

This is a digital document from the collections of the *Wyoming Water Resources Data System (WRDS) Library*.

For additional information about this document and the document conversion process, please contact WRDS at wrd@uwyo.edu and include the phrase “**Digital Documents**” in your subject heading.

To view other documents please visit the WRDS Library online at:
<http://library.wrds.uwyo.edu>

Mailing Address:

Water Resources Data System
University of Wyoming, Dept 3943
1000 E University Avenue
Laramie, WY 82071

Physical Address:

Wyoming Hall, Room 249
University of Wyoming
Laramie, WY 82071

Phone: (307) 766-6651

Fax: (307) 766-3785

Funding for WRDS and the creation of this electronic document was provided by the Wyoming Water Development Commission
(<http://wwdc.state.wy.us>)

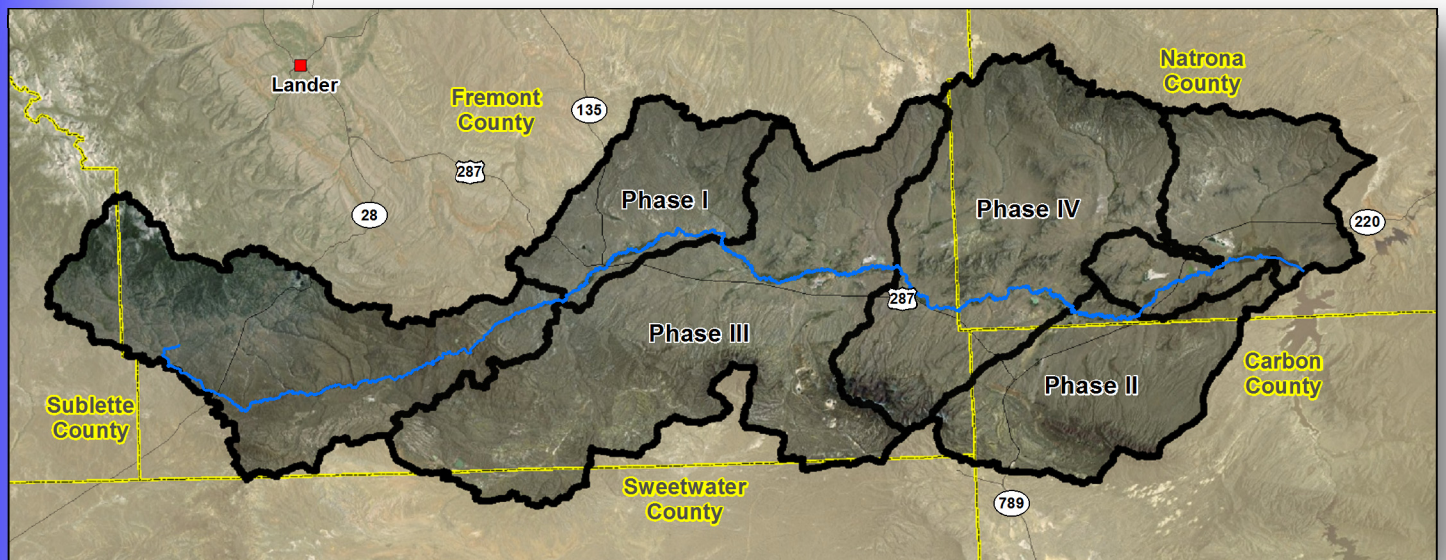
EXECUTIVE SUMMARY

SWEETWATER RIVER WATERSHED STUDY

LEVEL I

Prepared For:

Wyoming Water Development Commission
6920 Yellowtail Road
Cheyenne, WY 82002



Prepared By:

Anderson Consulting Engineers, Inc.
375 E. Horsetooth Rd. Bldg. 5
Fort Collins, CO 80525
(ACE Project No. WYWDC26)



ANDERSON CONSULTING ENGINEERS, INC.

Civil • Water Resources • Environmental

EXECUTIVE SUMMARY

SWEETWATER RIVER WATERSHED STUDY
LEVEL I

Prepared for:

Wyoming Water Development Commission
6920 Yellowtail Road
Cheyenne, WY 82002

Prepared by:

Anderson Consulting Engineers, Inc.
375 E. Horsetooth Road, Bldg. 5
Fort Collins, CO 80525
(ACE Project No. WYWDC26)

April 20, 2012

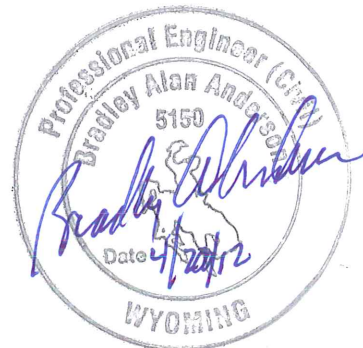


TABLE OF CONTENTS

I. INTRODUCTION 1
II. PROJECT PURPOSE AND OBJECTIVES 1
III. PROJECT MANAGEMENT..... 1
IV. WATERSHED INVENTORY 1
V. WATERSHED MANAGEMENT PLAN..... 3
VI. PERMITS 3
VII. FUNDING 3
VIII. CONCLUSIONS 3

LIST OF FIGURES

Figure 1. Sweetwater River Watershed: Location Map 2

LIST OF TABLES

Table 1. Sweetwater River Watershed Management Plan: Irrigation 4
Table 2. Sweetwater River Watershed Management Plan: Livestock/
Wildlife Upland Watering Opportunities 5
Table 3. Sweetwater River Watershed Management Plan: Stream Channel Rehabilitation /
Stabilization Projects..... 7

I. INTRODUCTION

In 2005 the Popo Agie Conservation District (PACD) requested funding from the Wyoming Water Development Commission (WWDC) for the completion of a watershed management plan for the Sweetwater River watershed. The intent was to have a comprehensive watershed inventory completed which identified issues related to land use and water resources and to then develop a plan addressing those issues. The WWDC approved funding for the project and Anderson Consulting Engineers, Inc. (ACE) was ultimately contracted in June, 2006 to complete the project. Figure 1 shows the general location of the watershed within the State of Wyoming.

