Raft River Watershed Total Maximum Daily Load

Implementation Plan for Agriculture

Developed for the Idaho Department of Environmental Quality

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RAFT RIVER TMDL IMPLEMENTATION PLAN

INTRODUCTION

Purpose

The agricultural component of the Raft River Total Maximum Daily Load (TMDL) Implementation Plan outlines an adaptive management approach for implementation of Best Management Practices (BMPs) and Resource Management Systems (RMS) to meet the requirements of the Raft River TMDL. Implementation activities will be phased in on a sub-watershed basis due to the size and complexity of the watershed, which encompasses 968,315 acres.

Goal

The goal of this plan is to provide a strategy for agriculture to assist and/or complement other watershed efforts in restoring and protecting beneficial uses for the Department of Environmental Quality (DEQ) 1998 list of 303(d) listed stream segments. These segments are identified in Table I:

Table I Water Quality Limited Stream Segments

Segment	Segment #	Boundaries	Pollutant(s)
Raft River	2430	Malta to Snake River	Bacteria, temperature, sediment
Raft River	2431	Utah line to Malta	Bacteria, temperature, sediment
Sublett Creek	2432	Sublett Res. to lower boundaries	Nutrients (total phosphorus)
Sublett Reservoir	2434	The reservoir	Nutrients (total phosphorus)
Cassia Creek	2438	Connor Creek to Raft River	Bacteria, nutrients, sediment
Fall Creek	7612	Headwater to Lake Fork	Nutrients, bacteria
Lake Fork Creek*	-	Fall Creek to Sublett Res.	Nutrients (total phosphorous)

*Note: Lake Fork Creek is not on 303(d) list, but it impacts Sublett Reservoir

Objectives

The major objective of this plan will be to reduce the amount of sediment, bacteria, and nutrients entering these water bodies from agricultural sources and to lower water temperatures where feasible. Agricultural pollutant reductions will be achieved through the application of Resource Management Systems (RMS) and Best Management Practices (BMPs) developed and implemented on site with individual agricultural operators.

Another objective of this plan will be to provide BMP effectiveness evaluation and monitoring in terms of reducing pollutant loading and impacts on designated beneficial uses of the above listed stream segments. Emphasis will also be placed on implementation of a water quality outreach program to encourage landowner participation in water quality implementation efforts within the watershed.

BACKGROUND

Project Setting

The Raft River Subbasin is located in the eastern half of Cassia County, Idaho and the northwestern part of Box Elder County, Utah (Figure 1). The watershed is bounded on the west by the Albion Mountains, on the east by the Sublett and Black Pine mountains, and to the south by the Raft River Mountains, an east-west trending mountain range located just south of the Idaho-Utah border. The Raft River originates in Utah, and flows in a northeasterly direction, terminating at Lake Walcott on the Snake River. The fourth field hydrologic unit code (HUC) for the Raft River Subbasin is 17040210. The subbasin is divided into 16 subwatersheds (fifth field HUCs). These are shown in Table II and Figure 2.

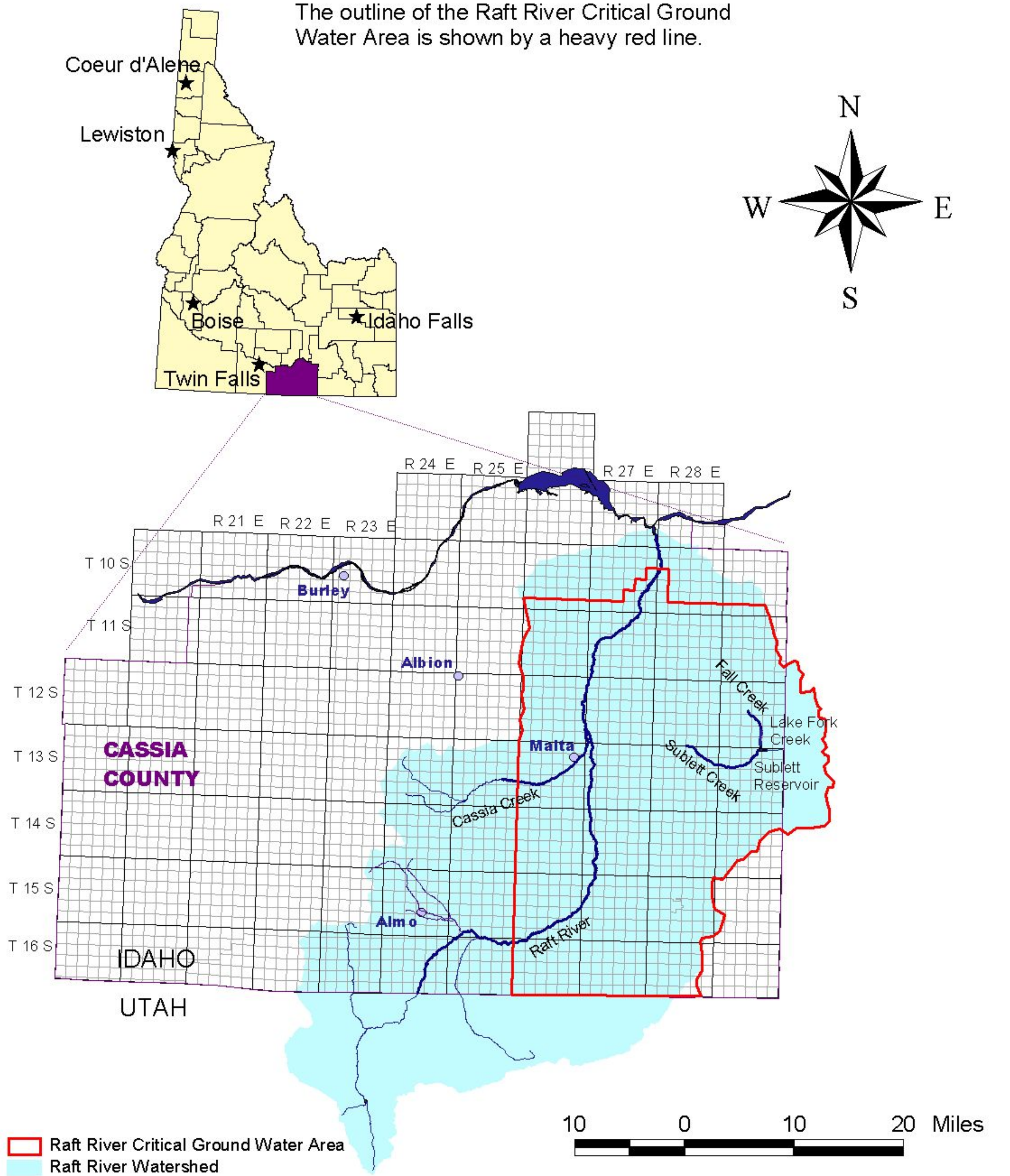
The Raft River, the major stream draining the subbasin, was once considered a perennial stream that was fed during periods of high runoff by numerous intermittent, ephemeral, and perennial streams. The natural surface outflow from the basin, based on measurements of the Raft River as early as 1910, is estimated to have averaged about17,000 acre-feet per year (Lay, et al, 2004). Considerably greater amounts of flow also occurred in the subbasin east of the Cotterel Range. That flow included an average annual inflow of about 18,000 acre-feet from Cassia Creek; 24,000 acre-feet from the Raft River at The Narrows; 8,400 acre-feet from creeks draining the Raft River Mountains; and 5,400 acre-feet from creeks rising in the Sublett Range. This average total inflow was about 56,000 acre-feet. Most of this water contributed to recharge of the ground water reservoir or was consumed by natural riparian ecosystems. However, certain reaches of the Raft River and its tributaries are now intermittent due to flow diversions for irrigation purposes (Lay, et al 2004). Flow into the Lake Walcott Subbasin from the Raft River is no longer considered perennial.

TABLE II. Fifth Field HUCs in Raft River Subbasin

Subwatershed Name	Total Acres	Subwatershed Name	Total Acres
Barnes-Wildcat	96,981	Lower Cassia Creek	41,737
Cassia Creek	62,278	Lower Raft River	160,045
Clear Creek	47,366	Meadow Creek	59,919
Cottonwood Creek	49,872	Sublett Creek	63,877
Edwards-Grape	47,093	Upper Cassia Creek	9,651
George	8,918	Upper Clear Creek	88,828
Junction-Circle	65,166	Upper Raft River	34,229
Kelsaw-Point Spring	69,554	Warm-Heglar	62,801

Figure 1. Raft River Watershed Index Map. Water bodies on 303(d) list are labeled and shown as heavier lines.

The outline of the Raft River Critical Ground Water Area is shown by a heavy red line.



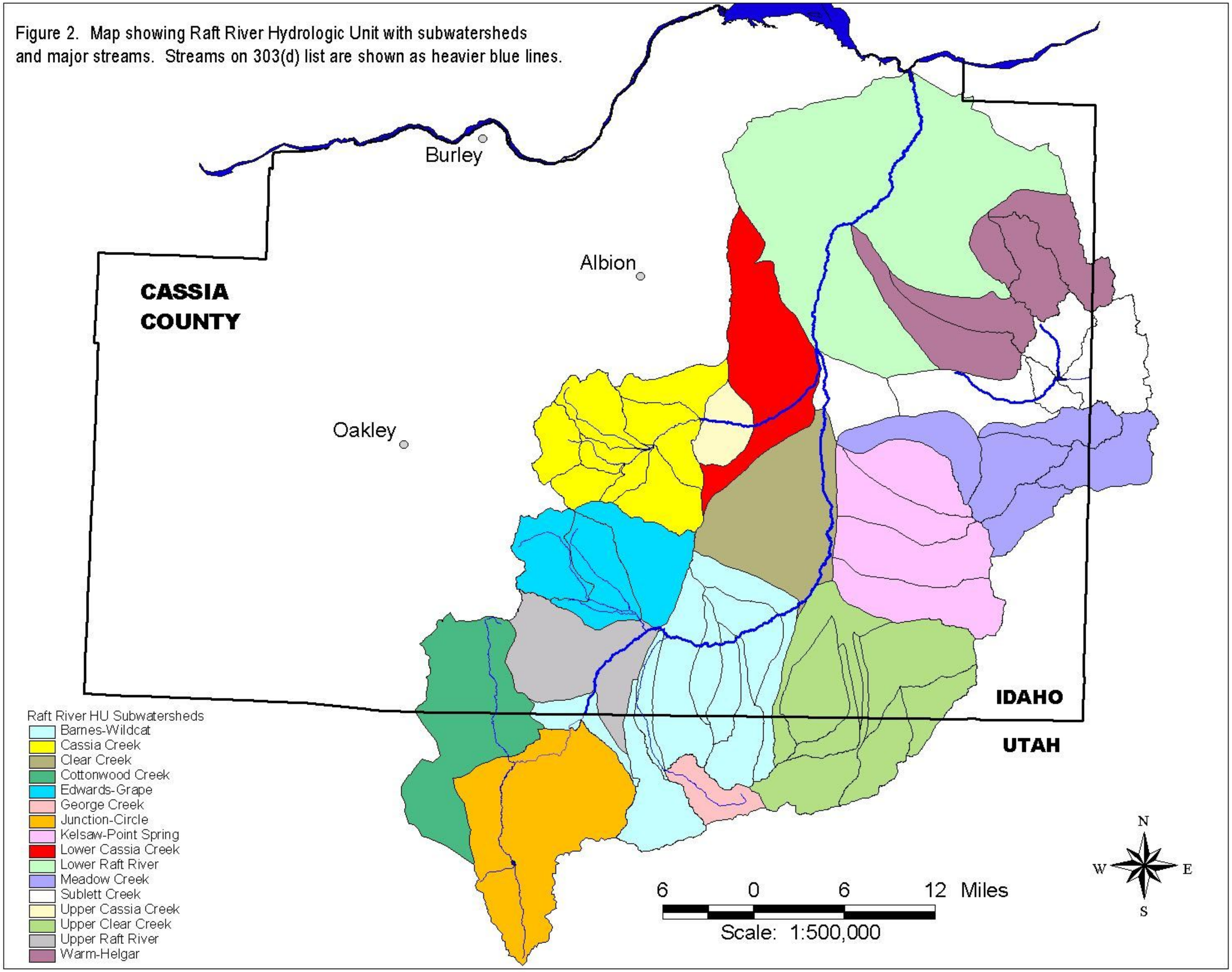


Figure 2. Map showing Raft River Hydrologic Unit with subwatersheds and major streams. Streams on 303(d) list are shown as heavier blue lines.

Subbasin Ground Water and Aquifers

The Raft River Subbasin includes subbasin aquifers, artesian springs, and various irrigation wells. Ground water in the Raft River Subbasin occurs in valley fill deposits, including the Pleistocene Raft Formation, the Holocene alluvium, and the upper part of the Pliocene Salt Lake formation. Most water is in the Raft River Valley, east of the Cotterell Range. Some pumping of ground water for irrigation in the valley was started in the 1920s, but it was not until about 1950 that larger-scale pumping for irrigation was developed. The ground water development was to supplement Raft River water shortages and to develop additional cropland. Mass production of deep wells for irrigation has adversely impacted the ground water supply. In 1963, the Idaho Department of Water Resources (IDWR) declared the aquifer in the Raft River drainage a Critical Ground Water Area. The expansion of the area under protection continued until 1977, restricting deep well pumping. Studies indicated the annual ground water contribution from the basin (presumably to the Snake River) was 80,000 acre-feet/year, but that pumping withdrawals in excess of 105,000 acre-feet/year were endangering this flow and causing declining ground water tables (SCS, et al. 1991). The Raft River Critical Ground Water Area of July 1977, shown on Figure 1, is still current today (Lay, et al, 2004).

