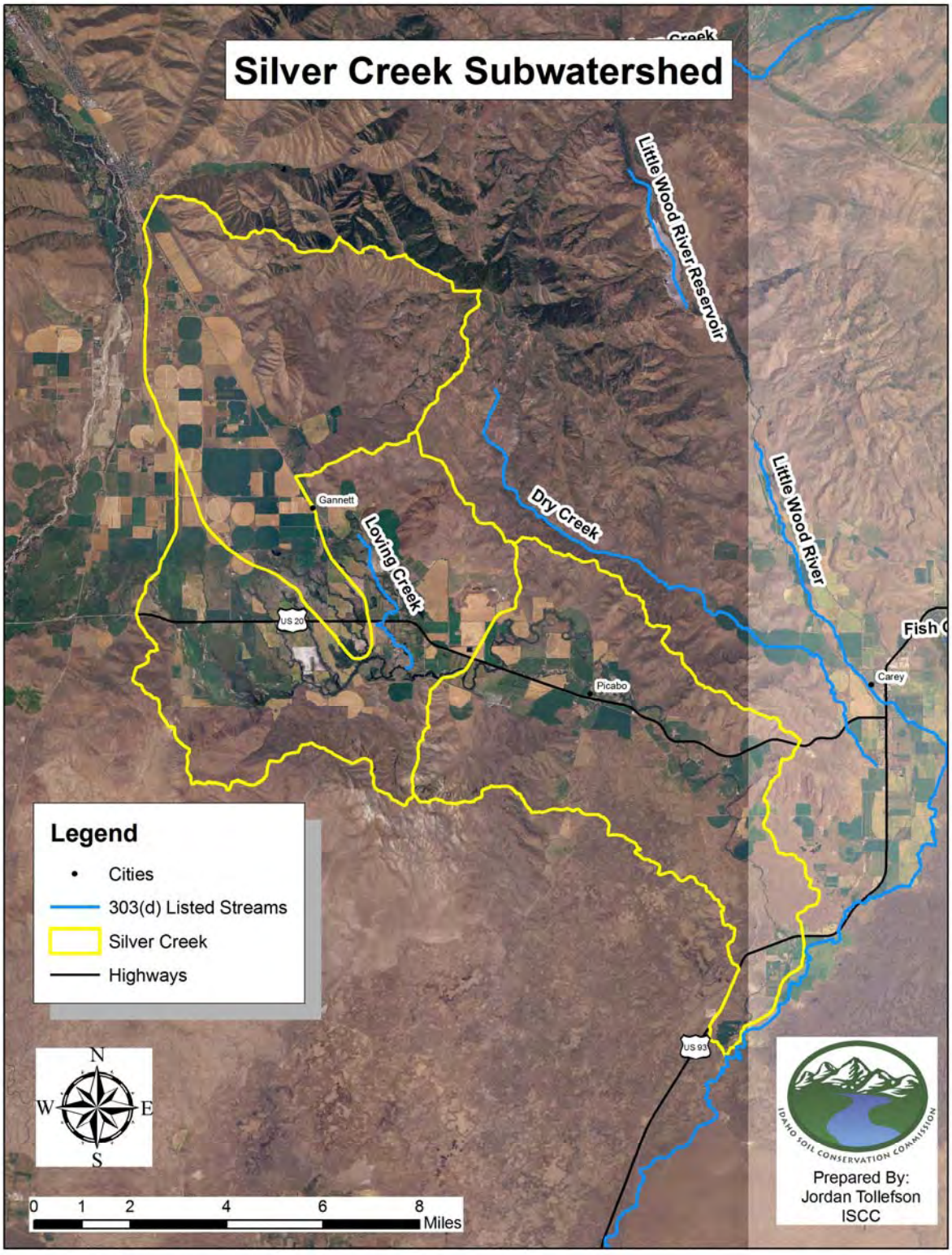

Figure 14. Map of the Silver Creek Subwatershed the Little Wood River Subbasin

