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**EXECUTIVE SUMMARY
LOWER LARAMIE RIVER
WATERSHED LEVEL I STUDY**



Prepared for:
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(ACE Project No. WYWDC40)



ANDERSON CONSULTING ENGINEERS, INC.
Civil • Water Resources • Environmental

Hinckley Consulting

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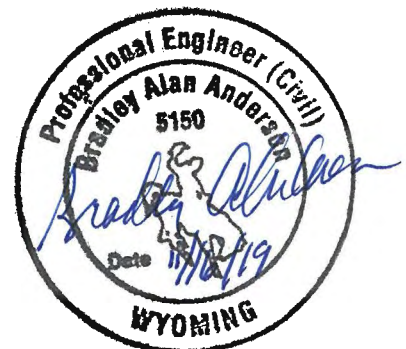
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1.0 INTRODUCTION

In 2017 the Platte County Resource District (PCRD) requested funding from the Wyoming Water Development Commission (WWDC) for the completion of a watershed management plan for the Lower Laramie River watershed. The intent of the funding request 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 study and Anderson Consulting Engineers, Inc. (ACE) was ultimately contracted in June 2018 to complete the project.

2.0 BACKGROUND

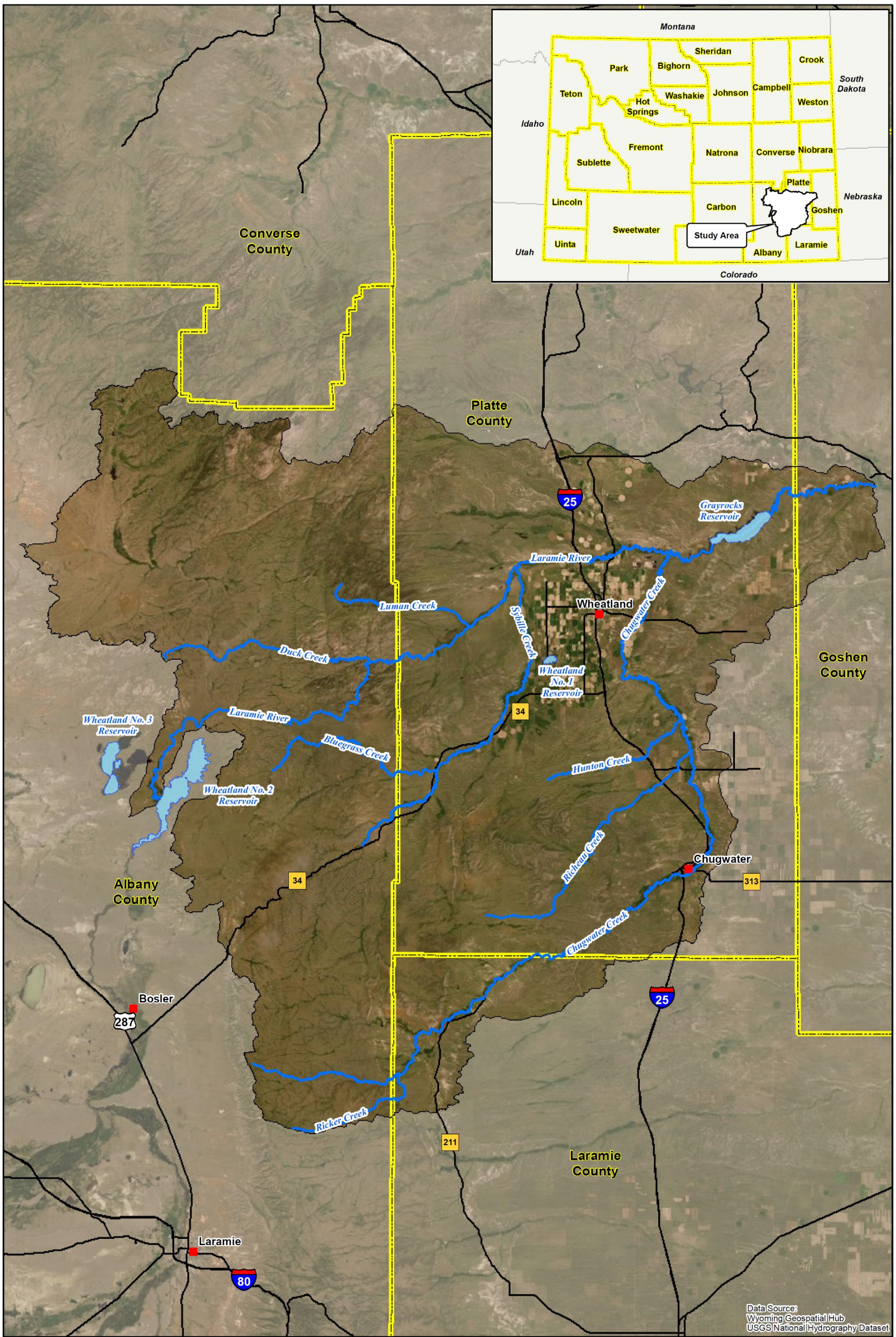
The project study area is located in southeastern Wyoming; primarily in Platte and Albany Counties, Wyoming (Figure 1). The Lower Laramie River is defined by the United States Geologic Survey (USGS) as the fourth order basin: Lower Laramie River (Hydrologic Unit Code 10180011). The study area begins where the Upper Laramie River watershed ends at Wheatland No. 2 Reservoir and extends downstream to the river's confluence with the North Platte River. Primary tributaries include Bluegrass Creek, Chugwater Creek, Duck Creek, Hunton Creek, Luman Creek, Sybille Creek, Richeau Creek, and Ricker Creek. The principal water storage facilities in the area include Grayrocks Reservoir and Wheatland Reservoir No. 1. Elevations within the watershed range from about 4,200 feet above mean sea level at the North Platte River to over 10,000 feet in the Laramie Mountains.