Most of the ground water suitable for irrigation development in the Raft River Subbasin occurs in the valley fill. The ground water is generally unconfined, and the several geologic formations constitute a single aquifer with a thickness exceeding 700 feet under most of the lowlands. Relatively impermeable rocks underlie this aquifer. West of the Cotterell Range, the same geologic formations are water bearing in the Yost-Almo and Elba watersheds. From these various watersheds there is outflow to the Raft River Valley through the alluvial valleys occupied by the Raft River and Cassia Creek as they traverse the Cotterell Range. The northern end of the subbasin is bordered by basalt which is highly permeable, but which includes massive impermeable rocks as well (Lay, et al, 2004).

Land Use

General land use categories and the percentage of each category within the Raft River Watershed are shown in Table III. The largest single land use is grazed rangeland. For the purposes of determining treatment units, these general categories will be broken into several sub-categories.

TABLE III. Land Use in the Raft River Watershed

LAND USE	PERCENT OF AREA
Rangeland	49
Crop Land	25
Forest Land	25
Streams, Riparian, Reservoirs	0.48
Transportation, Urban, Other Ag, Misc.	0.48
Concentrated Animal Feeding Operations, Dairies	0.04

Ownership

Surface ownership within the entire watershed is shown in Figure 4 and in Table IV.

TABLE IV. Raft River Watershed Surface Ownership

OWNERSHIP	TOTAL ACRES	PERCENT OF TOTAL
Bureau of Land Management	309,861	32
Forest Service	193,663	20
Private	435,742	45
State	29,049	3

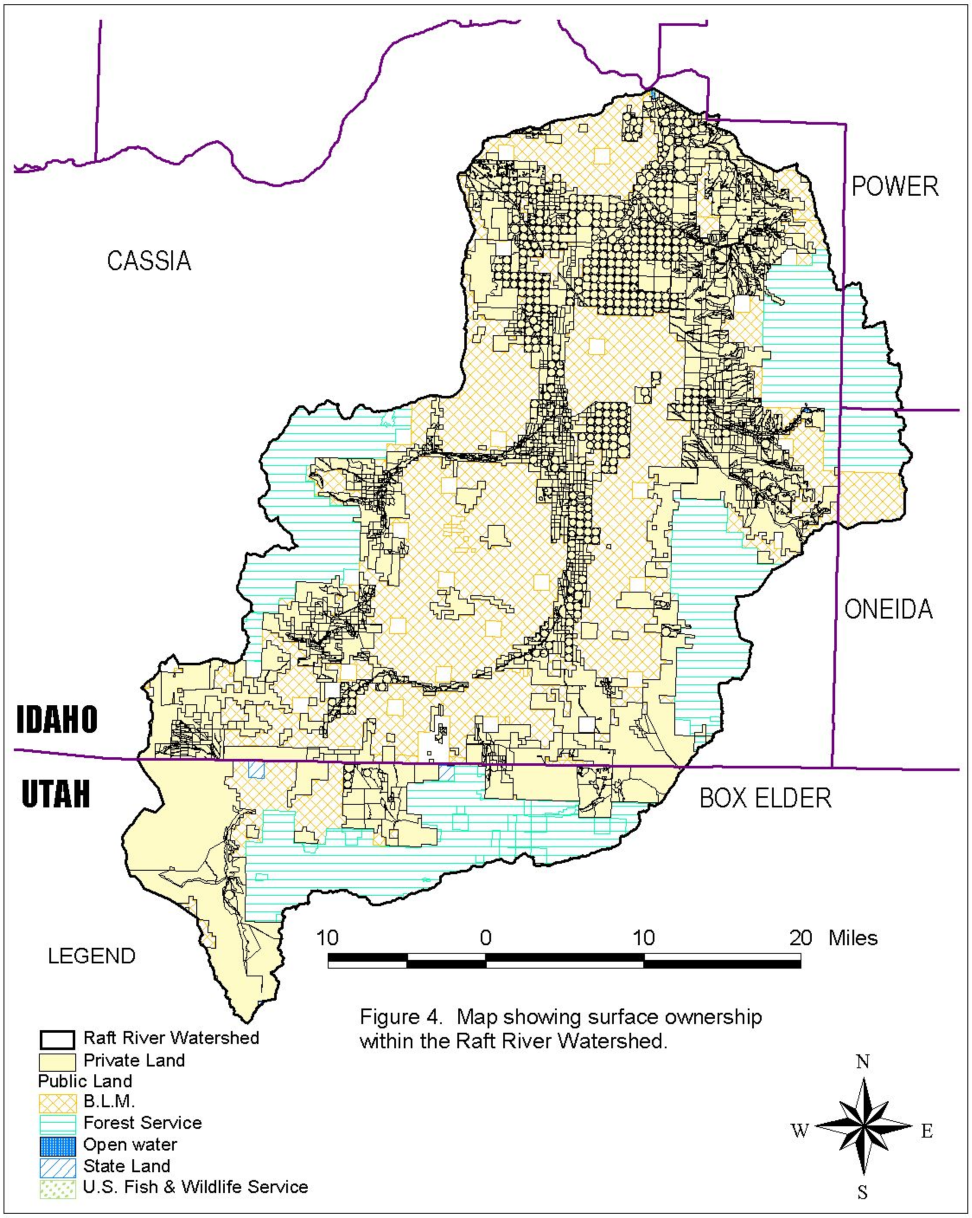


Figure 4. Map showing surface ownership within the Raft River Watershed.

Accomplishments within the Raft River Watershed

Table V shows BMPs implemented over the last ten years (1995-2004). Funding in the amount of $5,409,101 was provided by landowners and by various programs, as shown on Figure 3.

TABLE V. BURLEY NRCS FIELD OFFICE ACCOMPLISHMENTS 1995-2004

Practice No.	Practice	Units		AMOUNT
314	Brush Mgt	8698	ac	$208,752.00
324	Chiseling & Sub-soiling/Deep Tillage	3452	ac	$55,232.00
327	Conservation Cover	41	ac	$5,740.00
328	Conservation Crop Rotation	3327	ac	$0.00
382	Corral Relocation	50	ac	$750.00
342	Critical Area Planting	40	ac	$8,000.00
382	Fence	131872	ft (25 mi)	$487,926.40
393	Filter Strip	1.5	ac	$277.50
490	Forest Site Preparation	9	ac	$1,395.00
410	Grade Stabilization Structure	24	each	$34,320.00
561	Heavy Use Protection (Stream Crossing)	26	each	$52,000.00
388	Irrigation Field Ditch (Contour Ditch)	28123	ft (5.3 mi)	$140,615.00
442	Irrigation System Sprinkler	1836	ac	$1,138,320.00
441A	Irrigation System, Microirrigation	56	ac	$67,200.00
443	Irrigation System, Surface & Subsurface	150	ac	$22,500.00
430 DD/EE/HH	Irrigation Water Conveyance	42630	ft (8 mi)	$186,719.40
449	Irrigation Water Mgt	2075	ac	$20,750.00
590	Nutrient Mgt	2377	ac	$23,770.00
510	Pasture & Hay Mgt	1955	ac	$9,775.00
512	Pasture & Hay Planting	1734	ac	$173,400.00
595	Pest Mgt	4972	ac	$198,880.00
516	Pipeline (Livestock Water)	102770	ft (19 mi)	$241,509.50
378	Pond	2	each	$8,000.00
528 A	Prescribed Grazing	16025	ac	$32,050.00
533	Pumping Plant for Water Control	6	each	$61,920.00
550	Range Planting	385	ac	$46,200.00
329A	Residue Mgt	3327	ac	$99,810.00
391A	Riparian Forest Buffer	12	ac	$9,600.00
350	Sediment Basin	57	each	$68,400.00
574	Spring Development	18	each	$43,200.00
580	Streambank Protection	2550	ft	$255,000.00
589B	Stripcropping	2078	ac	$62,340.00
587	Structure for Water Control	55	each	$55,000.00
609	Surface Roughening	981	ac	$7,357.50
612	Tree & shrub establishment	25845	ft (5 mi)	$18,300.00
614	Trough	71	each	$47,357.00
645	Upland Wildlife Habitat Mgt	13251	ac	$13,251.00
472	Use Exclusion	79	ac	$316.00
312	Waste Mgt System	3	each	$300,000.00
642	Well - Stockwater	1	each	$4,000.00
648	Wildlife Watering Facility	4	each	$4,000.00
380	Windbreak Establishment	298792	ft (57 mi)	$1,195,168.00

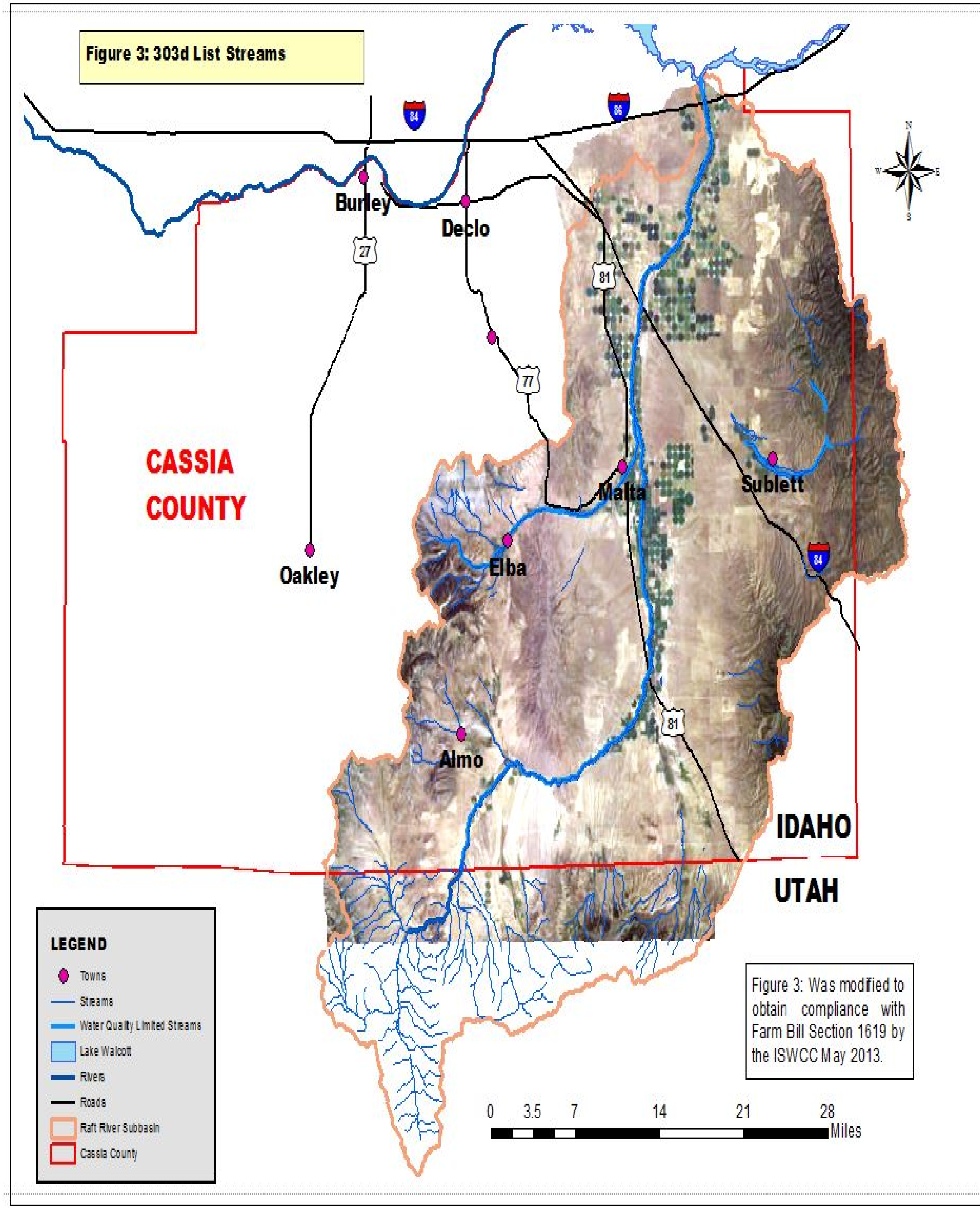


Figure 3: 303d List Streams
84
86
Burley
Declo
27
81
77
CASSIA
COUNTY
Oakley
Elba
Malta
Sublett
84
81
Almo
IDAHO
UTAH
LEGEND
Towns
Streams
Water Quality Limited Streams
Lake Walcott
Rivers
Roads
Raft River Subbasin
Cassia County
Figure 3: Was modified to obtain compliance with Farm Bill Section 1619 by the ISWCC May 2013.
0 3.5 7 14 21 28
Miles

STATEMENT OF PROBLEM

Beneficial Use Status and Pollutants

Beneficial uses in the Raft River are affected to a large extent by flow alteration. Water from the Raft River rarely enters the Snake River due to irrigation diversions. However, during wetter years, snow melt and spring rains will contribute enough water to the Raft River to allow flow to the Snake River for a short period of time during May or June. This scenario occurs only once or twice every 10 years (Neddo, personal communication). Flow alteration is also a significant factor affecting the beneficial uses of Cassia Creek. Only during wetter years will water from Cassia Creek reach the Raft River. Sublett Creek is also entirely diverted to a canal and drain system during the irrigation season. As with Raft River and Cassia Creek, beneficial uses of Sublett Creek and Sublett Reservoir are primarily affected by flow alteration. Table VI, taken from the Raft River Subbasin Assessment and TMDL (Lay, et al, 2004) lists the beneficial uses of each water body on the 1998 §303(d) list of impaired streams. Table VII (Lay, et al, 2004) shows the listed streams, along with their pollutants, including flow alteration (labeled "Q").