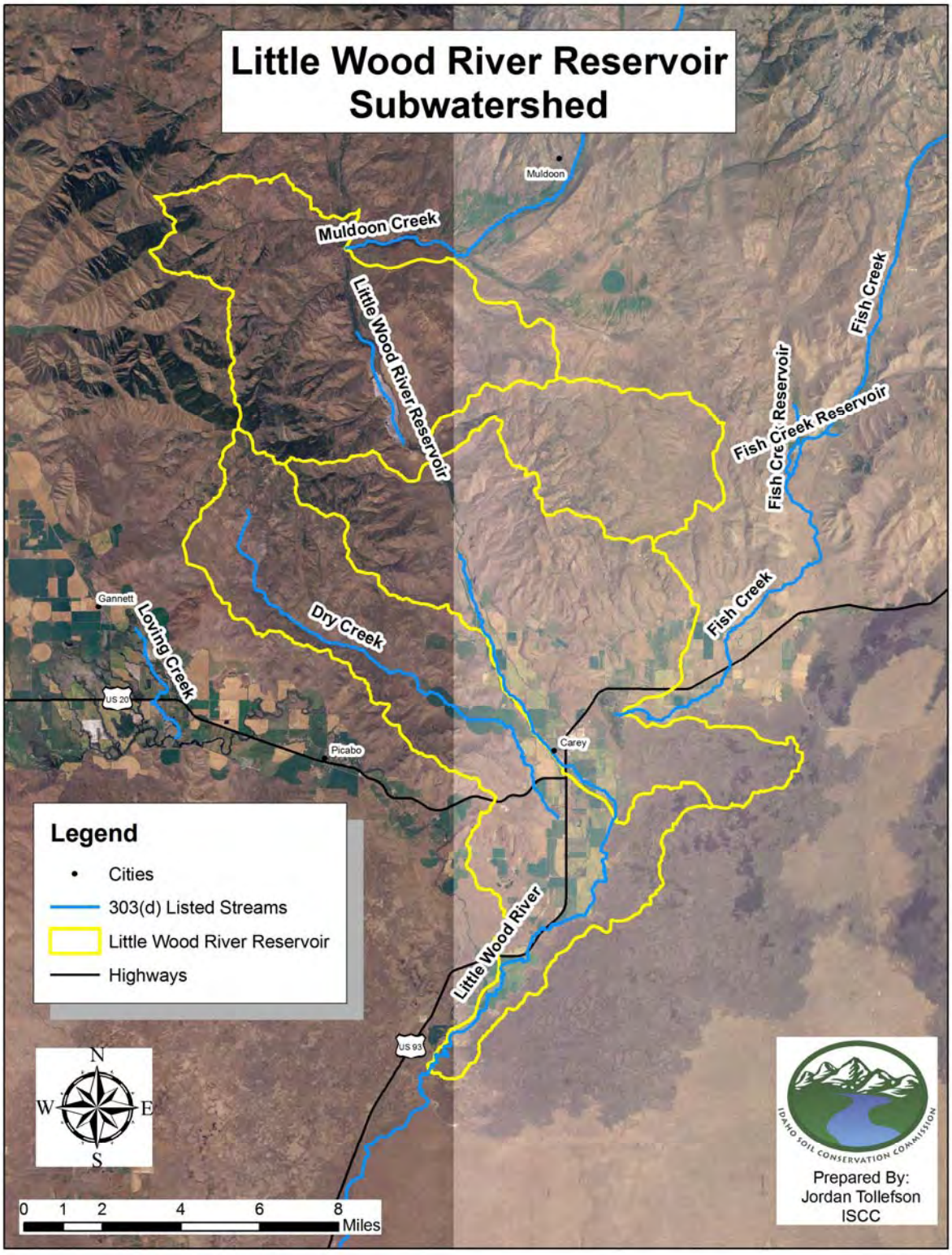

Figure 15. Map of the Little Wood River Reservoir Subwatershed the Little Wood River Subbasin