II. PROJECT PURPOSE AND OBJECTIVES

The primary goal of this Level I Study is to combine all existing data with data collected and generated from this study to form a comprehensive Watershed Management and Rehabilitation Plan. The purpose and objectives of the proposed project are itemized below:

- *Facilitate consensus building among the Advisory Committee, the Conservation District, landowners and the Wyoming Water Development Commission.*
- *Facilitate public participation.*
- *Conduct an evaluation and description of the Sweetwater River watershed, including quantity and quality of surface water resources, and riparian/upland conditions.*
- *Conduct a geomorphic investigation of the primary channels within the watershed and identify potential mitigation measures to improve impaired channel reaches.*
- *Conduct an irrigation system inventory and develop a rehabilitation plan for those ditches expressing an interest to participate.*
- *Conduct an evaluation of water storage needs and opportunities to augment water available for livestock and wildlife.*
- *Develop a watershed management plan which identifies problem areas within the watershed and proposes practical economic solutions.*
- *Identify permits easements and clearances necessary for plan implementation.*
- *Develop cost estimates for improvements.*
- *Complete an economic analysis and evaluate alternative sources of funding.*

III. PROJECT MANAGEMENT

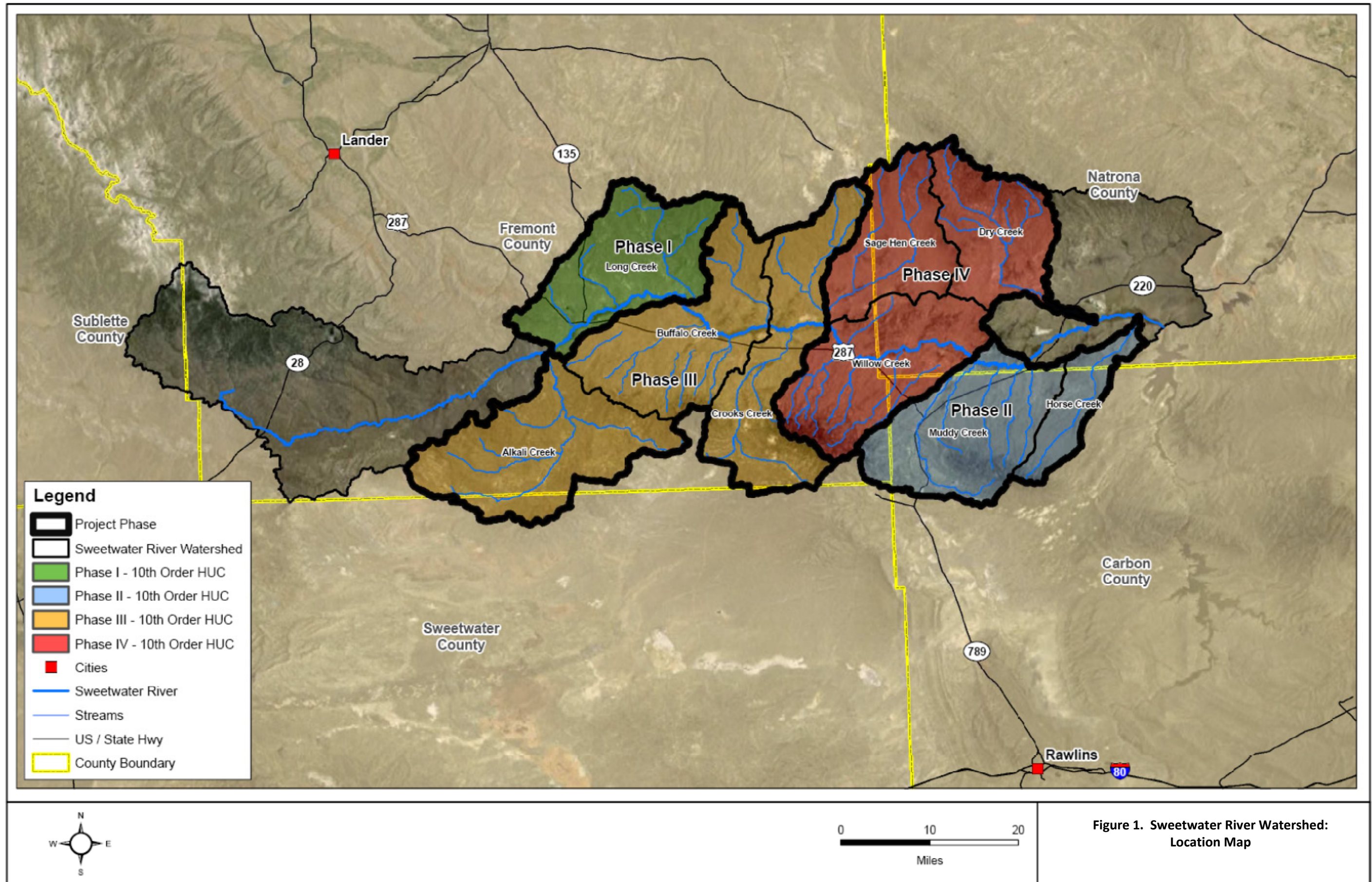
Due to the vast extent of the Sweetwater River watershed and the range of conditions found within it, as well as varying level of interest and willingness to participate among stakeholders, it was determined that ACE would focus upon the development of watershed management plans at the subwatershed level. This strategy was selected to promote stakeholder participation and the development of plans more detailed and practical than would be afforded at the larger scale.

Four phases of the project were ultimately completed which focused a subwatershed approach that ranged in areal extent from one to three of the 10th order Hydrologic Units defined by the United States Geologic Survey (Figure 1). A fifth phase entitled "Sweetwater River Watershed Study: Basin-wide Summary" was completed which summarizes the results of the individual phases as well as characterizing the resources of the entire Sweetwater River watershed.

IV. WATERSHED INVENTORY

The watershed inventory phase of the project involved the collection of information pertaining to a wide range of watershed characteristics, including geology, hydrology, soils, climate, plant communities, wildlife habitat, infrastructure, irrigation, stream channel conditions, and upland range conditions. The objective of the inventory phase was to gather the information necessary to identify resource-related issues and to develop specific remediation options and watershed improvement projects.

The results of the data collection efforts were incorporated into a comprehensive Geographic Information System (GIS). Spatial data pertaining to the project study area was collected from a wide range of sources. Agencies providing information included the State of Wyoming, USDI Bureau of Land Management, Wyoming Game and Fish Department, Fremont County, Natrona County, Sweetwater County, the USDA Natural Resources Conservation Service, and others. A significant amount of the spatial data was also specifically developed during the course of this investigation.