In addition to flow alteration, agricultural activities affecting beneficial uses within the Raft River Subbasin include the following: grazing of riparian areas; the practice of tillage operations occurring immediately adjacent to stream channels; poor irrigation water management, which results in headcutting caused by irrigation return flows; lack of crop residue during winter months; dry farm fields being left as summer fallow; and using traditional tillage techniques (rather than no-till or low-till) on soils susceptible to erosion.

TABLE VI. Beneficial Uses of Water Bodies in the Raft River Watershed (Lay, 2004)

Water Body	Designated Uses[a]	1998 §303(d) List[b]
RAFT RIVER SEGMENTS – DESIGNATED BENEFICAL USE		
Raft River, Malta to SR 2430	CW, SS, PCR	Yes
Raft River, Utah line to Malta 2331	CW, SS, PCR	Yes
TRIBUTARY SEGMENTS-EXISTING BENEFICAL USES		
Sublett Creek, Sublett Reservoir to lower boundaries 2432	AWS	yes
Sublett Reservoir 2434	CW, SS, PCR, SCR, AWS	Yes
Fall Creek, Headwaters to Lake Fork 7612	CW, SS, PCR, SCR, AWS	yes
Cassia Creek, Conner Creek to Raft River, 2438	CW, SS, PCR, SCR, AWS	yes

[a] CW – Cold Water, SS – Salmonid Spawning, PCR – Primary Contact Recreation, SCR – Secondary Contact Recreation, AWS – Agricultural Water Supply, DWS – Domestic Water Supply
[b] Refers to a list created in 1998 of water bodies in Idaho that did not fully support at least one beneficial use. This list is required under section 303 subsection "d" of the Clean Water Act.

TABLE VII. Raft River Subbasin Water Bodies on §303(d) List (Lay, 2004)

Water Body Name	Segment ID Number	1998 §303(d)[a] Boundaries	Pollutants[b]
Raft River	2430	Malta to Snake River	Ex Sed, Ex N, NH_3, DO, *E. coli*, Q, Sal,
Raft River	2331	Utah line to Malta	Ex Sed, DO, Tem, *E. coli*, Sal
Tributaries or Tributary Segments/Reservior			
Sublett Creek	2432	Sublett Reservoir to lower boundaries	Ex Sed, Ex N, DO. *E. coli*, Q
Sublett Reservoir	2434	Sublett Reservoir	Ex Sed, Ex N, DO, Q
Fall Creek	7612	Headwaters to Lake Fork	U
Cassia Creek	2438	Conner Creek to Raft River	Ex Sed, Q
Cassia Creek	Not §303(d) listed	Headwaters to Conner Creek	U
Lake Creek	Not §303(d) listed	Headwaters to Sublett Reservoir	U
Van Camp Creek	Not §303(d) listed	Headwaters to Lake Creek	U
New Canyon Creek	Not §303(d) listed	Headwaters to Cassia Creek	U
Flat Canyon Creek	Not §303(d) listed	Headwaters to Cassia Creek	U

[a] Refers to a list created in 1998 of water bodies in Idaho that did not fully support at least beneficial use. This list is required under section §303(d) of the Clean Water Act.
[b] Q = flow alternation or diversions. Ex Sed = Excess sediments. Ex N = Excess nutrients. NH_3 = Total ammonia. DO = Dissolved oxygen. *E.. coli* = *Escherichia coli*. Tem = temperature (thermal modification). U = Unknown pollutants. Sal = salinity.

Soil erosion in the Raft River Subbasin occurs as sheet and rill erosion, irrigation induced erosion, gully (classic and ephemeral) and streambank erosion. Sheet and rill erosion occurs on non-irrigated cropland when runoff occurs on sloping fields that are not protected by crop residue. Dry farming in the watershed occurs primarily in the eastern half. However, a significant amount of dry cropland now participates in the Conservation Reserve Program (CRP) as shown in Figure 3, thus minimizing the amount of sheet and rill erosion occurring in these areas. Figure 5 is a map of the K-factor, or soil erodibility factor in the Universal Soil Loss Equation (Wischmeier and Smith, 1965). Values for the K-factor in the Raft River Watershed range from 0.15 (least erosive) to 0.55, with the majority of the soil being in the range of 0.37 to 0.49. Average soil slope also indicates potential for soil erosion. Representative slope for the subbasin is shown in Figure 6. The majority of the land area falls within the range of 0 to 8 per cent slope.

Irrigation induced erosion occurs primarily as a result of flood (gravity) irrigation practices. Water flowing down the furrows in fields detaches soil particles. Irrigation return flows, or tailwater also contribute sediment to creeks and canals. Conversion from gravity to sprinkler irrigation can alleviate much of the irrigation induced erosion problems. Much of the irrigated land within the Raft River Watershed has been put under sprinkler irrigation. Because of the extended drought that has occurred within the subbasin, an accelerated effort has been made by farmers and ranchers to increase irrigation water efficiency by converting to sprinkler irrigation.

Gully erosion occurs primarily on the fan slopes of the valley floors. This happens during summer thunderstorms and cloud bursts. Bare soils and fields that are summer fallow are most susceptible to gully erosion.

Streambank erosion occurs in areas where riparian vegetation has been degraded or eliminated by drought and/or grazing practices. Some sections of the Raft River have been straightened, a practice which also contributes to loss of riparian habitat. In some areas, farming operations continue into the riparian zone, thus eliminating riparian species. Streambank erosion inventories were conducted on the majority of Cassia Creek and along sections of the Raft River by personnel from the Twin Falls DEQ office, the Burley Natural Resources Conservation Service (NRCS) field office, and the Idaho Soil Conservation Commission (ISCC). Representative stream segments were assessed, with the height, length and relative position of eroding banks being recorded. Results of the inventories are presented in Tables VIII and XI.

Table X shows the load allocations and reductions as submitted by DEQ and approved by the Environmental Protection Agency (EPA) for all pollutants within the Raft River Watershed.

Water Quality Monitoring Results

The subbasin assessment for the Raft River Watershed (Lay, 2004) includes historical water quality data collected from various federal and state agencies, as well as information from the Idaho DEQ's own monitoring activities and their Beneficial Use Reconnaissance Program. DEQ took samples from 1999 through 2002. Monitoring information for the Utah portion of the Raft River Watershed was obtained from the Utah DEQ. This data is shown in Appendix C. In addition, the Idaho Association of Soil Conservation Districts (IASCD), in cooperation with the East Cassia Soil and Water Conservation District (SWCD) established a monitoring program in 1999 in conjunction with an EPA grant (referred to as the Almo 319 Project) to restore riparian areas along Edwards Creek, Almo Creek, and Little Cove Creek, three tributaries of the Raft River. Data was collected from three sites on Edwards Creek, one site on Almo Creek, and three sites on the Raft River from June 1999 to June 2000. At the conclusion of the monitoring project, two recommendations for improving water quality in the areas monitored were made: 1) Livestock grazing along streams should be managed to improve riparian vegetation and reduce bacterial contamination from livestock. 2) Irrigation diversions and flood irrigation practices should be improved and/or changed to eliminate erosion caused by overland flow (particularly during spring runoff) and irrigation return flows (Dallon, 2001). A follow up monitoring program was begun in April 2004 and concluded in April 2005 by IASCD to evaluate the effectiveness of the BMPs installed as part of the Almo 319 Project. One additional site on Edwards

Figure 5. Map showing soil K factor in the Idaho portion of the Raft River Watershed.

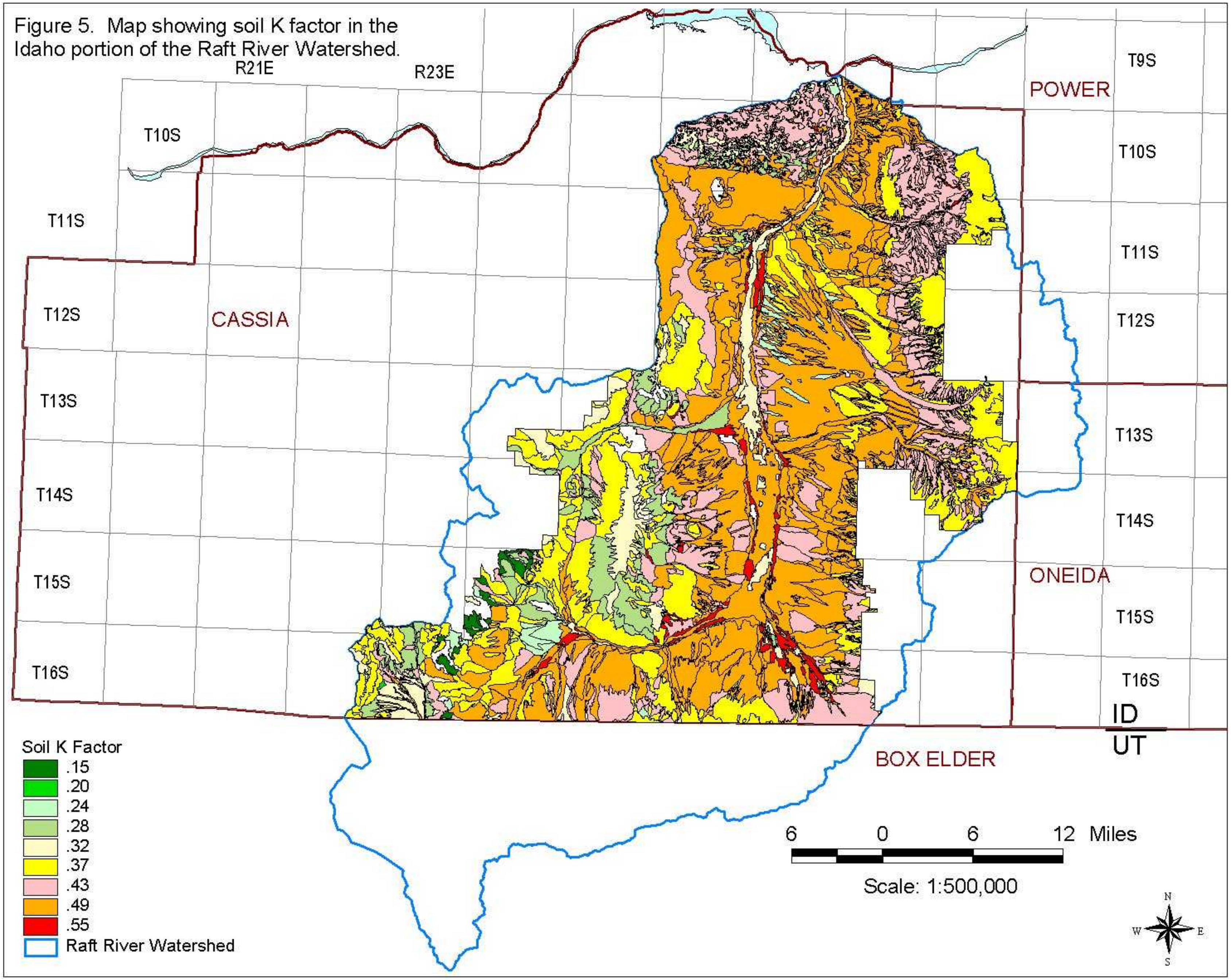


Figure 6. Map showing representative slope for the Idaho portion of the Raft River Watershed.