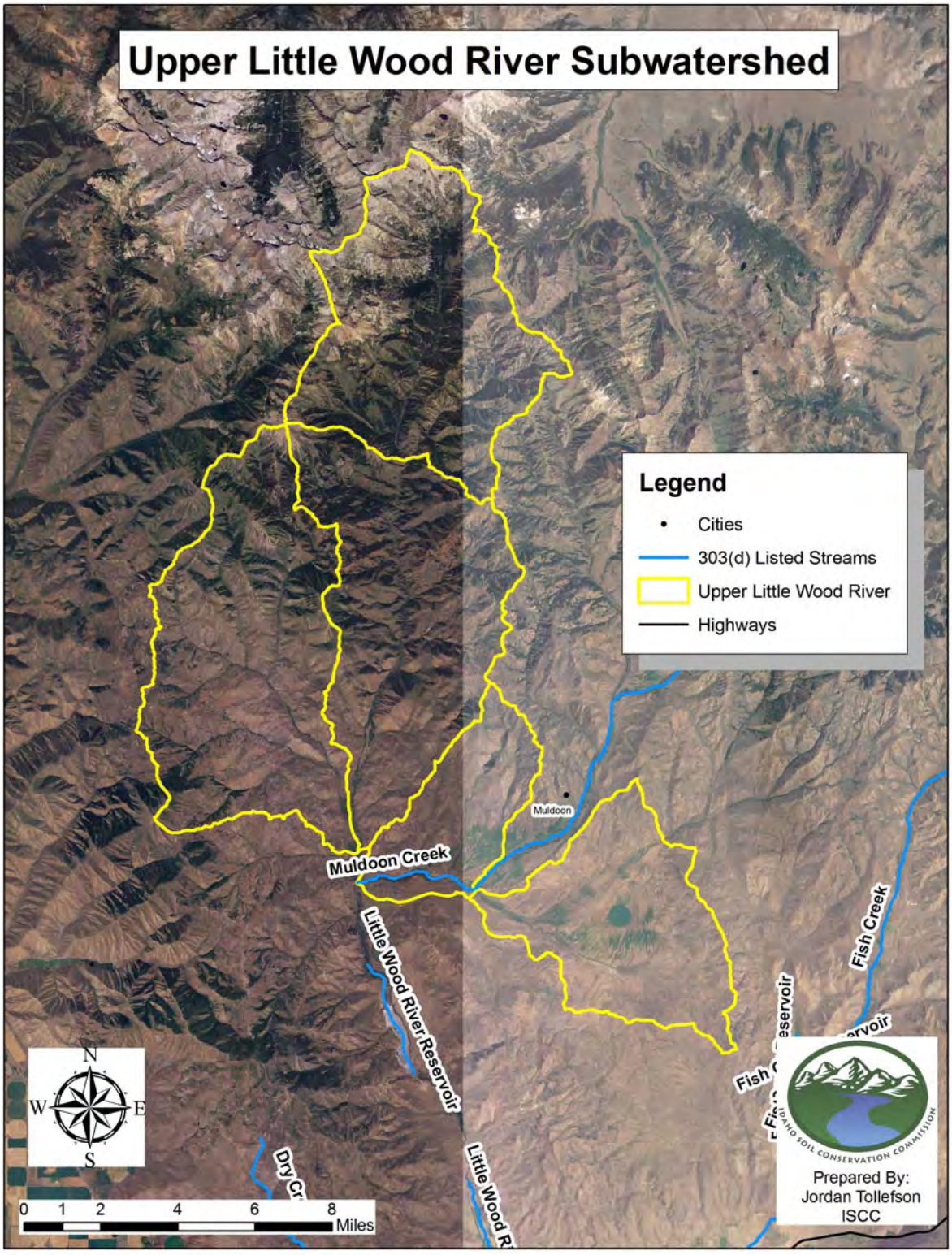

Figure 16. Map of the Upper Little Wood River Subwatershed the Little Wood River Subbasin