V. WATERSHED MANAGEMENT PLAN

A watershed management plan was developed which incorporates recommended projects in each of the various disciplines investigated:

- Project Components "I": Irrigation system rehabilitation components
- Project Components "L/W": Livestock / wildlife upland watering opportunities
- Project Components "R": Reservoir storage opportunities
- Project Components "G": Grazing management opportunities
- Project Components "S": Stream channel stability components
- Project Components "O": Other management opportunities

These improvements focus on potential mitigation of several key issues that presently exist within the watershed. The plan is summarized in Tables 1 through 3. Table 1 tabulates the irrigation system rehabilitation components of the plan. Table 2 tabulates the livestock / wildlife upland watering opportunities and Table 3 presents the stream channels identified as benefiting from stabilization / rehabilitation effort.

VI. PERMITS

Many of the potential projects described in this plan will be subject to the National Environmental Policy Act (NEPA) and other federal environmental regulations administered by federal agencies such as the EPA, Bureau of Land Management (BLM), Army Corps of Engineers (COE), and/or the U.S. Fish and Wildlife Service (FWS). The Wyoming agencies which may have environmental, land use, and other regulatory approval requirements include, but are not necessarily limited to the Department of Environmental Quality (WDEQ), State Engineer's Office (WSEO), State Historic Preservation Officer (SHPO), Board of Land Commissioners through the State Lands and Investments Board (SLIB), and Game and Fish Department (WGFD).

Approximately 74.5 percent (2,176 square miles) are federally owned and are managed by the BLM. Consequently, coordination with BLM will be required for most projects. BLM would consequently be the lead agency for NEPA related permitting efforts. Depending upon the project location, coordination would be required with the Lander, Rawlins, or Casper Field Office.

VII. FUNDING

Project funding/financing is a critical aspect associated with the implementation of watershed improvement projects. Given the scope of the investigation and the perceived projects which may be pursued (irrigation infrastructure improvements, wildlife/stock watering, stream/riparian corridor rehabilitation, and "other" related water-resource projects), there may be a large variety of funding sources which may be available to provide funding for future watershed improvements.

The Popo Agie Conservation District, the Saratoga-Encampment Conservation District, or the Natrona County Conservation District would serve as sponsor for those funding mechanisms requiring a sponsoring entity. For example, the WWDC's Small Water Project Program (SWPP) funds sponsored projects defined as providing multiple benefits where the total estimated project costs (including construction, permitting, construction engineering, and land procurement) are less than \$100,000 or where WWDC's maximum financial contribution is 50 percent of project costs or twenty-five thousand dollars (\$25,000), whichever is less. SWPP funding is a "one-time" grant so that ongoing operation and maintenance costs are not included. Loans are not available under SWPP.

By combining funding from additional sources (i.e., NRCS EQIP funding), total costs can be reduced or potentially eliminated for the landowner.

VIII. CONCLUSIONS

Upon completion of the watershed inventory phase of the project, the project team developed several watershed management plans. The plans were developed based upon findings of an inventory phase, a series of public meetings, questionnaires, and interaction with the project steering committee. Key issues and problems were within the watershed identified and ultimately, project goals and objectives were formulated and improvements subsequently developed to address them.

Table 1. Sweetwater River Watershed Management Plan: Irrigation.