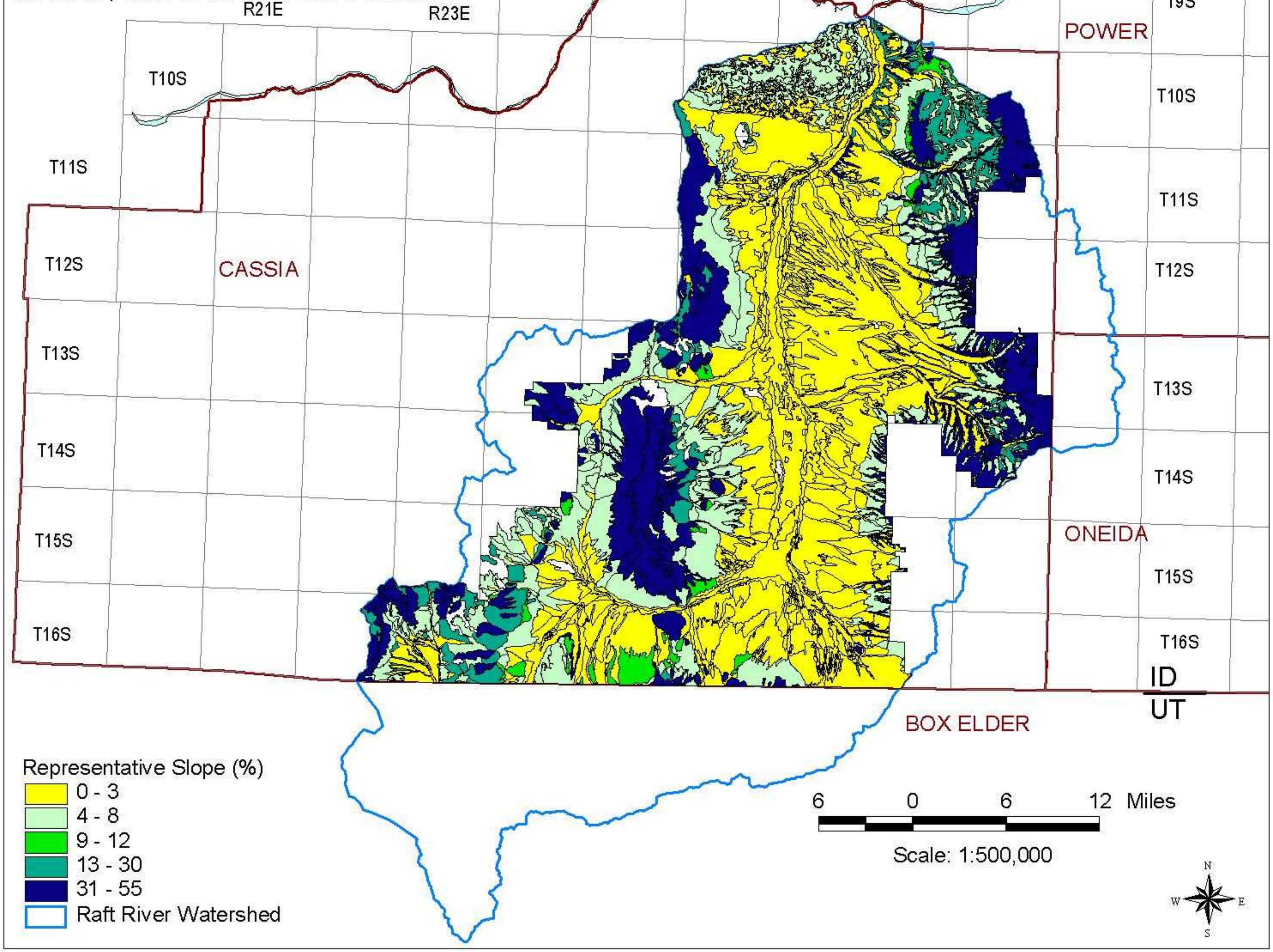


Table VIII. Stream Bank Erosion Estimates for Raft River (Lay, 2004)

Reach	Existing		Proposed			
	Erosion Rate (Mg/mi/y)[a]	Total Erosion (Mg/y)[b]	Erosion Rate (Mg/mi/y)[a]	Total Erosion (Mg/y)[b]	Erosion Rate Percent Reduction	Percent of Existing Total Load
Utah/Idaho Border to The Narrows	197.6	2171.2	32.6	357.8	84	38.59
The Narrows	8.3	146.6	19.5	344.1	0	2.61
The Narrows to Malta	385.3	5,479.3	42.7	606.9	89	97.39
	Total Erosion (Mg/y)[b]	5,625.9		951.0	83.10	100.00

[a] Metric tons per mile per year
[b] Metric tons per year

Table IX. Stream Bank Erosion Estimates for Cassia Creek (Lay, 2004)

Reach	Existing		Proposed			
	Erosion Rate (Mg/mi/y)[a]	Total Erosion (Mg/y)[b]	Erosion Rate (Mg/mi/y)[a]	Total Erosion (Mg/y)[b]	Erosion Rate Percent Reduction	Percent of Existing Total Load
Public Lands Reference	2.5	7.3	7.9	23.6	0	0.26
BLM to Cross Creek	3.4	7.4	7.3	15.9	0	0.27
Cross Creek to Clyde Creek	0.5	1.1	6.3	15.3	0	0.04
Clyde Creek to Jones Hollow	0.9	2.3	6.3	16.0	0	0.08
Jones Hollow to Conner Creek	11.8	33.7	10.7	30.6	0	1.22
Conner Creek to Park Creek	5.5	43.1	14.9	116.2	0	1.56
Park Creek to Hudspeth Cutoff	12.7	27.1	20.7	44.1	0	0.98
Hudspeth Cutoff to Malta	63.2	186.0	39.3	39.3	38	6.73
Malta to Raft River	442.4	2,455.2	24.5	136.0	94	88.85
	Total Erosion (Mg/y)[b]	2,763.2		437.0	84.19	100.00

[a] Metric tons per mile per year
[b] Metric tons per year

Table X. Raft River Subbasin TMDLs (Lay, 2004)

Creek	Pollutants	Critical Period	Critical Flow (m^3/s)[a]	Load Capacity	Background	Total Load	Margin of Safety[b]	Nonpoint Source Load Allocation	Load Reduction	Percent Reduction	Units[c]
Raft River	Bacteria	Jun-Aug	0.46	576	69	967	58	449	518	54	col/100 ml
Raft River	Temperature	Jun-Aug	0.46	4.1	4.1	6.9	0.4	3.7	3.2	46	kwh/m^2/day
Raft River	Sediment	Mar-May	0.46	951	951	5,626	Imp	951	4,675	83	Mg/year
Cassia Creek	Sediment	Mar-May	0.5	437	437	2,763	Imp	437	2,326	84	Mg/year
Cassia Creek	Nutrients	Mar-May	0.5	4.32	0.86	8.42	0.43	3.02	5.40	64	kg/day
Cassia Creek	Bacteria	Mar-May	0.5	576	41	937	58	477	460	49	col/100 ml
Fall Creek	Nutrients	May-Oct	0.03	0.13	0.05	0.29	0.01	0.06	0.23	78	kg/day
Fall Creek	Bacteria	May-Oct	0.03	576	84	1114	58	434	680	61	col/100 ml
Lake Fork Creek	Nutrients	May-Oct	0.04	0.17	0.07	0.27	0.02	0.09	0.18	68	kg/day
Sublett Creek Upper	Nutrients	May-Oct	0.11	0.48	0.19	0.39	0.05	0.24	0.15	39	kg/day

[a] m^3/s = cubic meters per second. [b] imp = implicit. [c] kg/day = kilograms per day, col/100 ml = colonies of bacteria per 100 milliliters, kwh/m^2/day = kilowatt hours per square meter per day, Mg/year = metric tons per year.

Creek and two additional sites on Almo Creek were established. However, only one site was monitored on the Raft River, the site downstream of the confluence with Edwards Creek. All four of the sites that were monitored both years (1999-2000 and 2004-2005) showed a load reduction in total suspended solids (TSS) ranging from 44 per cent to 69 per cent (Clawson, 2005). Additional BMPs were installed on Edwards and Little Cove Creeks in the fall of 2005, and installation of two major sprinkler systems on irrigated land along the Raft River in the Narrows was begun in December 2005. Because of this, IASCD will continue monitoring during the 2006 irrigation season. Maps showing the locations of structures installed and monitoring sights are included as Figures 7 and 8.

Threatened and Endangered Species

There are only two federally listed aquatic plants and animals that will be influenced by the TMDL. They are the spotted frog (*Rana luteiventris*) and the Ute ladies' tresses (*Spiranthes diluvalis*). The spotted frog can be found in and near streams, lakes, marshes, and ponds. The Ute ladies' tresses may be found in wet meadows, along riparian zones, and in other wetlands (Lay, 2004). Any conservation planning will need to address potential endangered species mitigation efforts, if applicable.

Animal Feeding Operations and Dairies

Three feedlots and seven dairies are located within the Raft River Watershed. One dairy and one feedlot could have an impact on water quality within the lowest reach of the Raft River, but only during high water years. A small dairy on the upper part of Raft River possibly could impact water quality, but again, only during high water years. Current regulations allow zero discharge to a water body from dairies, animal feeding operations (AFOs), and concentrated animal feeding operations (CAFOs). However, there are several landowners within the watershed who have corrals adjacent to streams. The NRCS has been working with some of these landowners over the past five years to relocate corrals away from water bodies. Similar efforts will continue as part of this TMDL implementation plan. To summarize, animal feeding operations and dairies currently have minimal impact on water quality within the Raft River Watershed.

Critical Areas

Areas of agricultural land that contribute excessive pollutants to water bodies are defined as "critical areas" for BMP implementation. Critical areas are prioritized 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. Agricultural critical areas in all of the listed stream segments within the Raft River Subbasin include the following:

- Unstable and erosive streambanks
- Areas of severe gully erosion
- Sheet and rill erosion areas on dry cropland
- Areas where livestock have access to streams and riparian areas
- Areas generating irrigation induced erosion, including erosion caused by irrigation return flows into streams

Critical areas are those areas in which treatment is considered necessary to address resource concerns affecting water quality. In this implementation plan, the acres of critical areas coincide with the acres of each treatment unit. NRCS personnel assisted in determining criteria to define each treatment unit (Combs, 2005). The categories are described in Table XIII and shown in Figures 10-15. A map showing land use categories of all private land is shown in Figure 9.

Table XIII. Treatment Units: Acreage Summary and Resource Concerns

Treatment Unit #1 Dry Cropland 0-8% Slopes

Total Acres	Soils	Resource Problems
14049	Silt Loam	Sheet and rill erosion
		Tillage pan forms if soils are excessively cultivated
		Soil condition (organic matter depletion)
		Surface water quality (suspended sediment)

Treatment Unit #2 Dry Cropland >8% slopes

Total Acres	Soils	Resource Problems
6679	Silt Loam	Sheet and rill erosion
		Tillage pan forms if soils are excessively cultivated
		Soil condition (organic matter depletion).
		Surface water quality (suspended sediment)
		Classic and Ephemeral gully erosion

Treatment Unit #3 Other Agriculture Land (pivot corners, feed stack yards, corrals, rural home sites)

Total Acres	Soils	Resource Problems
8256	Silt Loam & Calcixerollic Xerocherpt (7%)	Wind erosion
		Soil condition (compaction)
		Soil condition – contaminants (animal waste)
		Plant condition (noxious and invasive plants)

Treatment Unit #4 Permanent Pasture / Hayland

Total Acres	Soils	Resource Problems
17371	Silty loams to gravelly sands. Slopes 1 to 5% for pasture; may be up to 7% for hay.	Inefficient water use on irrigated land
		Soil condition (compaction)
		Gully & streambank erosion from irrigation return flows

Treatment Unit #5 Rangeland

Total Acres	Soils	Resource Problems
98793	Stony & Gravelly Silt Loam	Plant productivity-health, vigor; noxious/invasive plants
		Low available water capacity, rocky and rough terrain

Treatment Unit #6 & #7 Riparian

Acres by stream	Soils	Resource Problems
Raft River :656	Stony & Gravelly Silt Loam	Stream dewatering from irrigation diversions. Gully erosion caused by irrigation return flows. Loss of riparian vegetation.
Cassia Creek: 342	Loam, Silt Loam, & Gravelly Loam	Unstable banks in lower reaches. Stream dewatering from irrigation diversions in lowest reaches.

Treatment Unit #8 Gravity Irrigation

Total Acres	Soils	Resource Problems
11371	Stony & Gravelly Silt Loam	Furrow erosion. Gully erosion caused by irrigation return flows.

IMPLEMENTATION PRIORITY

Methodology, Rationale, and Treatment Units

Determining treatment units within the Raft River Watershed focused on land use, slope, soil erodibility factors, and land capability class for all categories except riparian. NRCS Guidance Documents for Resource Management Systems (Field Office Technical Guide, Section III) were used to determine recommended practices to address the resource concerns. The guides were selected for Common Resource Area numbers 11.9, 13.6, and 25.7 (see map, Appendix A). Detailed land use inventory work was done using interpretations from the NAIP 2004 aerial photographs combined with ground truthing of many areas and interviewing various landowners and operators within the watershed. Dry cropland and pasture/hayland determinations were based on land capability class greater than 4, and slopes greater than 6 per cent. Rangeland determinations took into consideration range sites suitable for grazing (as indicated by the soil survey), and land capability class greater than 4, with slopes greater than 6 per cent. Land enrolled in the CRP program was not considered necessary for treatment. Land irrigated with sprinklers was generally not considered necessary for treatment, but it is acknowledged that irrigation induced erosion can occur with sprinkler erosion. All resource concerns will be evaluated on a site-specific basis with individual landowners. Gravity irrigated lands within the watershed for the most part consist of acreage adjacent to creeks and rivers. All gravity irrigated land was considered necessary for treatment.