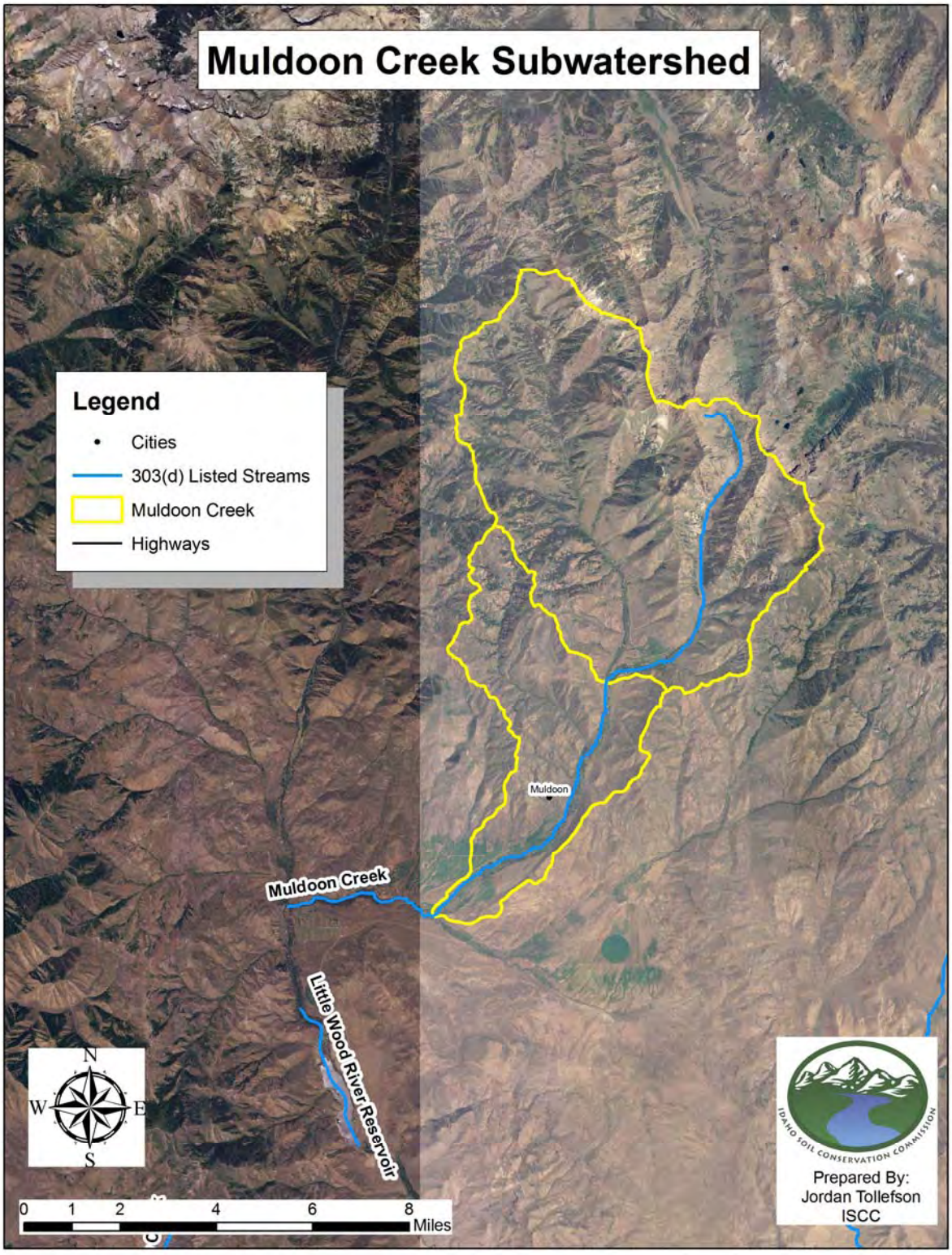

Figure 17. Map of the Muldoon Creek Subwatershed the Little Wood River Subbasin