Item	Rehabilitation Item Number	Description	Priority	Construction Cost	Engineering (10%)	Construction and Engineering Subtotal	Contingency (15%)	Total Construction Cost	Final Plans and Specs	Permitting / Legal Fees / Acces and Rights of Way	Total Project Cost
Phase I Irrigation System Components											
J.M. Brown Ditch East (Corbett)											
1	Phase I: I-1	Diversion Structure	1	\$18,000	\$1,800	\$19,800	\$3,000	\$22,800	\$3,000	\$2,000	\$27,800
2	Phase I: I-2	Install 2-ft Parshall flume	2	\$2,000	\$200	\$2,200	\$300	\$2,500	\$500		\$3,000
3	Phase I: I-3	Install 10-inch farm turnout headgates (5)	2	\$10,000	\$1,000	\$11,000	\$1,700	\$12,700	\$1,800		\$14,500
4	Phase I: I-4	Install 3-ft wide check structures (3)	2	\$6,000	\$600	\$6,600	\$1,000	\$7,600	\$2,000		\$9,600
5	Phase I: I-5	Install 24-inch underdrain culverts (4)	2	\$8,000	\$800	\$8,800	\$1,300	\$10,100	\$3,000		\$13,100
6	Phase I: I-6	Install 8-inch gated pipe (app. 3,000 LF)	2	\$1,000	\$100	\$1,100	\$200	\$1,300	\$1,000		\$2,300
7	Phase I: I-7	Install approx. 300 feet 18-inch PIP at seepage location	2	\$4,000	\$400	\$4,400	\$700	\$5,100	\$1,600		\$6,700
J.M. Brown Ditch West (Corbett)											
8	Phase I: I-8	Install diversion structure in creek	1	\$18,000	\$1,800	\$19,800	\$3,000	\$22,800	\$3,000	\$2,000	\$27,800
9	Phase I: I-9	Install 2-ft Parshall flume	2	\$2,000	\$200	\$2,200	\$300	\$2,500	\$500		\$3,000
10	Phase I: I-10	Install 10-inch farm turnout headgates (3)	2	\$6,000	\$600	\$6,600	\$1,000	\$7,600	\$1,800		\$9,400
11	Phase I: I-11	Install 3-ft wide check structures (3)	2	\$6,000	\$600	\$6,600	\$1,000	\$7,600	\$2,000		\$9,600
12	Phase I: I-12	Install 8-inch gated pipe (app. 1,200 LF)	3	\$4,000	\$400	\$4,400	\$700	\$5,100	\$1,000		\$6,100
Russell Ditch											
13	Phase I: I-13	Replace existing slide gate with 48-inch slide gate	1	\$6,000	\$600	\$6,600	\$1,000	\$7,600	\$2,000		\$9,600
14	Phase I: I-14	Install 2-ft Parshall flume	2	\$3,000	\$300	\$3,300	\$500	\$3,800	\$500		\$4,300
Independent Ditch											
15	Phase I: I-15	Remove existing headgate/install 36-inch diameter slide gate/concrete structure	1	\$10,000	\$1,000	\$11,000	\$1,700	\$12,700	\$2,000		\$14,700
16	Phase I: I-16	Install 2-ft Parshall flume	2	\$3,000	\$300	\$3,300	\$500	\$3,800	\$500		\$4,300
Graham and Farnsley Ditch											
17	Phase I: I-17	Remove existing headgate/install 36-inch diameter slide gate/concrete	1	\$4,000	\$400	\$4,400	\$700	\$5,100	\$2,000		\$7,100
18	Phase I: I-18	Install 2-ft Parshall flume	2	\$3,000	\$300	\$3,300	\$500	\$3,800	\$500		\$4,300
Jacob Ditch Headgate											
19	Phase I: I-19	Install 24-inch diameter slide gate/concrete headwall	1	\$8,000	\$800	\$8,800	\$1,300	\$10,100	\$2,000		\$12,100
20	Phase I: I-20	Install 2-ft Parshall flume	2	\$3,000	\$300	\$3,300	\$500	\$3,800	\$500		\$4,300
21	Phase I: I-21	Clear vegetation and sediment from Jacob Ditch	2	\$4,000	\$400	\$4,400	\$700	\$5,100	\$0		\$5,100
Koehler Ditch											
22	Phase I: I-22	Remove existing headgate/install 24-inch diameter slide gate/concrete	1	\$8,000	\$800	\$8,800	\$1,300	\$10,100	\$2,000		\$12,100
23	Phase I: I-23	Install 2-ft Parshall flume	2	\$3,000	\$300	\$3,300	\$500	\$3,800	\$500		\$4,300
National Ditch											
24	Phase I: I-24	Streambank stabilization (J-hook vanes / cross vane weir)	1	\$75,000	\$7,500	\$82,500	\$12,400	\$94,900	\$2,000	\$3,000	\$99,900
25	Phase I: I-25	Install 2-ft Parshall flume	2	\$3,000	\$300	\$3,300	\$500	\$3,800	\$500		\$4,300
Phase II Irrigation System Components											
Hays Ditch											
26	Phase II: I-01	Install diversion structure	1	\$12,000	\$1,200	\$13,200	\$1,980	\$15,180	\$2,500	\$500	\$18,180
27	Phase II: I-02	Install 2-ft Parshall flume	2	\$3,000	\$300	\$3,300	\$495	\$3,795	\$500	\$0	\$4,295
28	Phase II: I-03	Install approx. 1,000 ft 12-inch PIP	2	\$7,000	\$700	\$7,700	\$1,155	\$8,855	\$2,000	\$0	\$10,855
29	Phase II: I-04	Realign Ditch	2	\$4,000	\$400	\$4,400	\$660	\$5,060	\$500	\$0	\$5,560
30	Phase II: I-05	Install 12-inch farm turnout headgate	2	\$2,000	\$200	\$2,200	\$330	\$2,530	\$500	\$0	\$3,030
31	Phase II: I-06	Install 3-ft wide check structure	2	\$2,000	\$200	\$2,200	\$330	\$2,530	\$500	\$0	\$3,030
32	Phase II: I-07	Install 8-inch gated pipe (app. 3,000 LF)	3	\$10,000	\$1,000	\$11,000	\$1,650	\$12,650	\$1,000	\$0	\$13,650
Mahoney / Marsh Ditches											
33	Phase II: I-08	Marsh Irrigating Ditch: Install diversion structure in Muddy Ck.	1	\$12,000	\$1,200	\$13,200	\$1,980	\$15,180	\$2,500	\$500	\$18,180
34	Phase II: I-09	Install three Parshall Flumes (18-inch) on ungaged ditches	2	\$9,000	\$900	\$9,900	\$1,485	\$11,385	\$500	\$0	\$11,885
35	Phase II: I-10	Monitor rebuilt spillway	1	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
36	Phase II: I-11	Clear vegetation from selected ditch reaches	1	\$3,000	\$300	\$3,300	\$495	\$3,795	\$0	\$0	\$3,795
Whiskey Creek / Dexter Ditches											
37	Phase II: I-12	Dexter Ditch: Install headgate	1	\$4,000	\$400	\$4,400	\$660	\$5,060	\$250	\$500	\$5,810
38	Phase II: I-13	Whiskey Ditch No. 1: Install headgate	1	\$4,000	\$400	\$4,400	\$660	\$5,060	\$0	\$0	\$5,060
39	Phase II: I-14	Whiskey Ditch No. 2: Install headgate	1	\$4,000	\$400	\$4,400	\$660	\$5,060	\$0	\$0	\$5,060
Phase III Irrigation System Components											
Point of Rocks Ditch Diversion Structure											
40	Phase III: I-1	Install rock weir structure in Sweetwater River	1	\$120,000	\$12,000	\$132,000	\$19,800	\$151,800	\$250	\$4,000	\$156,050
41	Phase III: I-2	Install 2-ft Parshall flume at diversion structure	2	\$3,000	\$300	\$3,300	\$495	\$3,795	\$250	\$0	\$4,045
Phase IV Irrigation System Components											
McIntosh-Beaton Ditch Diversion Structure											
42	Phase IV: I-1	Install rock weir structure in Sweetwater River	1	\$120,000	\$12,000	\$132,000	\$19,800	\$151,800	\$250	\$4,000	\$156,050
43	Phase IV: I-2	Install 2-ft Parshall flume at diversion structure	3	\$3,000	\$300	\$3,300	\$495	\$3,795	\$250	\$0	\$4,045
Cranor Ditch Rehabilitation											
44	Phase IV: I-3	Rehabilitate Cranor Ditch failure	1	\$12,000	\$1,200	\$13,200	\$1,980	\$15,180	\$250	\$2,000	\$17,430
45	Phase IV: I-4	Install 2-ft Parshall flume at diversion structure	3	\$3,000	\$300	\$3,300	\$495	\$3,795	\$250	\$0	\$4,045

Table 2. Sweetwater River Watershed Management Plan: Livestock / Wildlife Upland Watering Opportunities.