The study area covers approximately 1,492,969 acres (2,333 sq. mi.) in southeast Wyoming. The watershed is mostly contained in Platte and Albany counties, with a small portion in Laramie and Goshen counties. The towns of Wheatland and Chugwater lie within the watershed boundary. The majority of the area's residents live in the Town of Wheatland and its vicinity. The remainder of the study area is relatively sparsely populated and consists primarily of open range lands and irrigated fields.

3.0 PROJECT PURPOSE AND OBJECTIVES

The purpose of this Level I watershed study was to combine the available data and information with the study-generated inventory data to develop a comprehensive watershed management and rehabilitation plan that outlines proposed and potential water-development opportunities. To accomplish this effort, the following objectives were completed:

- *Facilitate consensus building among the conservation district, landowners and the Wyoming Water Development Commission.*
- *Facilitate public participation through public meetings, open houses/workshops, PCRD contacts, and advertisements.*
- *Conduct an evaluation and description of the Lower Laramie River watershed, including quantity and quality of surface water resources, and riparian/upland conditions.*
- *Inventory and describe irrigation systems, water storage, and flood control needs present within the watershed.*



Data Source:
 Wyoming Geospatial Hub
 USGS National Hydrography Dataset



- Legend**
- City
 - Stream
 - Primary Roads
 - Lakes
 - Study Area
 - Counties



Figure 1 Lower Laramie River Watershed: Location Map

- *Conduct a geomorphic assessment 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 in participating.*
- *Conduct an evaluation of water storage needs and opportunities to augment water available for livestock and wildlife.*
- *Develop a watershed management plan which identifies water resource related issues 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.*

4.0 WATERSHED MANAGEMENT PLAN

Potential improvements were developed and categorized into the following:

- **Irrigation System Conservation and Rehabilitation:** The inventory and evaluation of existing infrastructure was completed and improvements were identified.
- **Livestock/Wildlife Upland Watering Opportunities:** Based upon an evaluation of existing water sources and the condition of upland grazing resources, potential upland water source development projects were identified.
- **Grazing Management Opportunities:** Based upon a review of the pertinent Ecological Site Descriptions (ESDs) and the ambient vegetation and soil conditions, grazing strategies are presented.
- **Environmental Enhancement Opportunities:** Several projects were identified which would fall under the category of stream channel stability and environmental enhancement; including stream bank stabilization, wetland enhancement and fisheries-related opportunities.
- **Aquatic Vegetation Management:** The issue of management of aquatic vegetation was discussed early in the project. Projects identified under this component of the watershed management plan address potential options that could be employed by individuals or entities to manage nuisance aquatic vegetation in irrigation conveyance systems.

The plan is summarized in Table 1.