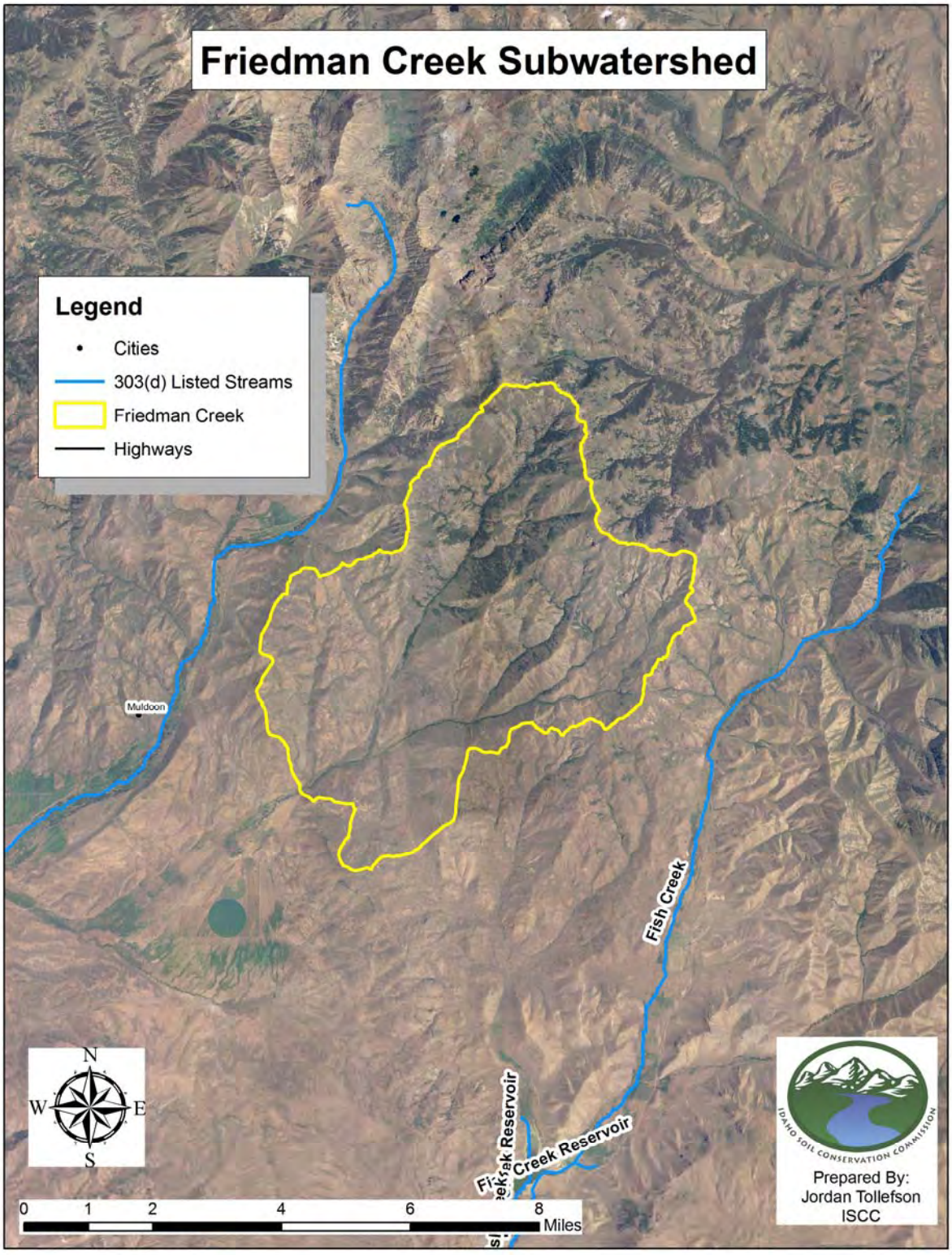

Figure 18. Map of the Friedman Creek Subwatershed the Little Wood River Subbasin