Phase I Wildlife / Livestock Water Supply Alternatives										
Recommended Alternative	Description	Priority	Total Construction Cost	Engineering (10%)	Construction and Engineering Subtotal	Contingency (15%)	Total Construction Cost	Final Plans and Specs	Permitting / Legal Fees / Access	Total Project Cost
Phase I: L/W 01	East Fork Long Creek Wells Project	2	\$60,700	\$6,070	\$66,770	\$10,016	\$76,786	\$2,000	\$2,000	\$80,786
Phase I: L/W 02	East Fork Long Creek Reservoirs Project	2	\$62,040	\$6,204	\$68,244	\$10,237	\$78,481	\$5,000	\$5,000	\$88,481
Phase I: L/W 03	Divide Well Project	2	\$90,250	\$9,025	\$99,275	\$14,891	\$114,166	\$3,000	\$2,000	\$119,166
Phase I: L/W 04	Grieve Well Pipeline Project	2	\$162,600	\$16,260	\$178,860	\$26,829	\$205,689	\$3,000	\$3,000	\$211,689
Phase I: L/W 05	Elkhorn Spring Pipeline Project	2	\$84,600	\$8,460	\$93,060	\$13,959	\$107,019	\$2,000	\$2,000	\$111,019
Phase I: L/W 06	Spring Run Rehabilitation Project	2	\$11,000	\$1,100	\$12,100	\$1,815	\$13,915	\$2,000	\$2,000	\$17,915
Phase I: L/W 07	East Fork Long Creek Solar Pump Project	2	\$57,340	\$5,734	\$63,074	\$9,461	\$72,535	\$2,000	\$2,000	\$76,535
Phase I: L/W 08	East Fork Long Creek Reservoir Reconstruction	2	\$44,750	\$4,475	\$49,225	\$7,384	\$56,609	\$7,000	\$15,000	\$78,609
Phase I: L/W 09	Long Creek Divide Well Project	2	\$63,290	\$6,329	\$69,619	\$10,443	\$80,062	\$3,000	\$2,000	\$85,062
Phase I: L/W 10	Plateau Well Project	2	\$34,890	\$3,489	\$38,379	\$5,757	\$44,136	\$3,000	\$2,000	\$49,136
Phase I: L/W 11	Liberty Draw Well	2	\$31,890	\$3,189	\$35,079	\$5,262	\$40,341	\$3,000	\$2,000	\$45,341
Phase I: L/W 12	School Section Well Project	2	\$31,890	\$3,189	\$35,079	\$5,262	\$40,341	\$3,000	\$2,000	\$45,341
Phase I: L/W 13	Koehler Draw Well Project	2	\$31,890	\$3,189	\$35,079	\$5,262	\$40,341	\$3,000	\$2,000	\$45,341
Phase I: L/W 14	Wildlife Guzzlers	2	\$30,000	\$3,000	\$33,000	\$4,950	\$37,950	\$1,000	\$1,000	\$39,950
Phase II Wildlife / Livestock Water Supply Alternatives										
Recommended Alternative	Description	Priority	Total Construction Cost	Engineering (10%)	Construction and Engineering Subtotal	Contingency (15%)	Total Construction Cost	Final Plans and Specs	Permitting / Legal Fees / Access	Total Project Cost
Phase II: L/W-01	Muddy Gap Spring	2	\$15,715	\$1,572	\$17,287	\$2,593	\$19,880	\$2,000	\$1,000	\$22,880
Phase II: L/W-02	McIntosh Well Enhancement	2	\$15,000	\$1,500	\$16,500	\$2,475	\$18,975	\$500		\$19,475
Phase II: L/W-03	Indian Creek Pipeline	2	\$31,256	\$3,126	\$34,382	\$5,157	\$39,539	\$2,000	\$1,000	\$42,539
Phase II: L/W-04	Muddy Creek Pipeline	2	\$28,412	\$2,841	\$31,253	\$4,688	\$35,941	\$2,000	\$1,000	\$38,941
Phase II: L/W-05	Ferris Mountain Well Construction	2	\$31,274	\$3,127	\$34,401	\$5,160	\$39,562	\$2,000	\$1,000	\$42,562
Phase II: L/W-06	Muddy Creek Spring Development	2	\$14,417	\$1,442	\$15,859	\$2,379	\$18,238	\$2,000	\$1,000	\$21,238
Phase II: L/W-07	Cress Creek Spring Rehabilitation	2	\$11,134	\$1,113	\$12,247	\$1,837	\$14,085	\$2,000	\$1,000	\$17,085
Phase II: L/W-08	UnNamed Spring Development	2	\$12,541	\$1,254	\$13,795	\$2,069	\$15,864	\$2,000	\$1,000	\$18,864
Phase II: L/W-09	Corral Creek Pipeline	2	\$39,914	\$3,991	\$43,905	\$6,586	\$50,491	\$2,000	\$1,000	\$53,491
Phase II: L/W-10	Murphrey Creek Pipeline	2	\$45,944	\$4,594	\$50,538	\$7,581	\$58,119	\$2,000	\$1,000	\$61,119
Phase II: L/W-11	Cherry/Pete Creek Pipeline	2	\$76,220	\$7,622	\$83,842	\$12,576	\$96,418	\$2,000	\$1,000	\$99,418
Phase II: L/W-12	Whiskey Creek Pipeline Extension	2	\$18,328	\$1,833	\$20,161	\$3,024	\$23,185	\$2,000	\$1,000	\$26,185
Phase II: L/W-13	Cherry/Whiskey Creek Pipeline	2	\$52,080	\$5,208	\$57,288	\$8,593	\$65,881	\$2,000	\$1,000	\$109,564
Phase II: L/W-14	Pete Creek Pipeline Extension	2	\$53,756	\$5,376	\$59,132	\$8,870	\$68,001	\$2,000	\$1,000	\$49,982
Phase II: L/W-15	Rush Creek Pipeline	2	\$43,182	\$4,318	\$47,500	\$7,125	\$54,625	\$2,000	\$1,000	\$57,625
Phase II: L/W-16	Pole Canyon Pipeline	2	\$60,252	\$6,025	\$66,277	\$9,942	\$76,219	\$3,000	\$1,000	\$80,219
Phase II: L/W-17	Annis Pipeline Phase I	2	\$73,280	\$7,328	\$80,608	\$12,091	\$92,699	\$2,000	\$1,000	\$95,699
	Annis Pipeline Phase II	2	\$54,944	\$5,494	\$60,438	\$9,066	\$69,504	\$2,000	\$1,000	\$72,504
Phase II: L/W-18	Mary's Well Pipeline	2	\$41,660	\$4,166	\$45,826	\$6,874	\$52,699	\$2,000	\$1,000	\$55,699
Phase II: L/W-19	Berra #3 Well Pipeline	2	\$31,479	\$3,148	\$34,627	\$5,194	\$39,821	\$2,000	\$1,000	\$42,821
Phase II: L/W-20	North Beefacre Well Replacement/Pipeline	2	\$67,644	\$6,764	\$74,408	\$11,161	\$85,570	\$3,000	\$1,000	\$89,570
Phase II: L/W-21	Wildlife Guzzlers	2	\$30,000	\$3,000	\$33,000	\$4,950	\$37,950	\$1,000	\$1,000	\$39,950

Table 2. Sweetwater River Watershed Management Plan: Livestock / Wildlife Upland Watering Opportunities (continued).