5.0 CONCLUSIONS

Upon completion of the watershed inventory phase of the project, the project team developed the watershed management plan. The plan was developed based upon findings of the inventory phase, a series of public meetings, and interaction with the PCRD staff. In previous chapters, key issues, problems and opportunities were identified and ultimately, project goals and objectives were formulated to address them. Specifically, plans were developed associated with the following broad categories:

Table 1 Lower Laramie River Watershed Management Plan.

Lower Laramie River Watershed Management Plan			
Watershed Management Plan Component	Sponsor Reference	Project Name	Description
Environmental Components			
ENV-001	deRyk-001	Lower Laramie River Bank Stabilization Project 1	Realign Streambank and Stabilize Erosive Banks
ENV-002	Lanier-001	Lower Laramie River Bank Stabilization Project 2	Stabilize Erosive Streambank
ENV-003	Nockels-001	Chugwater Creek Bank Stabilization Project 1	Stabilize Erosive Streambank
ENV-004	WGF-001	Wilson No. 2 Ditch Diversion Fish Passage Project	Enhance Fish Passage Capabilities
ENV-005	WGF-002	North Laramie Land Company Canal Fish Passage Project	Enhance Fish Passage Capabilities
ENV-006	WGF-003	Burger Ditch Diversion Structure Fish Barrier	Increase Fish Barrier Opportunity
ENV-007	Freeborn-001	Lower Laramie River Stabilization Project 3	Stabilize Erosive Streambank
ENV-008	Freeborn-002	Lower Laramie Wetland Rehabilitation Project	Restore Wetland Functionality
Irrigation Components			
IRR-001	Christinic-001	Christinic Pipeline Conversion Project	Convert Open Ditch to Buried Pipeline
IRR-002	Cochorn-001	Cochorn Pipeline Conversion Project	Convert Open Ditch
IRR-003	Faris-002	Faris Pipeline Project	Install Pipeline within Conveyance System
IRR-004	Farthing-001	Iron Mountain Ditch No. 2 Headgate Replacement Project	Replace Failing Headgate
IRR-005	Farthing-002	Davidson Ditch Headgate Replacement Project	Replace Failing Headgate
IRR-006	Kontour-001	Kontour Headgate Replacement Project	Replace Failing Headgate
IRR-007	Schockley-001	Schockley Headgate Project	Replace Headgate/Ditch Lost to Bank Erosion
Livestock/Wildlife Water Supply Components			
L/W-001	Brant-001	Brant Stock Reservoir Rehabilitation Project	Rehabilitate Existing Sediment-Filled Stock Reservoir
L/W-002	Brown-001	Brown Well and Stock Tank Project	Construct New Well, Pipeline, and Stock Tank
L/W-003	Faris-001	Faris Well Replacement Project	Rehabilitate Existing Well System
L/W-004	Gillaspie-001	Gillaspie Spring Development Project 1	Replace Existing Spring Development/Pipeline/Tank
L/W-005	Gillaspie-002	Gillaspie Spring Development Project 2	Replace Existing Spring Development/Pipeline/Tank
L/W-006	Gillaspie-003	Gillaspie Solar Project 1	Install Solar Platform/Pump in Existing Well
L/W-007	Gillaspie-004	Gillaspie Solar Project 2	Install Solar Platform/Pump in Existing Well
L/W-008	Irvine-001	Irvine Stock Reservoir Rehabilitation	Rehabilitate Existing Stock Reservoir
L/W-009	Langseth-001	Langseth Well Construction Project 1	Construct New Well, Pipeline, and Stock Tank
L/W-010	Langseth-002	Langseth Well Construction Project 2	Construct New Well, Pipeline, and Stock Tank
L/W-011	Preston-001	Preston Stock Reservoir Rehabilitation Project	Rehabilitate Existing Stock Reservoir
L/W-012	Preston-002	Preston Stock Reservoir Construction Project	Construct New Stock / Wildlife Reservoir
L/W-013	Purdy-001	Purdy Spring Development Project 1	Construct New Spring Development/Tank
L/W-014	Purdy-002	Purdy Spring Development Project 2	Construct New Spring Development/Tank
L/W-015	Watson-001	Watson Pipeline Project 1	Construct New Pipeline/Tank System From Existing Well
L/W-016	Watson-002	Watson Pipeline Project 2	Construct New Pipeline/Tank System From Existing Well
L/W-017	West-001	West Well and Pipeline Construction Project	Construct New Well, Pipeline, and Stock Tank

- Irrigation System Conservation and Rehabilitation,
- Livestock/Wildlife Upland Watering Opportunities,
- Surface Water Storage Opportunities,
- Environmental Enhancement Opportunities, and
- Grazing Management Opportunities.