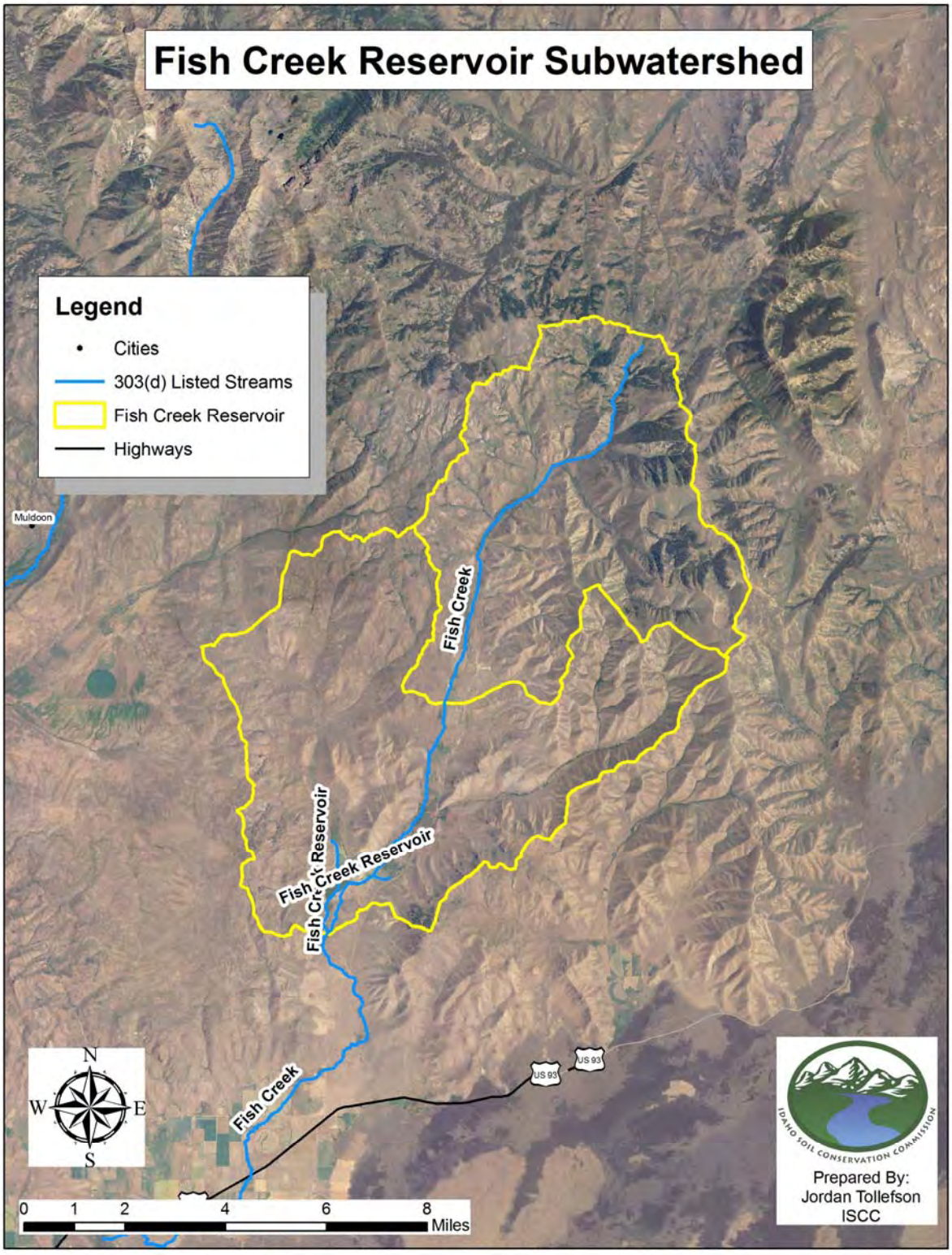

Figure 19. Map of the Fish Creek Reservoir Subwatershed the Little Wood River Subbasin