Phase III Wildlife / Livestock Water Supply Alternatives										
Recommended Alternative	Recommended Alternative	Priority	Total Construction Cost	Engineering (10%)	Construction and Engineering Subtotal	Contingency (15%)	Total Construction Cost	Final Plans and Specs	Permitting / Legal Fees / Access and	Total Project Cost
Phase III: L/W-01	BLM Recommendations: Cameco Well	2	\$10,180	\$1,018	\$11,198	\$1,680	\$12,878			\$12,878
Phase III: L/W-02	BLM Recommendations: Bare Ring Butte Well	2	\$10,180	\$1,018	\$11,198	\$1,680	\$12,878			\$12,878
Phase III: L/W-03	BLM Recommendations: Circle Bar Well	2	\$33,088	\$3,309	\$36,397	\$5,460	\$41,856			\$41,856
Phase III: L/W-04	BLM Recommendations: North Horse Track Well	2	\$33,088	\$3,309	\$36,397	\$5,460	\$41,856			\$41,856
Phase III: L/W-05	BLM Recommendations: Monument Well	2	\$33,088	\$3,309	\$36,397	\$5,460	\$41,856			\$41,856
Phase III: L/W-06	BLM Recommendations: Smiley Well	2	\$33,088	\$3,309	\$36,397	\$5,460	\$41,856			\$41,856
Phase III: L/W-07	BLM Recommendations: Granite Spring	2	\$7,362	\$736	\$8,098	\$1,215	\$9,313			\$9,313
Phase III: L/W-08	BLM Recommendations: Upper Ladysmith Spring	2	\$7,362	\$736	\$8,098	\$1,215	\$9,313			\$9,313
Phase III: L/W-09	BLM Recommendations: Lower Wager Meadows Spring	2	\$7,362	\$736	\$8,098	\$1,215	\$9,313			\$9,313
Phase III: L/W-10	BLM Recommendations: Twin Springs	2	\$7,362	\$736	\$8,098	\$1,215	\$9,313			\$9,313
Phase III: L/W-11	BLM Recommendations: Mud Spring	2	\$7,362	\$736	\$8,098	\$1,215	\$9,313			\$9,313
Phase III: L/W-12	BLM Recommendations: Fuzzy Reservoir	2	\$7,636	\$764	\$8,400	\$1,260	\$9,660			\$9,660
Phase III: L/W-13	Tank Improvement 4	2	\$7,500	\$750	\$8,250	\$1,238	\$9,488	\$250		\$9,738
Phase III: L/W-14	West Alkali Well Improvement Project	2	\$7,500	\$750	\$8,250	\$1,238	\$9,488	\$250	\$1,000	\$10,738
Phase III: L/W-15	Daley Lake Well Improvement Project	2	\$7,500	\$750	\$8,250	\$1,238	\$9,488	\$250	\$1,000	\$10,738
Phase III: L/W-16	Stampede Well Improvement	2	\$7,500	\$750	\$8,250	\$1,238	\$9,488	\$250	\$1,000	\$10,738
Phase III: L/W-17	Soda Lakes Well Improvement	2	\$9,542	\$954	\$10,496	\$1,574	\$12,071	\$500	\$1,000	\$13,571
Phase III: L/W-18	Fletcher Gap Well Improvement	2	\$14,250	\$1,425	\$15,675	\$2,351	\$18,026	\$2,000	\$1,000	\$21,026
Phase III: L/W-19	Diamond Springs Pipeline Improvement Project	2	\$22,438	\$2,244	\$24,682	\$3,702	\$28,384	\$2,000	\$1,000	\$31,384
Phase III: L/W-20	Grassy Lake Well Improvement Project	2	\$18,520	\$1,852	\$20,372	\$3,056	\$23,428	\$2,000	\$1,000	\$26,428
Phase III: L/W-21	Mitten Flat Well Improvement Project	2	\$35,404	\$3,540	\$38,944	\$5,842	\$44,786	\$2,000	\$1,000	\$47,786
Phase III: L/W-22	Woods Gulch Pond Rehabilitation	2	\$158,000	\$15,800	\$173,800	\$26,070	\$199,870	\$2,000	\$4,000	\$205,870
Phase III: L/W-23	Green Mountain Unnamed Spring Redevelopment	2	\$9,402	\$940	\$10,342	\$1,551	\$11,894	\$500	\$1,000	\$13,394
Phase III: L/W-24	Unnamed Spring Sheep Creek Improvement Project	2	\$12,902	\$1,290	\$14,192	\$2,129	\$16,321	\$500	\$1,000	\$17,821
Phase III: L/W-25	Bare Ring Slough Well Improvement Project	2	\$78,435	\$7,844	\$86,279	\$12,942	\$99,220	\$2,000	\$1,000	\$102,220
Phase III: L/W-26	Black Rock Spring Pipeline Project	2	\$58,180	\$5,818	\$63,998	\$9,600	\$73,598	\$2,000	\$1,000	\$76,598
Phase III: L/W-27	Barras Spring Projection Project	2	\$5,000	\$500	\$5,500	\$825	\$6,325	\$500	\$1,000	\$7,825
Phase III: L/W-28	Tincup Spring Development	2	\$34,780	\$3,478	\$38,258	\$5,739	\$43,997	\$1,500	\$1,000	\$46,497
Phase III: L/W-29	Soda Lakes Well Project	2	\$23,140	\$2,314	\$25,454	\$3,818	\$29,272	\$2,000	\$1,000	\$32,272
Phase III: L/W-30	Picket Creek Well Construction Project	2	\$31,408	\$3,141	\$34,549	\$5,182	\$39,731	\$2,000	\$1,000	\$42,731
Phase III: L/W-31	Mitten Springs Area Well Construction Project	2	\$29,408	\$2,941	\$32,349	\$4,852	\$37,201	\$3,000	\$1,000	\$41,201
Phase III: L/W-32	Upper Middle Fork Sulphur Creek Well Construction Project	2	\$29,408	\$2,941	\$32,349	\$4,852	\$37,201	\$3,000	\$1,000	\$41,201
Phase III: L/W-33	Alkali Creek Tributary Well Construction Project No. 1	2	\$29,408	\$2,941	\$32,349	\$4,852	\$37,201	\$3,000	\$1,000	\$41,201
Phase III: L/W-34	Alkali Creek Tributary Well Construction Project No. 2	2	\$29,408	\$2,941	\$32,349	\$4,852	\$37,201	\$3,000	\$1,000	\$41,201
Phase III: L/W-35	Flats North of Ladysmith DraW-Well Construction Project	2	\$29,408	\$2,941	\$32,349	\$4,852	\$37,201	\$3,000	\$1,000	\$41,201
Phase III: L/W-36	Unnamed Alkali Tributary Well Pipeline Project No. 2	2	\$37,408	\$3,741	\$41,149	\$6,172	\$47,321	\$3,000	\$1,000	\$51,321
Phase III: L/W-37	North Immigrant Well Construction Project	2	\$29,408	\$2,941	\$32,349	\$4,852	\$37,201	\$3,000	\$1,000	\$41,201
Phase III: L/W-38	Upper Buffalo Creek	2	\$148,400	\$14,840	\$163,240	\$24,486	\$187,726	\$2,000	\$1,000	\$190,726
Phase III: L/W-39	Coyote Gulch Pipeline Project	2	\$90,850	\$9,085	\$99,935	\$14,990	\$114,925	\$3,000	\$1,000	\$118,925
Phase III: L/W-40	Warm Springs Pipeline Project	2	\$119,292	\$11,929	\$131,221	\$19,683	\$150,904	\$3,000	\$1,000	\$154,904
Phase IV Wildlife / Livestock Water Supply Alternatives										
Recommended Alternative	Recommended Alternative	Priority	Total Construction Cost	Engineering (10%)	Construction and Engineering Subtotal	Contingency (15%)	Total Construction Cost	Final Plans and Specs	Permitting / Legal Fees / Access and	Total Project Cost
Phase IV: L/W-01	Stock Tank Replacement Project	2	\$7,500	\$750	\$8,250	\$1,238	\$9,488	\$250	\$0	\$9,738
Phase IV: L/W-02	Hat Well #1 Improvement Project	2	\$7,500	\$750	\$8,250	\$1,238	\$9,488	\$250	\$0	\$9,738
Phase IV: L/W-03	Jammerman Pastures Well Improvement Project	2	\$7,500	\$750	\$8,250	\$1,238	\$9,488	\$250	\$0	\$9,738
Phase IV: L/W-04	Lankin Well Improvement Project	2	\$9,542	\$954	\$10,496	\$1,574	\$12,071	\$500	\$1,000	\$13,571
Phase IV: L/W-05	Nolan Pocket Spring Development	2	\$39,126	\$3,913	\$43,039	\$6,456	\$49,494	\$250	\$1,000	\$50,744
Phase IV: L/W-06	Well Replacement	2	\$14,902	\$1,490	\$16,392	\$2,459	\$18,851	\$500	\$1,000	\$20,351
Phase IV: L/W-07	Starr Well Pipeline Extension	2	\$12,074	\$1,207	\$13,281	\$1,992	\$15,274	\$2,000	\$1,000	\$18,274
Phase IV: L/W-08	Sage Hen Springs Improvement Project	2	\$36,102	\$3,610	\$39,712	\$5,957	\$45,669	\$2,000	\$500	\$48,169
Phase IV: L/W-09	Lone Mountain Springs Development Project	2	\$24,406	\$2,441	\$26,847	\$4,027	\$30,874	\$2,000	\$1,000	\$33,874
Phase IV: L/W-10	Dry Creek Pipeline Project	2	\$126,852	\$12,685	\$139,537	\$20,931	\$160,468	\$2,000	\$1,000	\$163,468