In summary, the following conclusions are provided.

5.1 Irrigation System Components

1. Irrigated agriculture is a dominant activity within the study area. The extent of irrigated lands, and corresponding irrigation infrastructure is significant. Wheatland Irrigation District (WID) represents the major stakeholder in the area and comprises over 54,100 irrigated acres and is supplied by over 120 miles of canals, ditches, and laterals. An irrigation district master plan was completed in 2011 by Anderson Consulting Engineers and included a lengthy list of recommendations for district managers to use for their planning purposes. The master plan should continue to be referenced by WID to drive their future planning efforts.
2. Several of the projects included in the Watershed Management Plan were recommended by stakeholders within the WID and involve smaller conservation/pipeline projects on lands located “downstream” of WID responsibility. It is recommended that the PCRDC work together with these and other stakeholders and the WID to strive to develop projects that may benefit greater numbers of users and be consistent with WID infrastructure.
3. Funding assistance is available from a number of sources, as previously mentioned, especially from the WWDC Small Water Project Program but also from various programs administered by the NRCS. The WID, as a legal entity, is also eligible for other funding opportunities through the WWDC and other agencies and programs.
4. Partnering opportunities may exist for construction of in-stream structures such as irrigation diversions. For example, Trout Unlimited (TU) has recently provided partial funding for projects within the region in an effort to enhance fisheries populations. Fish passage opportunities identified in the plan could potentially be funded by multiple entities.

5.2 Livestock/Wildlife Upland Watering Opportunities

1. There are numerous opportunities to improve range and riparian conditions by means of increasing the availability of upland water sources for wildlife and livestock use.

2. Opportunities to improve range and riparian conditions require installing and operating well-distributed, reliable upland water sources and watering facilities for wildlife and livestock. Installing pipelines and stock tanks is the foundation of effective grazing management and can be an economical way to improve rangeland conditions. Strategic fencing is frequently required to optimize these benefits.
3. 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.
4. Through discussion with local landowners and stakeholders, a total of 17 potential livestock / wildlife water supply projects were identified. Conceptual plans and conceptual level cost estimates were prepared for each project. Projects ranged from installation of stock tanks to well spring development and pipeline construction.
5. Most of the livestock / wildlife projects could be completed entirely on private lands. Consequently, permitting issues are greatly simplified. However, a few will involve coordination with the Bureau of Land Management (BLM). BLM consultation will be necessary in order to obtain the requisite permits and cultural clearances.

5.3 Surface Water Storage Opportunities

1. No new storage facility projects were identified in this study and no previous studies were found which identified any potential projects. Limitations and complexities of water administration in the basin make development of storage opportunities possible, but problematic.

5.4 Stream Channel Condition and Stability

1. Based on the geomorphic assessment and input from the project Sponsor, the project team identified several locations where stream channel migration is resulting in bank erosion threatening infrastructure. It is recognized that meandering streams will continually migrate laterally resulting in erosive banks in some locations and sediment deposition in others. However, when erosion threatens highways, irrigation structures, homes, or other infrastructure, mitigation is recommended. Likewise, mitigation is also prudent when migration threatens activities such as pastures, crops, etc.
2. Channel degradation does not appear to be systemic. Significant or system-wide indicators of channel instability were not observed nor were they presented by area stakeholders. Impairments appear to be locally identifiable and include primarily:

- Riparian Vegetation Degradation: Impaired riparian condition and habitat, and
- Riparian Degradation: Generally, bank erosion and physical disturbance of stream banks.
- Imbalance of Sediment Supply: Imbalance between stream capacity and sediment supply can lead to channel degradation or aggradation

5.5 Grazing Management Opportunities

1. Construction and operation of reliable water supply projects must be developed and implemented in areas with inadequate water sources before adjustments or alternatives in grazing management can be made on a particular area or allotment.
2. Development of reliable water sources and associated watering facilities can aid in distribution of grazing animals and the timing and frequency of grazing. However, additional measures such as cross-fencing, low-stress herding, mineral/salting, and stock density should be evaluated as part of the site-specific, grazing management inventory and plan.
3. Available tools such as the ESD and the STM can be used by landowners and managers to become aware of the growth potential of desirable vegetation and predicted responses on a particular range site.
4. These tools could be used in developing appropriate rangeland treatments and grazing practices to begin the transition from a current state or condition to a more desirable plant community condition.

