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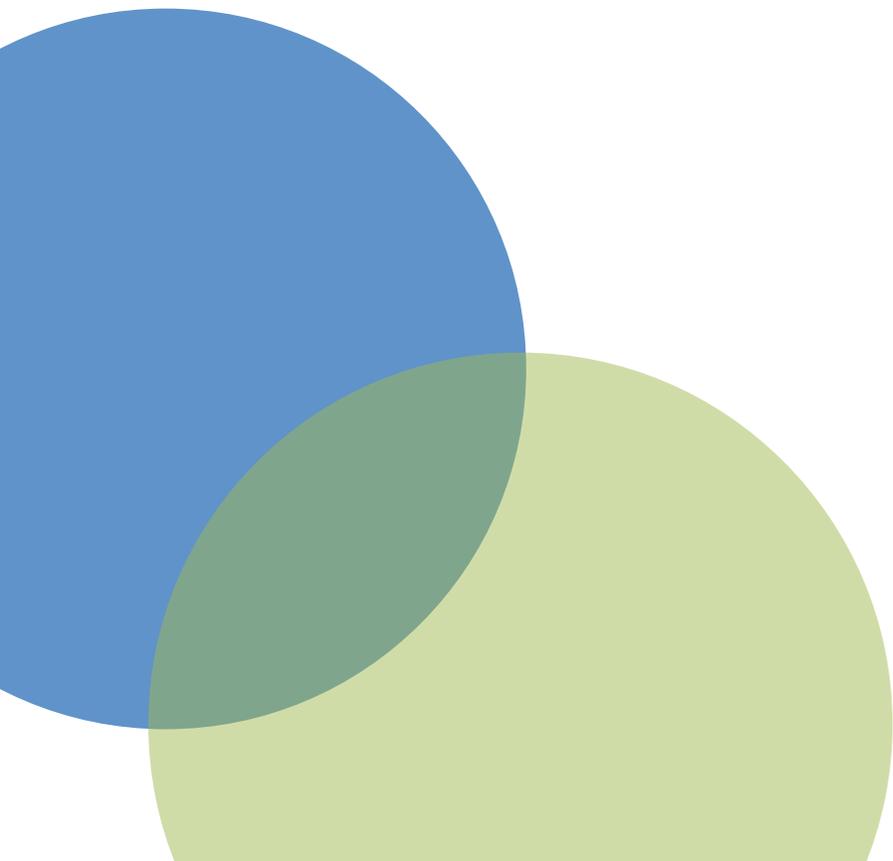
EXECUTIVE SUMMARY
MIDDLE NORTH PLATTE–GLENDO WATERSHED STUDY LEVEL I
WATERSHED MANAGEMENT PLAN

Topical Report RSI-2673

prepared for

Wyoming Water Development Commission
6920 Yellowtail Road
Cheyenne, Wyoming 82002

November 2016



RESPEC

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WATERSHED MANAGEMENT PLAN

Topical Report RSI-2673

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November 2016

I hereby certify that this report was prepared by us or under our direct supervision and that we are duly licensed Professional Geologists and Engineers under the laws of the state of Wyoming.

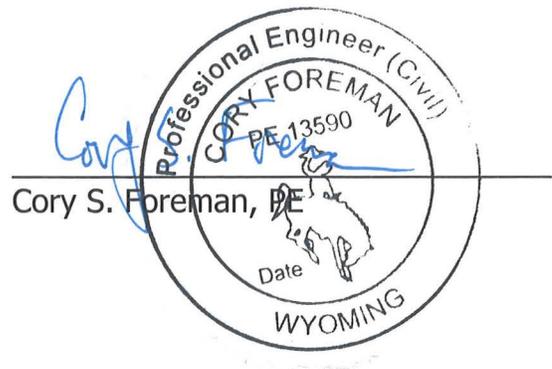
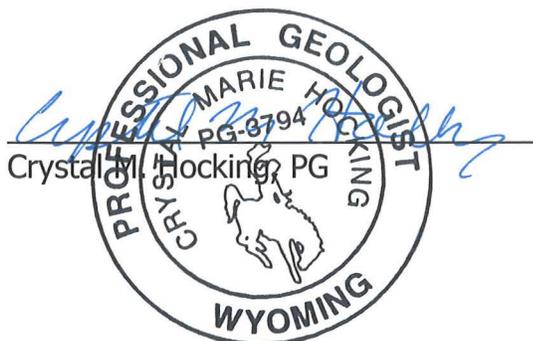