Table 3. Sweetwater River Watershed Management Plan: Stream Channel Rehabilitation / Stabilization Projects.

Phase I	
Plan Component	Stream
S-1	Long Creek Restoration
S-2	East Fork Restoration
S-3	West Fork Long Creek
Phase II	
S-1	Arkansas Creek Restoration
S-2	Murphrey Creek Restoration
S-3	Camp Creek Restoration
S-4	Corral Creek Restoration
Phase III	
S-1	Coyote Gulch Rehabilitation
S-2	Sulphur Creek Rehabilitation
S-3	Upper East Alkali Creek Rehabilitation
S-4	Crooks Creek Rehabilitation
Phase IV	
S-1	Lower Dry Creek Rehabilitation
S-2	Upper Dry Creek Rehabilitation
S-3	Lower Sage Hen Creek Rehabilitation
S-4	Upper Sage Hen Creek Rehabilitation

Irrigation System Considerations

1. Potential solutions to the primary issues and problems associated with irrigation system infrastructure were identified for 14 individual ditch systems. Conceptual level cost estimates were completed for the recommended improvements.
2. Of the irrigation systems inventoried and evaluated during this study, several structures are in immediate need of rehabilitation. Several improvements have been identified to reduce potential seepage and conserve water.
3. Individual improvements range from installation of measurement devices to reconstruction of irrigation diversions on the Sweetwater River which could cost in excess of \$156,000.
4. Table 1 identifies the irrigation system improvements developed for the watershed management plan. The recommended improvements to each irrigation system can be implemented individually, in combination, or as a complete package depending on the needs, preferences and financial ability of the owner. Funding assistance is available from a number of sources, especially the SWPP and various programs administered by the NRCS.
5. The majority of the recommended improvement projects involving irrigation system infrastructure would require little, if any, permits or coordination with agencies in order to be completed. Several projects would require work within stream channels and consequently, coordination with the United States Army Corps of Engineers would be required. However, it is our understanding that these projects may be included in the Section 404(f) exemption found at 33 C.F.R. Part 323.4(a)(3) which reflects construction and maintenance of farm or stock ponds or irrigation ditches and associated structures.