5.6 Environmental Enhancement Opportunities

1. Several environmental enhancement opportunities were identified. Two of the projects involve construction of barriers to fish passage to facilitate fisheries management objectives. Funding for these projects could potentially be completed through partnering with agencies such as Wyoming Game and Fish and private entities such as Trout Unlimited.
2. Other environmental enhancement opportunities include the potential to convert abandoned stream channel oxbows to wetland features. Similar projects have been recently completed within the similar watersheds which could potentially be implemented providing valuable wetland habitat.

6.0 RECOMMENDATIONS

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

1. Many of the irrigation rehabilitation alternatives and the livestock / wildlife upland watering alternatives fall within the constraints for funding eligibility of the WWDC's Small Water Project Program (SWPP). These projects should be reviewed and selected alternatives 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.

Funding through the SWPP does not require formation of a public entity as defined by WWDC criteria. Consequently, individuals can seek funding through this program by applying through a conservation district as their sponsor. As discussed in Chapter 7, grants are available for up to 50 percent of the total project cost or \$35,000, whichever is less.

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 barriers to fish passage, could potentially be eligible for funding through SWPP. Additional funding may 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.*

2. Continued communication between the PCRCD and stakeholders regarding irrigation system improvements is highly recommended. Irrigation system infrastructure is generally eligible for funding through the WWDC's Small Water Project Program (SWPP). We have found through the completion of previous watershed studies, that interest in the program grows as projects are completed. Therefore, we highly recommend that the PCRCD include reference to the SWPP in future newsletters and communications in an effort to broadcast its benefits. Upon completion and with consent of the existing participant, PCRCD could include reference of project completion to demonstrate SWPP opportunities.
3. Community-sponsored stream channel and habitat improvement projects could provide numerous benefits to the watershed. 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. Specifically, Rock Creek/Wheatland Creek and other clean-up projects could be completed within city limits.
4. Landowners or managers seeking to participate in the SWPP should consult and coordinate with the PCRCD, which is the eligible sponsor of SWPP applications and project agreements. Guidance and design from NRCS can help offset potential costs to the applicant.

5. The Lower Laramie River study's GIS and digital library should be used as a tool in planning and developing potential projects and should be updated as necessary from available information sources. This information used in conjunction with the Wyoming Association of Conservation District's (WACD) SuiteWater tools provide powerful watershed analytical capabilities. In addition, the Digital Library provided in this project contains a wealth of information and resources pertinent to PCRDR activities.
6. Potential funding opportunities exist for proposed and future improvement projects within the watershed including ranch and farm improvements, irrigation system rehabilitation, riparian/wetland enhancements, river corridor and stream channel restoration, and urban drainage and flood control projects. For example, the Saratoga Encampment Rawlins Conservation District (SERCD) was recently granted funding through the USDA Regional Conservation Partnership Program (RCPP). The funding is intended for achieving resource management goals from improving water quality and wildlife habitat to streambank restoration. Where appropriate, partnering SWPP funding with RCPP funded projects could provide multiple financial benefits.
7. Innovative strategies for coordinated project funding and financing should be investigated and focus on local, collaborative endeavors that integrate more than one watershed issue or concern that could potentially result in achievement of multiple benefits.
8. Every effort was made to provide information within this document to support the application for SWPP funding from the WWDC with PCRDR sponsorship. Project narratives, conceptual designs, cost estimates, and discussion of project benefits can all be incorporated directly into the SWPP application by the PCRDR.
9. The public outreach portion of this project attempted to accommodate all interested parties. To the best of the project team's knowledge, all who expressed interest in participating were contacted. However, our experience has shown that additional "new" individuals will come forward wishing to participate after this Level I study is completed. These individuals must be made aware that they are eligible for SWPP funding; the WWDC has removed the requirement of a completed watershed study for eligibility. They simply have not had the benefit of having met with the project team and having a portion of their application needs provided to them. They would be subject to the same application requirements and deadlines as those who did participate.
10. The Lower Laramie River Watershed Management plan was completed based primarily upon input obtained from the PCRDR and participating agencies, landowners, and stakeholders.



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