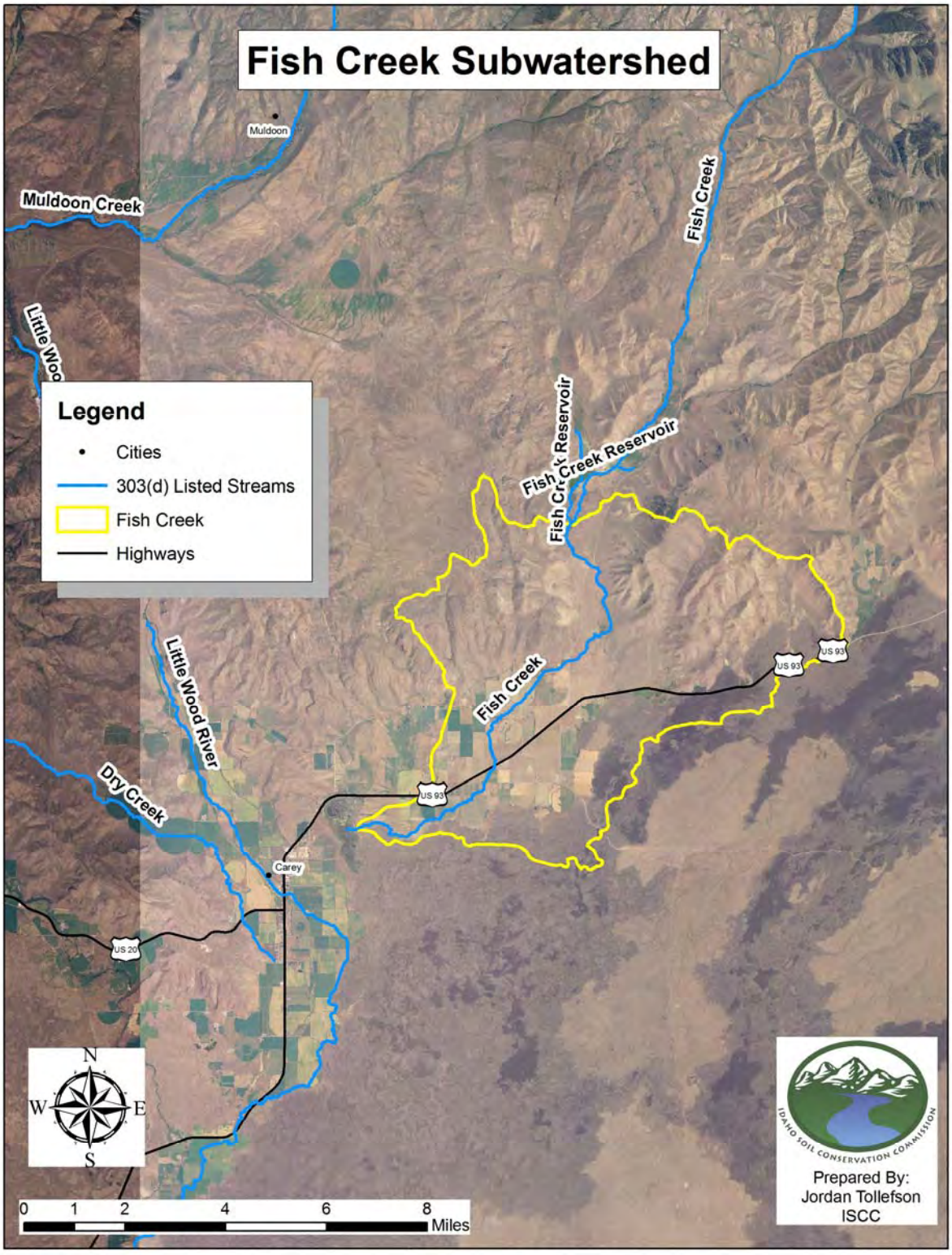

Figure 20. Map of the Fish Creek Subwatershed the Little Wood River Subbasin