Livestock/Wildlife Upland Watering Considerations

1. The Green Mountain Common Allotment (GMCA) represents a significant portion of the study area. Management strategies pertaining to this allotment are currently in a state of transition and lie to a large degree with the courts. Attention should be paid to the judicial process by all stakeholders within the watershed as forthcoming management decisions pertaining to the GMCA could likely be precedents for other portions of the watershed.
2. Pending the ultimate outcome of pending court cases, development of recommended upland livestock/wildlife water supply projects should be implemented to the extent possible.
3. Due to the fact that large percentage of the watershed is federally owned and managed by the BLM, coordination with BLM will be required for the majority of the recommended projects. Given the current regulatory climate and involvement of private interest groups, construction of projects involving federal lands could be problematic and at the least, involve lengthy delays. Many of the recommended pipeline projects could feasibly be redesigned to involve deeded or State lands only. This would likely involve greater materials and construction costs associated with greater project lengths, but this could offset potential permitting issues. Alternatively, projects could also be phased to involve deeded or State lands initially and extended during subsequent phases.
4. There appears to be numerous opportunities to improve range and riparian conditions by means of increasing the availability of upland water sources for wildlife and livestock use.
5. Pipeline/tank systems appear to offer the most efficient and cost-effective means to provide adequate watering to large areas of rangeland. Water sources for these systems will depend on the location of the rangeland to be served and the available alternative sources. The most likely sources are wells or spring developments.
6. As indicated in Table 2, a total of 92 potential wildlife/livestock water supply projects were identified following an evaluation of available water sources and input from local land owners and allotment permittees. Conceptual plans and conceptual level cost estimates were prepared for each project. Projects ranged from installation of a guzzler to a regional upland water supply project servicing several wildlife / livestock water tanks and several miles of buried pipeline.
7. Any such improvements and practices must be fully implemented and maintained by the landowner to gain the maximum overall benefits to the watershed.

Surface Water Storage Opportunities

Due to constraints imposed by the North Platte River settlement, development of future storage opportunities other than stock reservoirs within the Sweetwater River watershed was not identified as a priority objective in this study (See Supreme Court of the United States. 2001. Final Settlement Stipulation in State of Nebraska v. State of Wyoming. No. 108).

Stream Channel Condition and Stability

1. Based on the geomorphic assessment, several impaired channel reaches were identified within the watershed. The categories of impairments that were identified include, but are not limited to degradation of riparian vegetation and degradation of riparian condition in the form of stream bank erosion and channel degradation.
2. Site-specific solutions should be developed to mitigate the channel impairment and ultimately included in the watershed management rehabilitation plan.
3. Community-sponsored stream channel and habitat improvement projects could provide numerous benefits to the watershed. Table 3 presents locations where channel improvement projects have been identified. Potential projects would include efforts such as bank stabilization efforts using techniques such as willow plantings. In addition to providing direct benefits to the specific stream, ancillary benefits include education and community involvement.
4. Recommendations pertaining to livestock/wildlife water supply alternatives should be incorporated into future stream channel rehabilitation efforts where applicable.

Grazing Management Opportunities

1. Acceptance of management alternatives by permittees and landowners is paramount to the success of any range management improvement strategy. Without participation, even the best of plans will fail. Commitment is required of those involved to implement a plan and to continue to maintain any infrastructure which may be incorporated.
2. Construction of water supply projects must be completed before alternative management strategies will be efficient.
3. Water developments can be used to expand grazing distribution to areas that do not currently have reliable water. Fencing of riparian areas is desired to optimize the utilization of the non-riparian facilities. In other words, the mere presence of upland water sources will not keep livestock and wildlife from preferring riparian areas. Riparian area plant community condition can be enhanced by development of water into upland areas.
4. Fencing to control livestock can enable a rest-rotation grazing system.
5. Fencing combined with low-stress herding can be used to discourage use of riparian areas.
6. Riparian areas can be fenced to exclude livestock and wildlife (i.e., wild horses) as well as facilitating utilization for short-term grazing pastures. Riparian pastures should generally be large enough to permit grazing as appropriate to their needs.
7. Strategic salting and herding are other tools that can be used to enhance grazing distribution.
8. Most range improvement practices which improve watershed condition, may also improve wildlife habitat. Wildlife needs should be considered when installing practices such as wildlife friendly fences, wildlife escape ramps from tanks, and wildlife watering facilities.
9. Strategies recommended in the state and transition models associated with NRCS descriptions of the ecological sites found within the watershed should be adopted and employed to optimize range conditions through prescribed grazing management and best management practices.
10. Proposed range management strategies associated with the GMCA may result in a single large herd of livestock. Consequently, water supply alternatives must incorporate adequate infrastructure to facilitate use by a large number

of animals at any given time. That is, water supply necessary to meet demand and larger stock tanks will enable more animals to use the facility at one time and will minimize the amount of time animals linger in the vicinity.

Other Upland Management Opportunities

Noxious weed management programs currently being conducted by the respective weed and pest control districts of the counties involved and should continue. Education opportunities for land owners and managers should continue to be made available.

Recommendations

Based upon the information presented throughout this report and the conclusions discussed above, the recommendations listed below are included for consideration:

1. Many of the irrigation rehabilitation improvements and the livestock / wildlife upland watering improvements fall within the constraints for funding eligibility of the SWPP. These projects should be reviewed and selected improvements should be implemented as soon as is practical. Completion of one or more of these projects in the near future would serve to benefit those directly involved in the project and increase interest and awareness of the benefits associated with the watershed planning process.
2. Funding through the SWPP does not require formation of a district. Consequently, individuals can seek funding through this program. The local conservation districts are eligible sponsors of SWPP project applications. As discussed previously, projects providing multiple benefits and for which total project cost are less than \$100,000 are eligible for funding under this program. Grants are available for up to 50 percent of the total project cost or \$25,000, whichever is less.
3. Several alternative sources exist for funding of improvements within the watershed including on-farm improvements, irrigation rehabilitation projects, stream enhancements/restoration projects, and conservation and flood control projects. Creative strategies for funding/financing of projects should be more fully investigated following identification of projects worthy of additional evaluation and potential implementation. As an example, replacement of a failing ditch headgate and diversion which are also identified by WGFD as a barrier to fish passage, could potentially be eligible for funding through SWPP (if total project cost meets SWPP criteria). Additional funding could also be attained through WGFD, Trout Unlimited, and other sources because of the fisheries and stream habitat benefits achievable with completion of the project. *By combining funding sources, the owner could conceivably obtain grants for most, if not all, of the project costs.*