Riparian treatment units were based on riparian assessments of stream reaches with water. These assessments were conducted from 2002 through 2004 by personnel from NRCS, IASCD, and ISCC. Treatment recommendations were also based on prior extensive survey work done in 1998 through 2000 by personnel from NRCS, the East Cassia SWCD, and the Idaho Soil Conservation Commission (Ferguson, 2001). Personnel from DEQ assisted with riparian assessments of Cassia Creek.

Table A-1 in Appendix A shows recommended practices and costs by treatment unit. The total estimated cost for all practices is $16,403,553.

Alternatives

Implementation alternatives range from no action, to implementation of all practices identified for the delineated treatment units. Over the past five years, the East Cassia Soil and Water Conservation District has taken an active role in promoting conservation efforts through programs such as EQIP (NRCS), EPA 319, and the Water Quality Program for Agriculture (WQPA) administered by the ISCC. With willing landowners and operators who voluntarily participate in these programs, both structural and management practices can be implemented on range ground, as well as dry cropland, irrigated cropland, and pasture. An emphasis will be placed on low-till and no-till dry farm practices. Where possible, riparian and stream channel restoration efforts will continue.

FUNDING

Financial and technical assistance for installation of BMPs is needed to ensure success of this implementation plan. There are many potential sources for funding that will be actively pursued by the East Cassia SWCD to implement water quality improvements on private agricultural and grazing lands. These sources include (but are not limited to):

CWA 319 projects refer to section 319 of the Clean Water Act. These are Environmental Protection Agency funds that are allocated to states. The Idaho Department of Environmental Quality has primacy to administer 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: Idaho Department of Environmental Quality.

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

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

Conservation Improvement Grants are administered by the Idaho Soil Conservation Commission. http://www.scc.state.id.us/programs.htm

Agricultural Management Assistance (AMA): 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. http://www.nrcs.usda.gov/programs/ama/

Conservation Reserve Program (CRP): 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. http://www.nrcs.usda.gov/programs/crp/

Conservation Technical Assistance (CTA): 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. This is provided through your 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. http://www.nrcs.usda.gov/programs/eqip/

Wetlands Reserve Program (WRP): 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. 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. http://www.nrcs.usda.gov/programs/whip/

SRF State Revolving Loan Funds are administered through the Idaho Soil Conservation commission. http://www.scc.state.id.us/programs.htm

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

CSP Conservation Security Program is a voluntary program that rewards the Nation's premier farm and ranch land conservationists who meet the highest standards of conservation environmental management.   More details can be found at http://www.nrcs.usda.gov

GLCI Grazing Land Conservation Initiative 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.   http://www.glci.org/

Stewardship projects The U.S. Army Corps of Engineers conducts these projects to improve wildlife habitat. Source: US Army Corps of Engineers.

NOAA Restoration Center Community-Based Restoration Funding source for habitat restoration for listed species. Source: NOAA

Research/supplementation Idaho Department of Fish and Game, and U.S. Fish and Wildlife Service work. Source: Bonneville Power Administration.

New RME Estimated for actions to address data gaps and research needs. Source: Idaho Department of Fish and Game.

Many of these programs could be used in combination with each other to implement BMPs.

OUTREACH

The East Cassia SWCD works closely with NRCS, IASCD, and ISCC to inform farmers and ranchers about conservation practices that can benefit their farming and ranching operations, as well as improve the environment. Newspaper articles, district newsletters, project tours, demonstration projects, and formal and informal landowner/operator meetings have been conducted as part of this outreach effort. These activities will continue during the implementation efforts.

MONITORING AND EVALUATION

On an individual farm/ranch level, status reviews are (and will be) conducted annually with those operators who have active conservation contracts to install BMPs. The effectiveness of these BMPs will be evaluated periodically by personnel from NRCS, IASCD, and ISCC. The NRCS has a web based Performance Reporting System for reporting applied practices, and the ISCC has a tracking program in place for conservation programs administered by the State of Idaho.

On a watershed level, the IASCD, in cooperation with the Idaho Department of Agriculture has an active water quality monitoring program, as previously mentioned. Streams within the Almo subwatershed and a portion of the Raft River in the Narrows will continue to be sampled through the remainder of the 2006 irrigation season. Future IASCD monitoring plans include sampling of Cassia Creek to test BMP effectiveness of stream restoration practices and offsite watering facilities that have been recently installed.

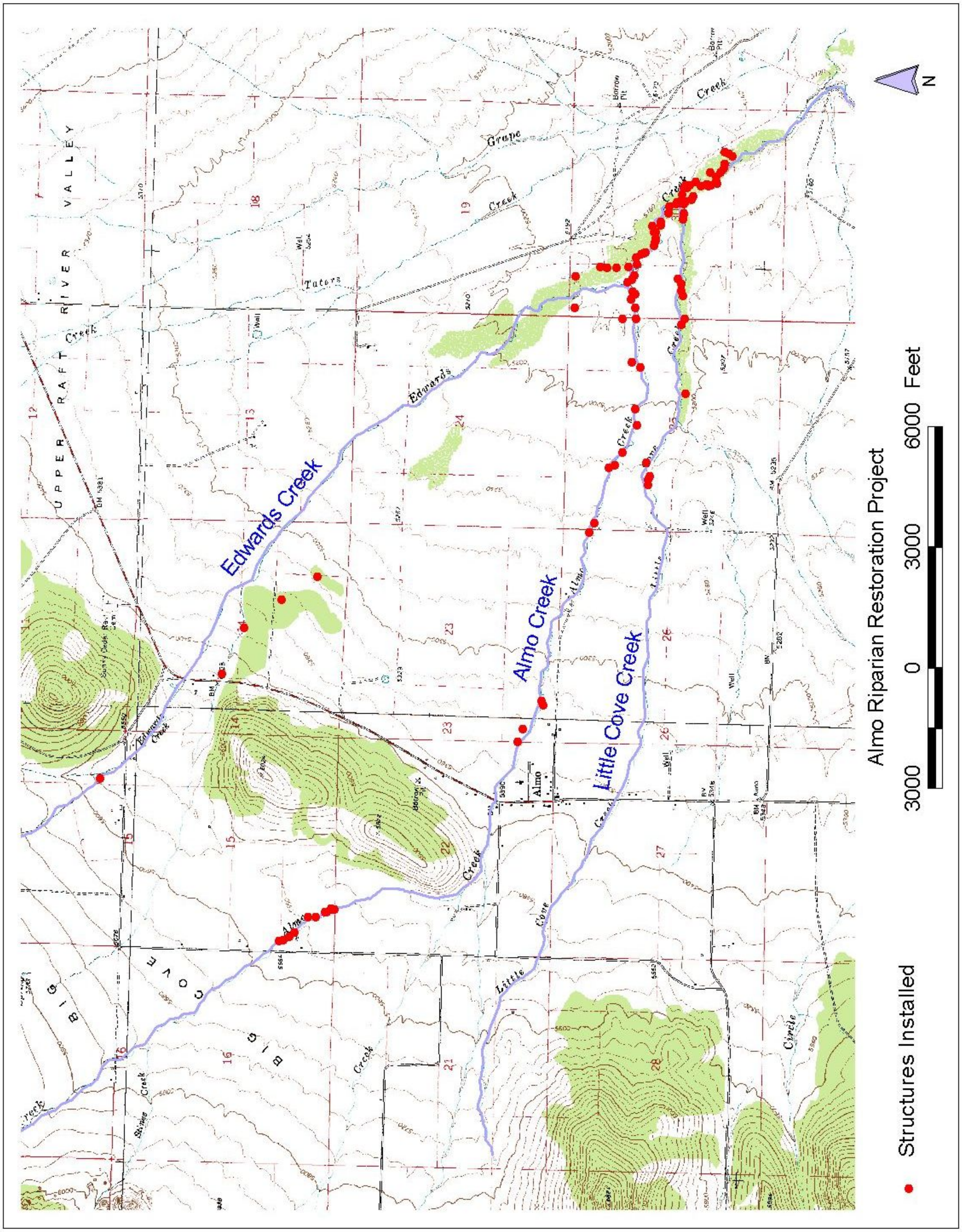

Edwards Creek
Almo Creek
Little Cove Creek
Structures Installed
Almo Riparian Restoration Project
3000
0
3000
6000 Feet
N
UPPER RAFT RIVER VALLEY
BIG COVE

Figure 7

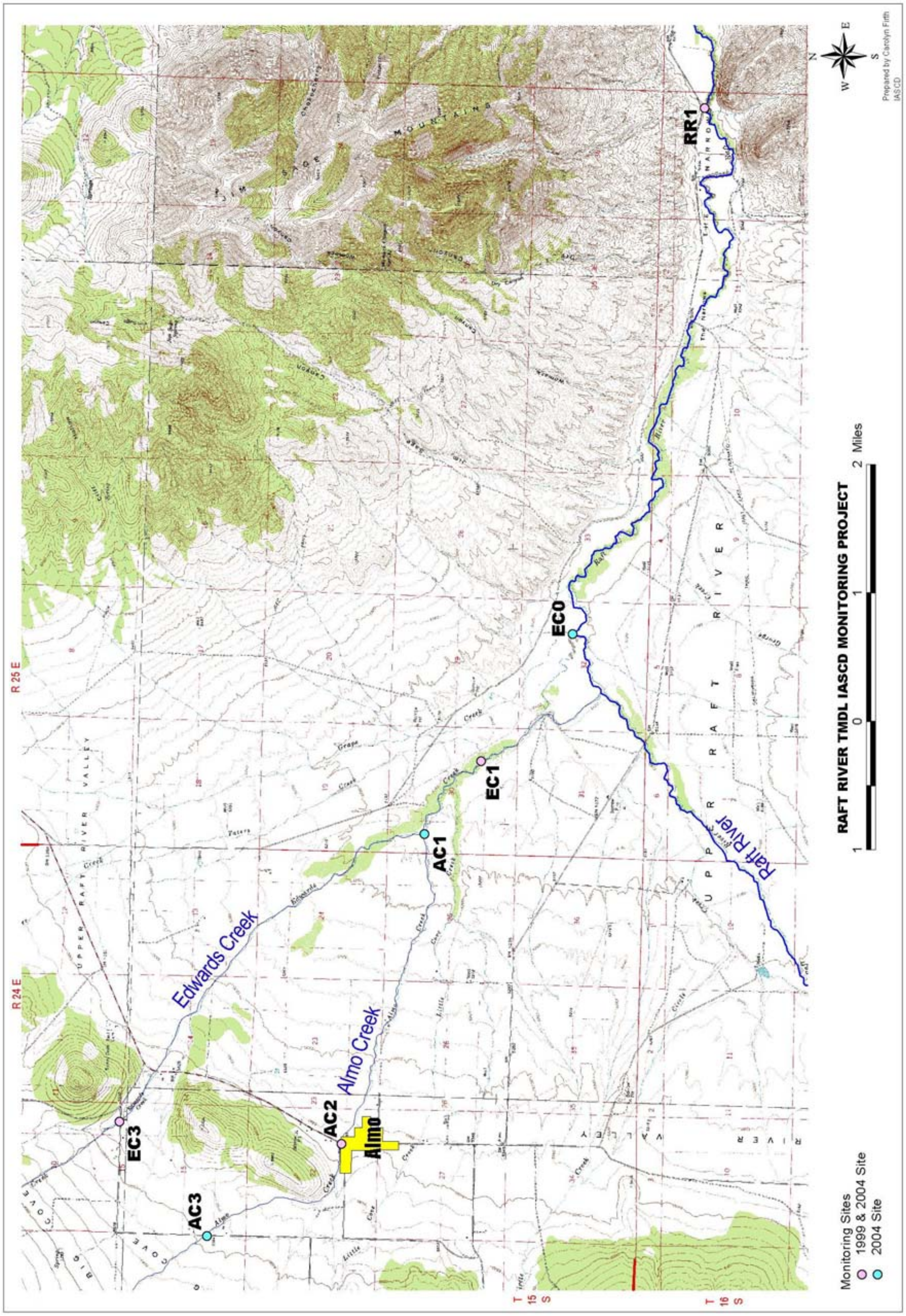

RAFT RIVER TMDL IASCD MONITORING PROJECT
Monitoring Sites
1999 & 2004 Site
2004 Site
Prepared by Carolyn Firth IASCD
1
0
1
2 Miles
N
E
S
W
R 24 E
R 25 E
T 15 S
T 16 S
EC3
AC3
AC2
Almo
Almo Creek
Edwards Creek
AC1
EC1
EC0
RR1
Raft River

Figure 8

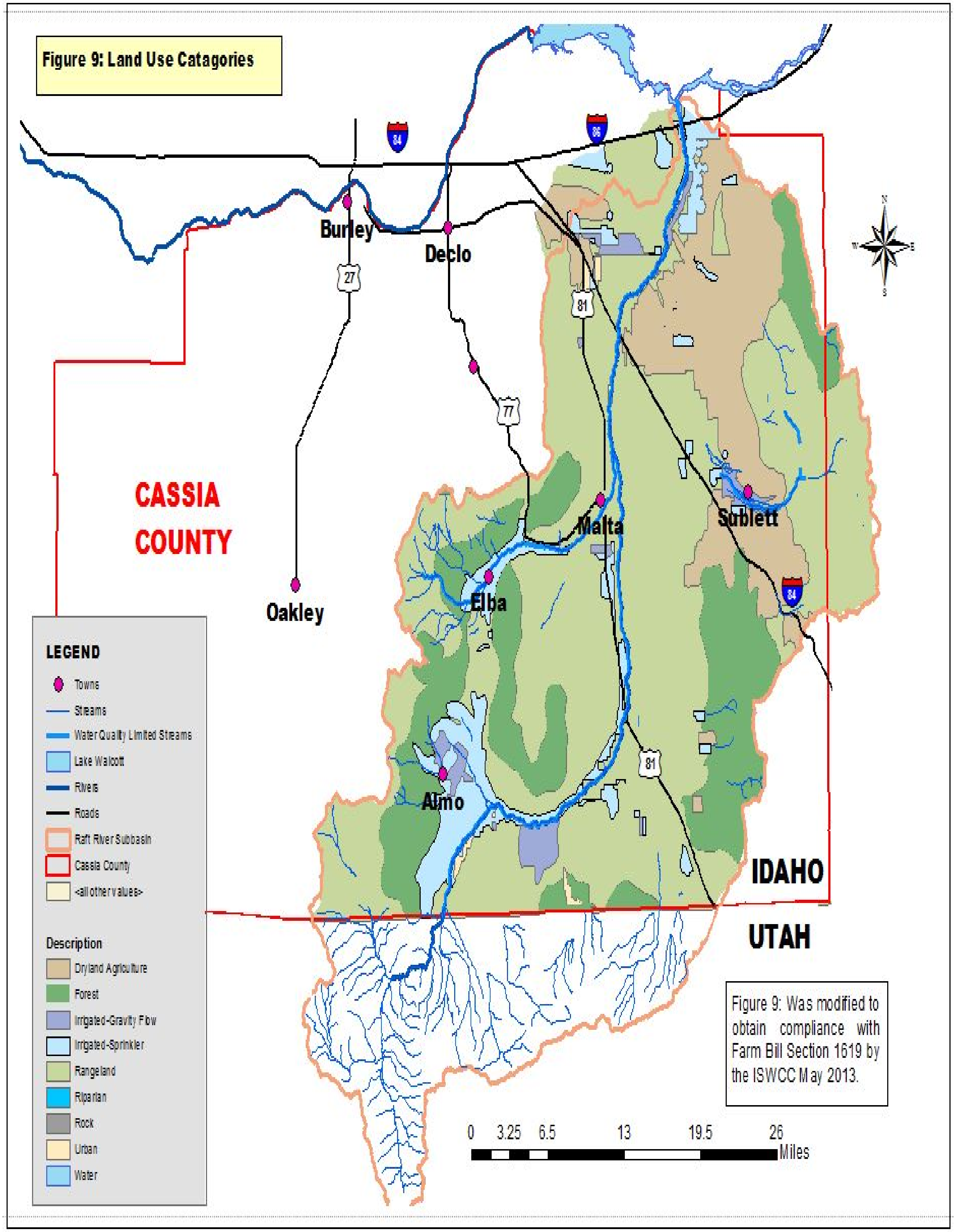


Figure 9: Land Use Catagories
Burley
Declo
Oakley
Elba
Malta
Sublett
Almo
CASSIA
COUNTY
IDAHO
UTAH
LEGEND
Towns
Streams
Water Quality Limited Streams
Lake Walcott
Rivers
Roads
Raft River Subbasin
Cassia County
<all other values>
Description
Dryland Agriculture
Forest
Irrigated-Gravity Flow
Irrigated-Sprinkler
Rangeland
Riparian
Rock
Urban
Water
Figure 9: Was modified to obtain compliance with Farm Bill Section 1619 by the ISWCC May 2013.
0 3.25 6.5 13 19.5 26
Miles

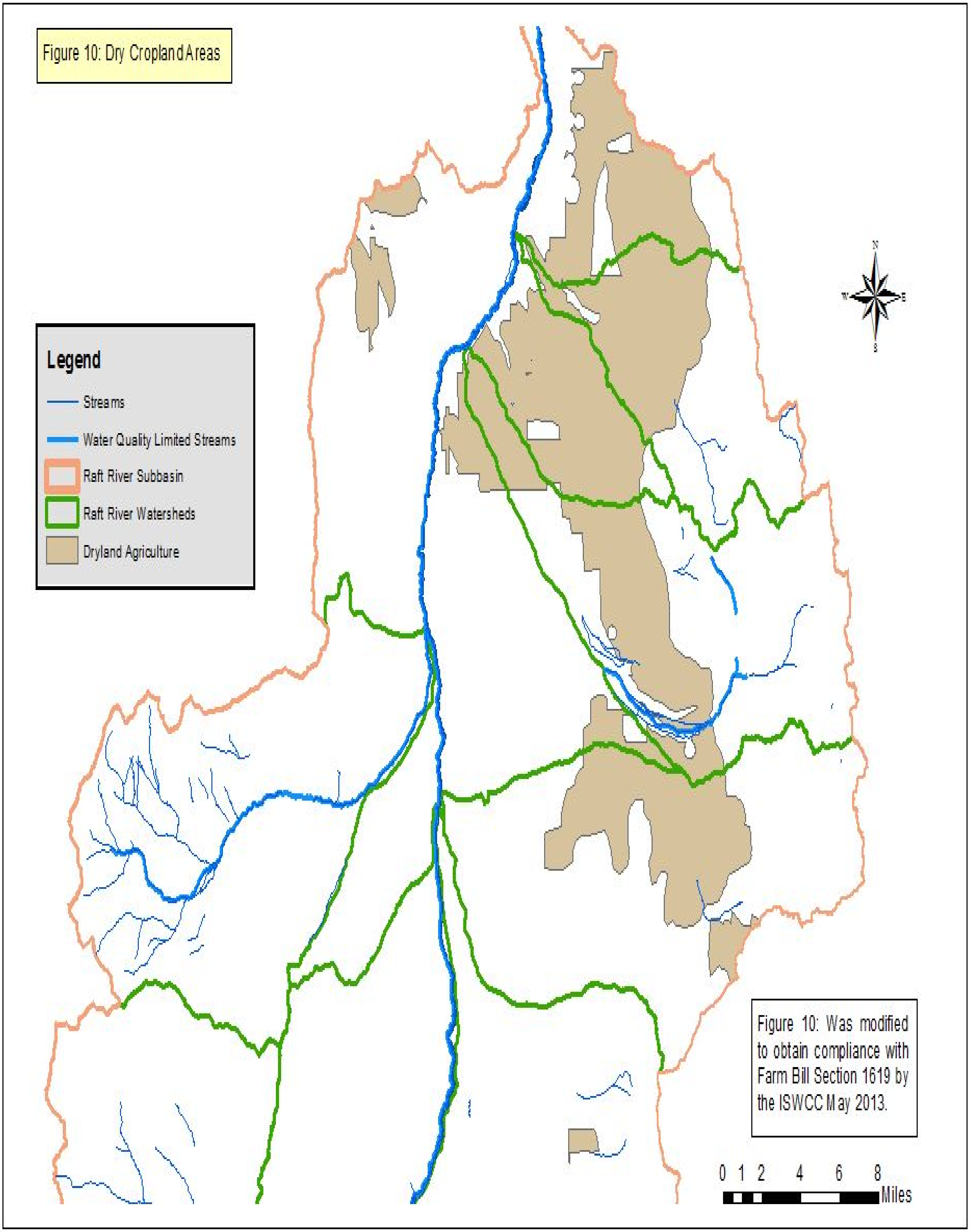


Figure 10: Dry Cropland Areas
Legend
Streams
Water Quality Limited Streams
Raft River Subbasin
Raft River Watersheds
Dryland Agriculture
Figure 10: Was modified to obtain compliance with Farm Bill Section 1619 by the ISWCC May 2013.
0 1 2 4 6 8
Miles

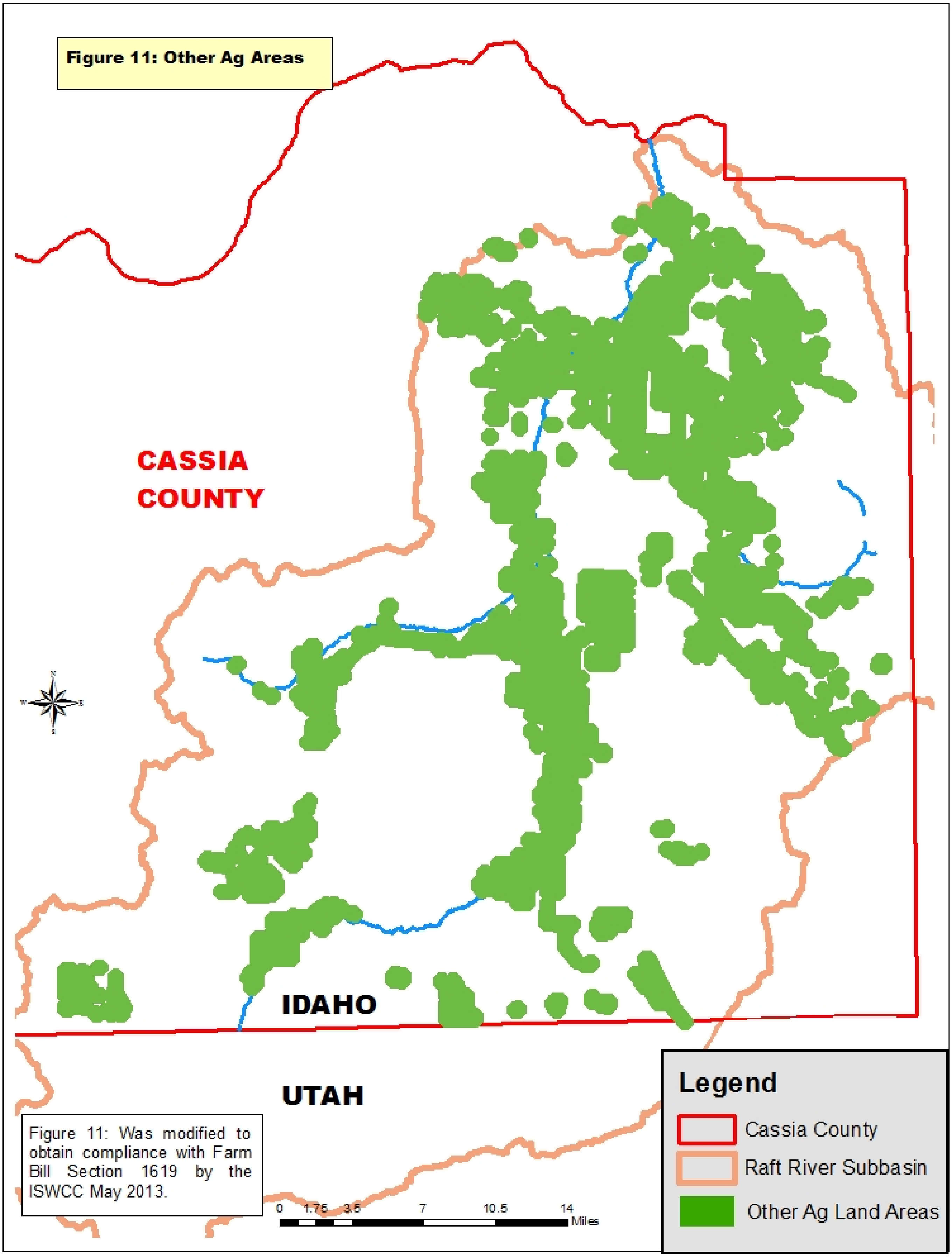


Figure 11: Other Ag Areas
CASSIA
COUNTY
IDAHO
UTAH
Figure 11: Was modified to obtain compliance with Farm Bill Section 1619 by the ISWCC May 2013.
0 1.75 3.5 7 10.5 14
Miles
Legend
Cassia County
Raft River Subbasin
Other Ag Land Areas

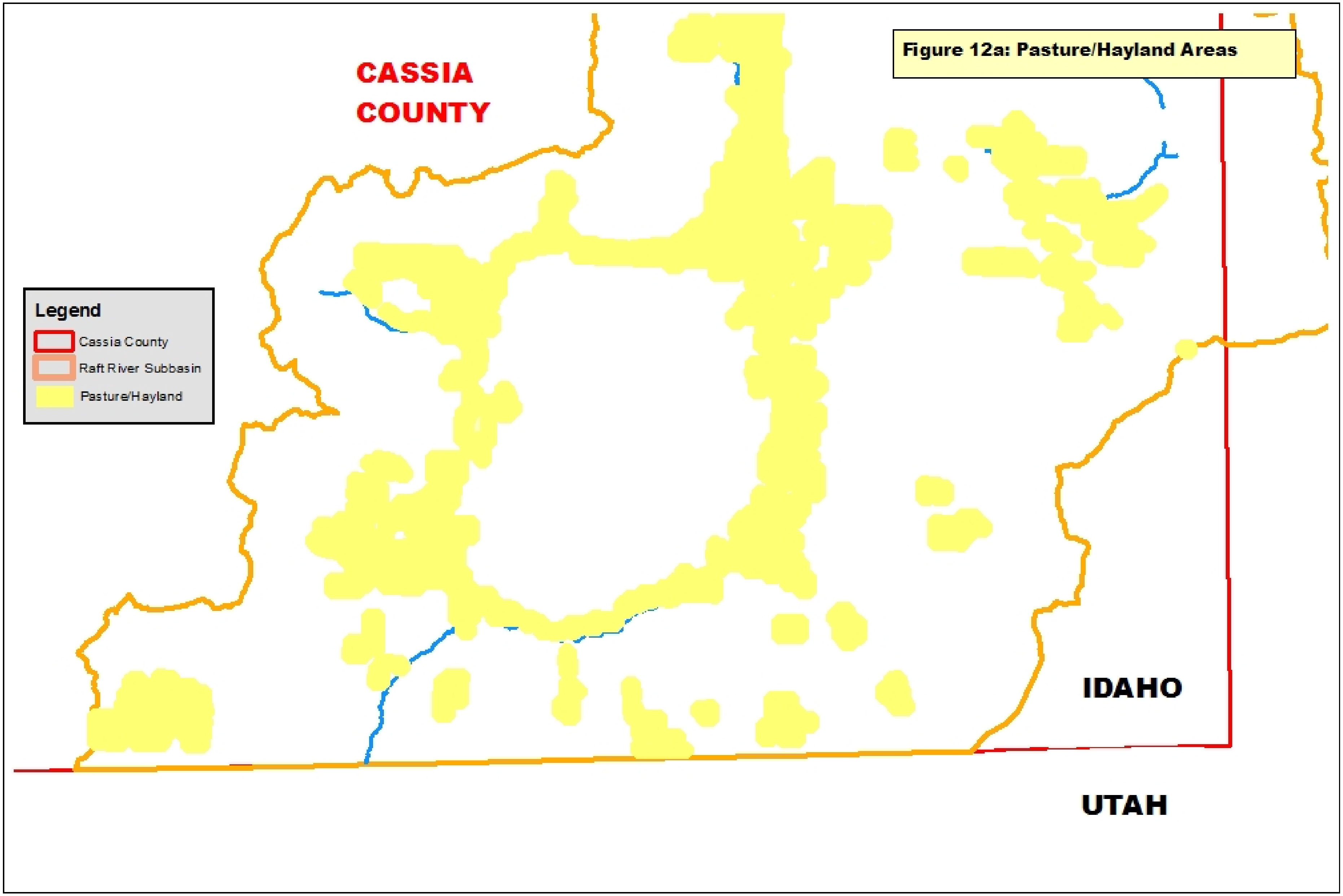


Figure 12a: Was modified to obtain compliance with Farm Bill Section 1619 by the ISWCC May 2013.

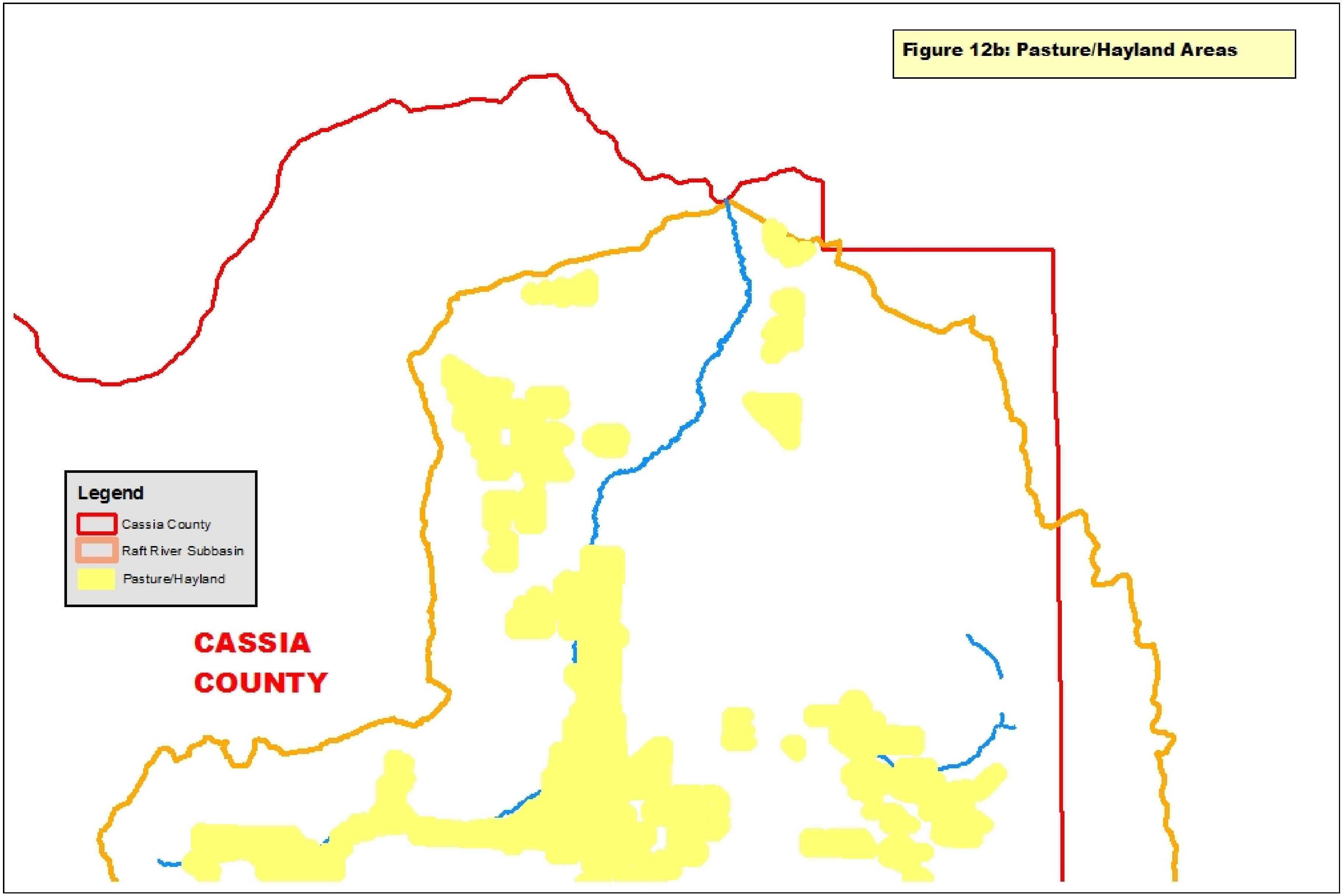


Figure 12b: Was modified to obtain compliance with Farm Bill Section 1619 by the ISWCC May 2013.

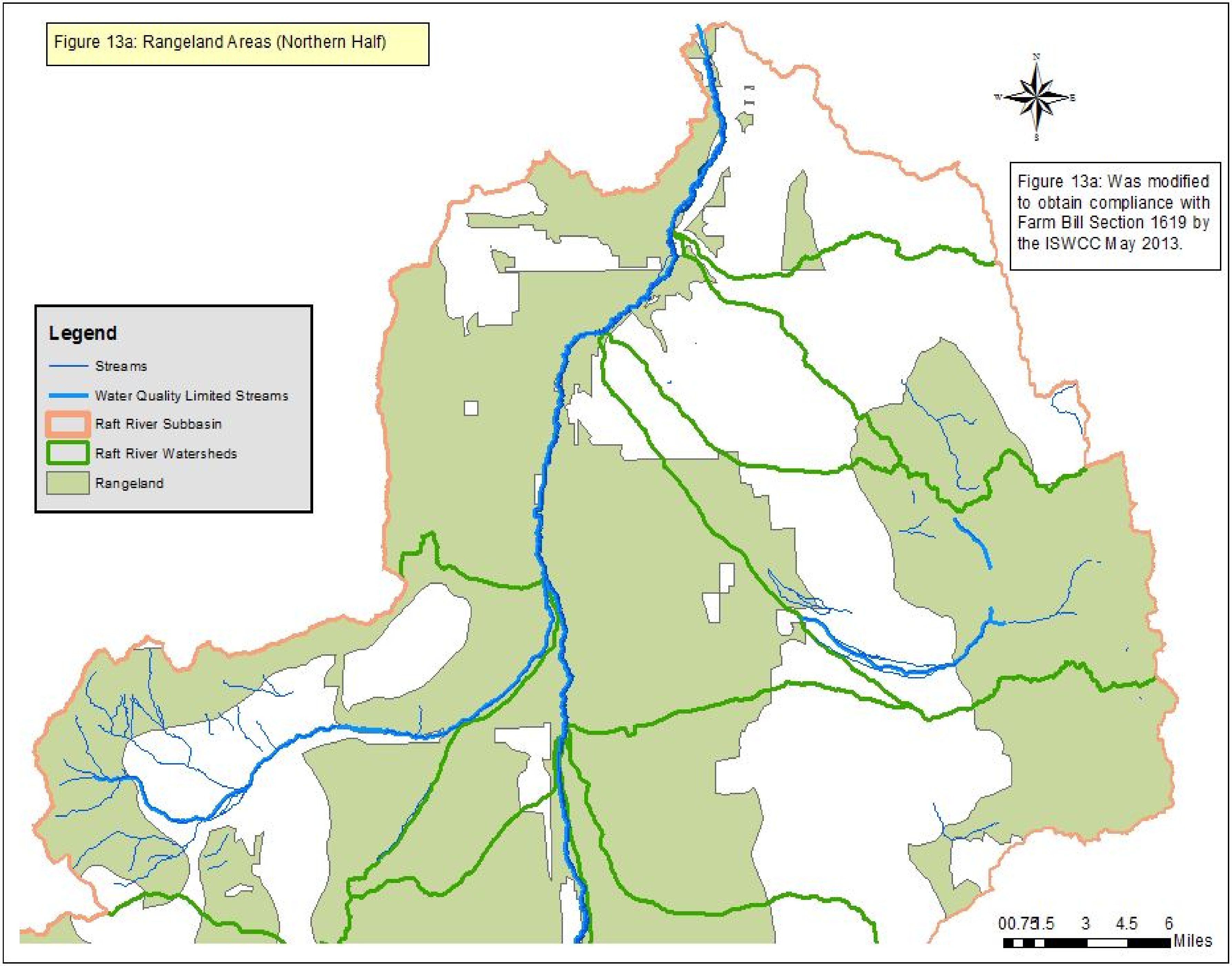


Figure 13a: Rangeland Areas (Northern Half)

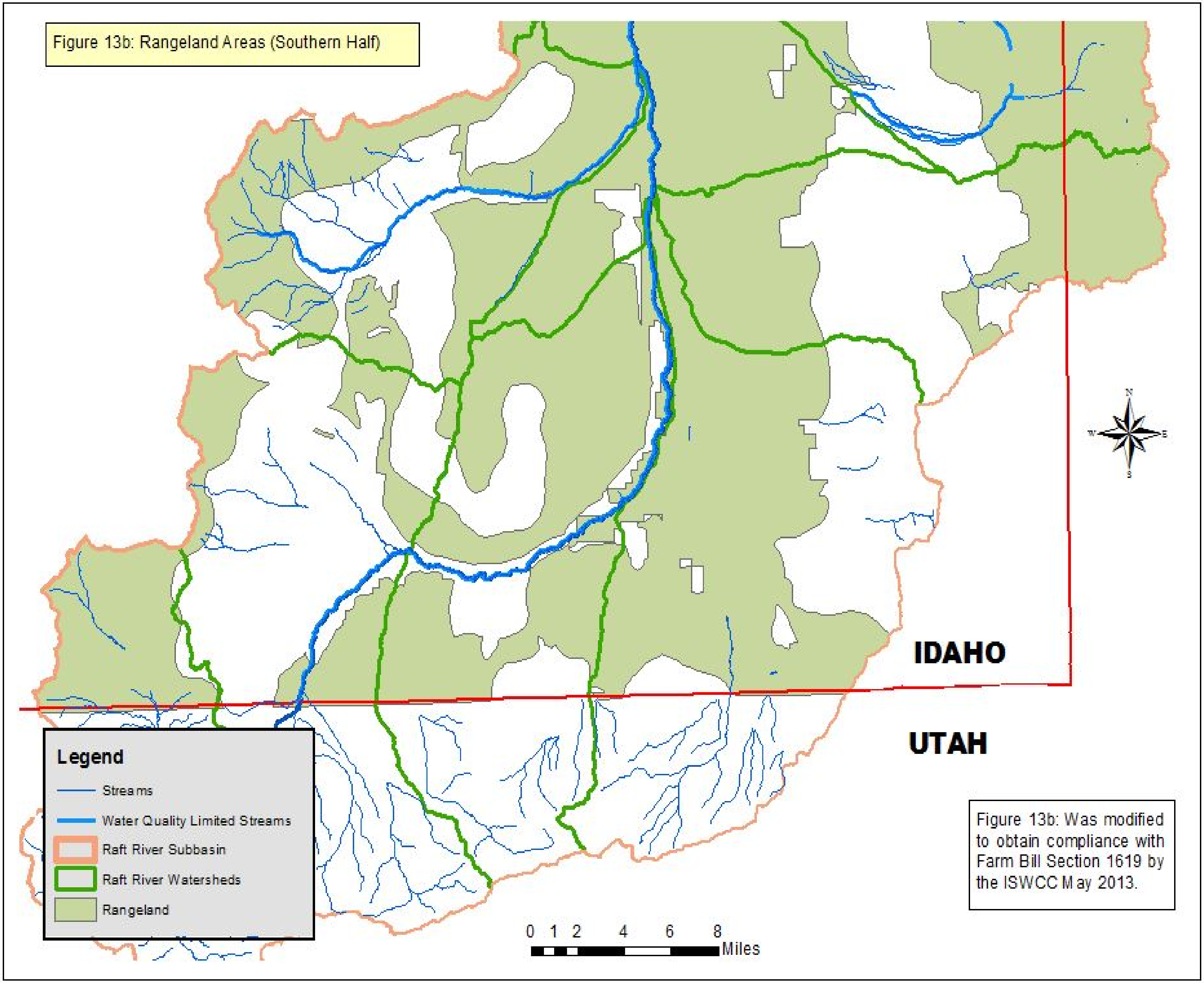


Figure 13b: Rangeland Areas (Southern Half)

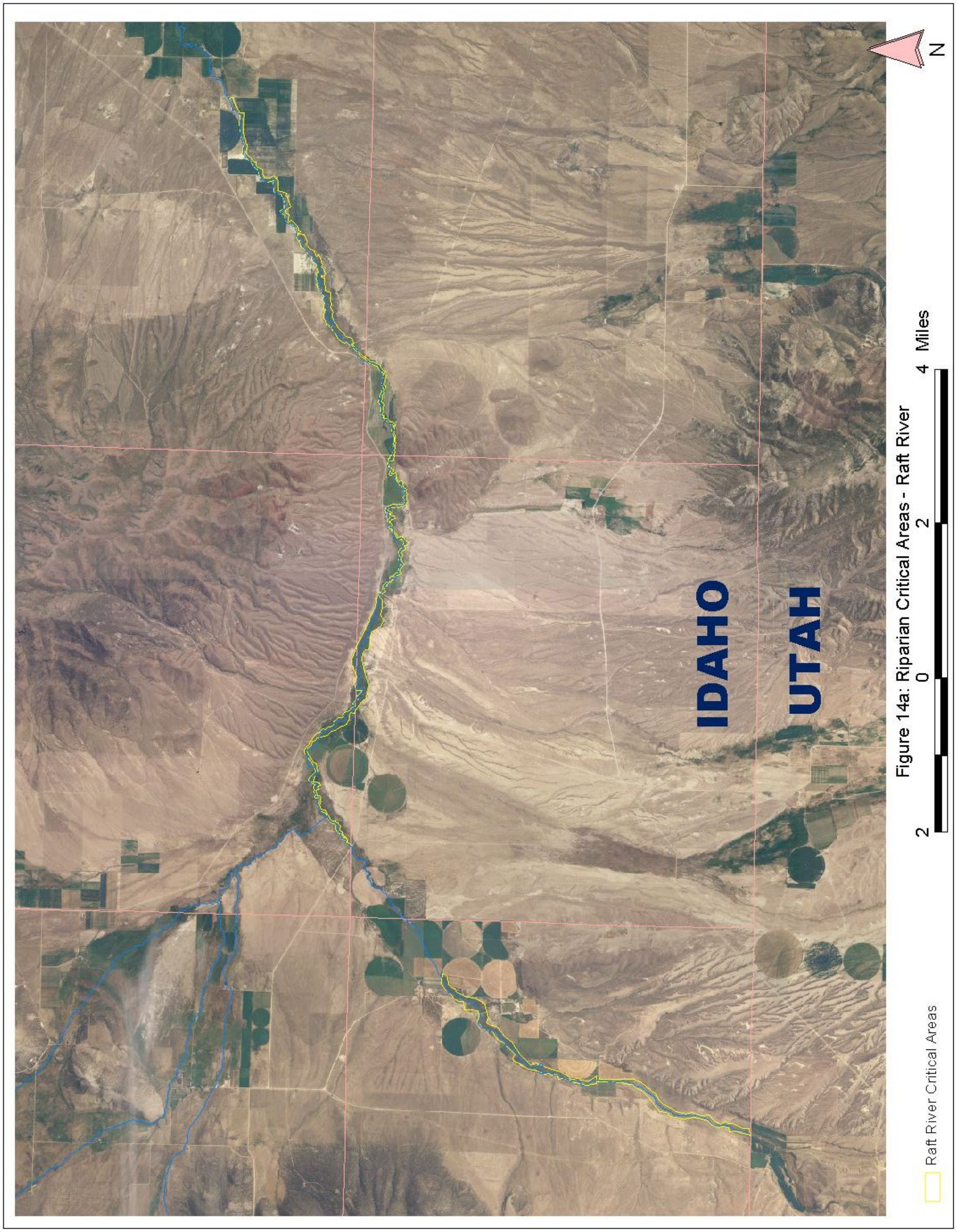


Figure 14a: Riparian Critical Areas - Raft River

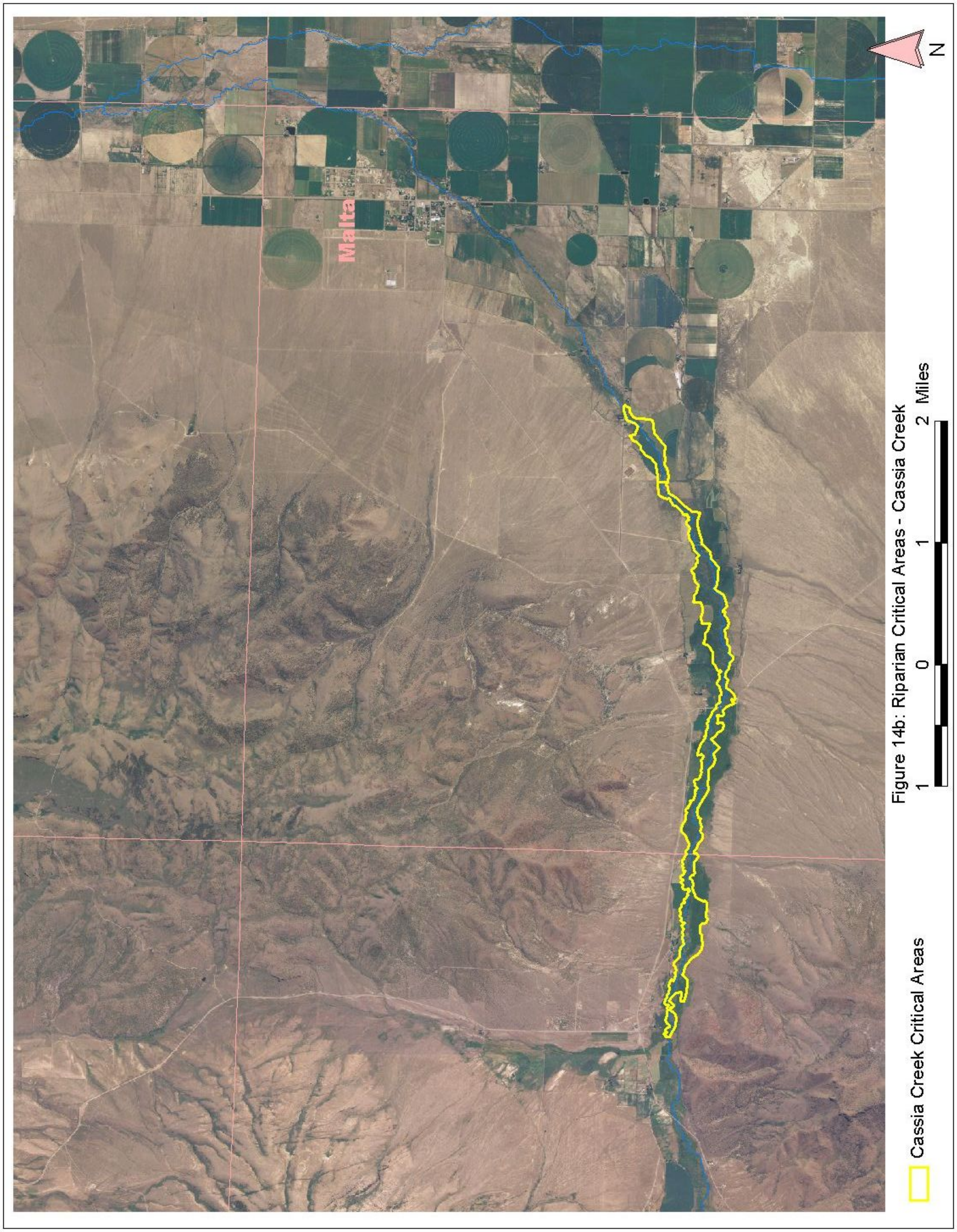


Figure 14b: Riparian Critical Areas - Cassia Creek

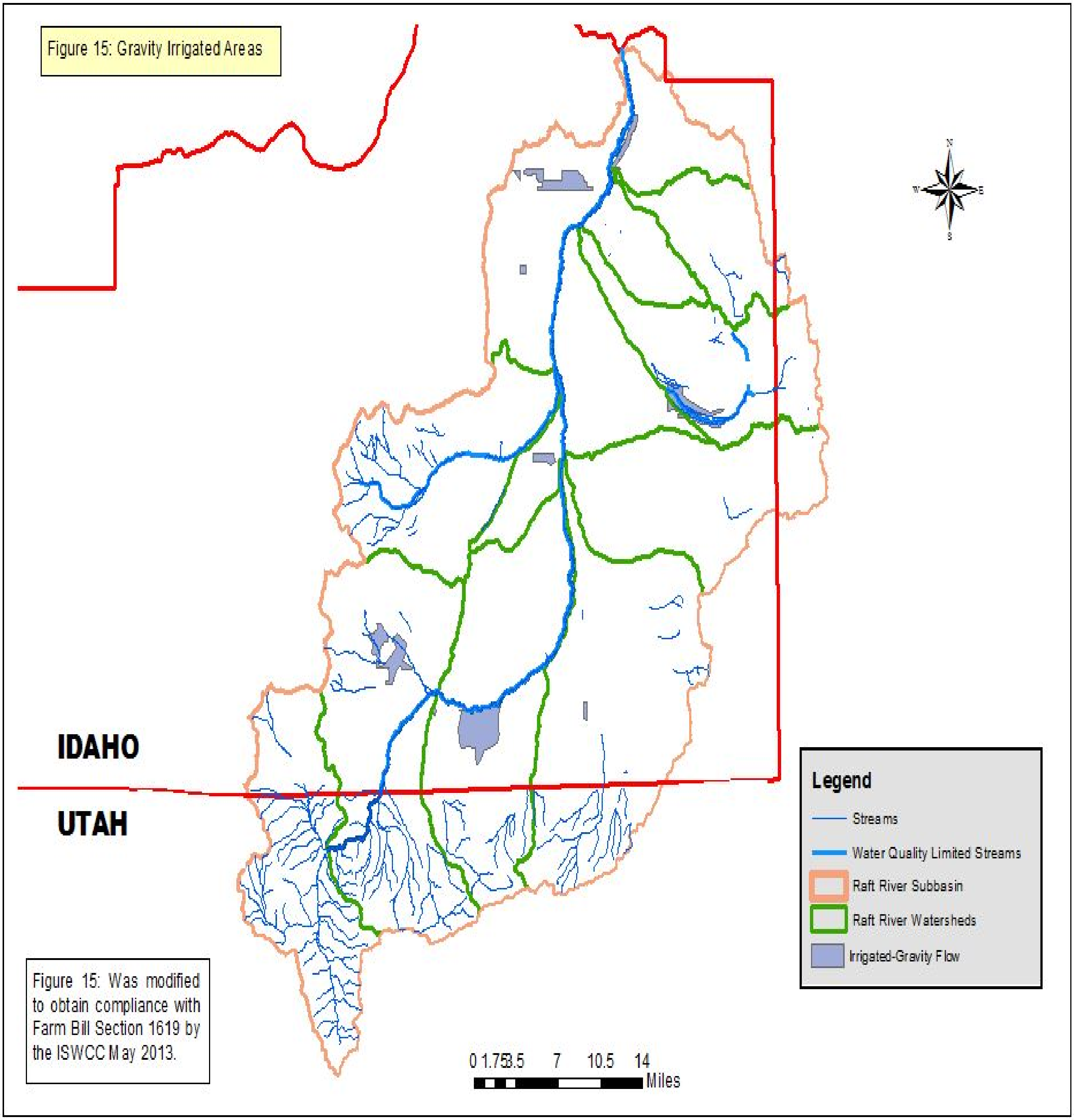


Figure 15: Gravity Irrigated Areas
IDAHO
UTAH
Legend
Streams
Water Quality Limited Streams
Raft River Subbasin
Raft River Watersheds
Irrigated-Gravity Flow
0 1.75 3.5 7 10.5 14
Miles
Figure 15: Was modified to obtain compliance with Farm Bill Section 1619 by the ISWCC May 2013.

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APPENDICES