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EXECUTIVE SUMMARY

In 2014, the Converse County Conservation District (CCCD) requested that the Wyoming Water Development Commission (WWDC) conduct a Level I study of the Middle North Platte–Glendo Watershed to evaluate its water resources, watershed function, and water availability. The watershed encompasses 3,275 square miles the majority of which are in Converse and Platte Counties. In 2015, the WWDC contracted with RESPEC and its subconsultant, Anderson Consulting Engineers, Inc. (ACE), to provide professional services for the Middle North Platte–Glendo Watershed Study, Level I.

This Level I study provides important information that the CCCD and the WWDC along with the neighboring conservation districts, the Platte County Resource District (PCRD), Niobrara Conservation District (NCD), Laramie Rivers Natural Resource District (LRCD), Natrona County Conservation District (NCCD), the Lingle-Ft. Laramie Conservation District (LFLCD), and the Natural Resources Conservation Service (NRCS) could use to identify water development opportunities and implement conservation practices that address water- and land-resource concerns within the study area.

The Level I study included a geographic information system (GIS) inventory of hydrography, soils, climate, land uses, fish and wildlife habitat, and transportation and energy infrastructure. The study also included an evaluation of surface and groundwater availability, irrigation infrastructure, rangeland and forestland conditions, and the geomorphic characterization of the rivers and creeks within the watershed. In developing the Watershed Management and Rehabilitation Plan, the consultant worked with the local conservation districts, individual landowners, and the LaPrele Irrigation District (LID) to identify necessary water projects, including rehabilitating irrigation diversion/conveyance infrastructure, livestock/wildlife water sources, and existing water-storage facilities.

1.1 PURPOSE AND OBJECTIVES

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

- Foster communication among residents and landowners, the local sponsors (CCCD, PCRD, NCD, LRCD, NCCD, and LFLCD), and the WWDC
- Solicit public participation in the watershed study
- Inventory and evaluate the watershed with emphasis on surface-water quantity and quality in addition to upland and riparian ecological conditions
- Perform a geomorphic classification of the major tributaries in the study area to identify impaired reaches and improvement options to restore channel stability
- Assess existing irrigation systems and generate rehabilitation alternatives for the irrigators who participate in the study
- Evaluate existing surface-water features, storage requirements, and potential opportunities to improve water availability for livestock and wildlife
- Prepare a Watershed Management and Rehabilitation Plan that includes proposed projects

- Identify permits, easements, and clearances necessary for plan implementation
- Estimate costs for proposed improvement alternatives and potential projects
- Complete an economic analysis and identify potential sources of funding.

1.2 STUDY AREA

The study area for the Middle North Platte–Glendo Watershed, as shown in Figure 1.1, encompasses a portion of the drainage area for the North Platte River that begins west of the town of Glenrock and flows generally east and southeast through Glendo and Guernsey Reservoirs. The study area covers approximately 3,275 square miles (or 2,095,807 acres) in eastern Wyoming. The watershed is mainly situated within Converse County (62.8 percent) and Platte County (24.8 percent), with small portions of Niobrara County (4.7 percent), Albany County (4.6 percent), Natrona County (2.1 percent), and Goshen County (1.0 percent) also included. The cities, towns, and communities of Douglas, Glendo, Glenrock, Guernsey, Hartville, Lost Springs, and Rolling Hills lie within the watershed.

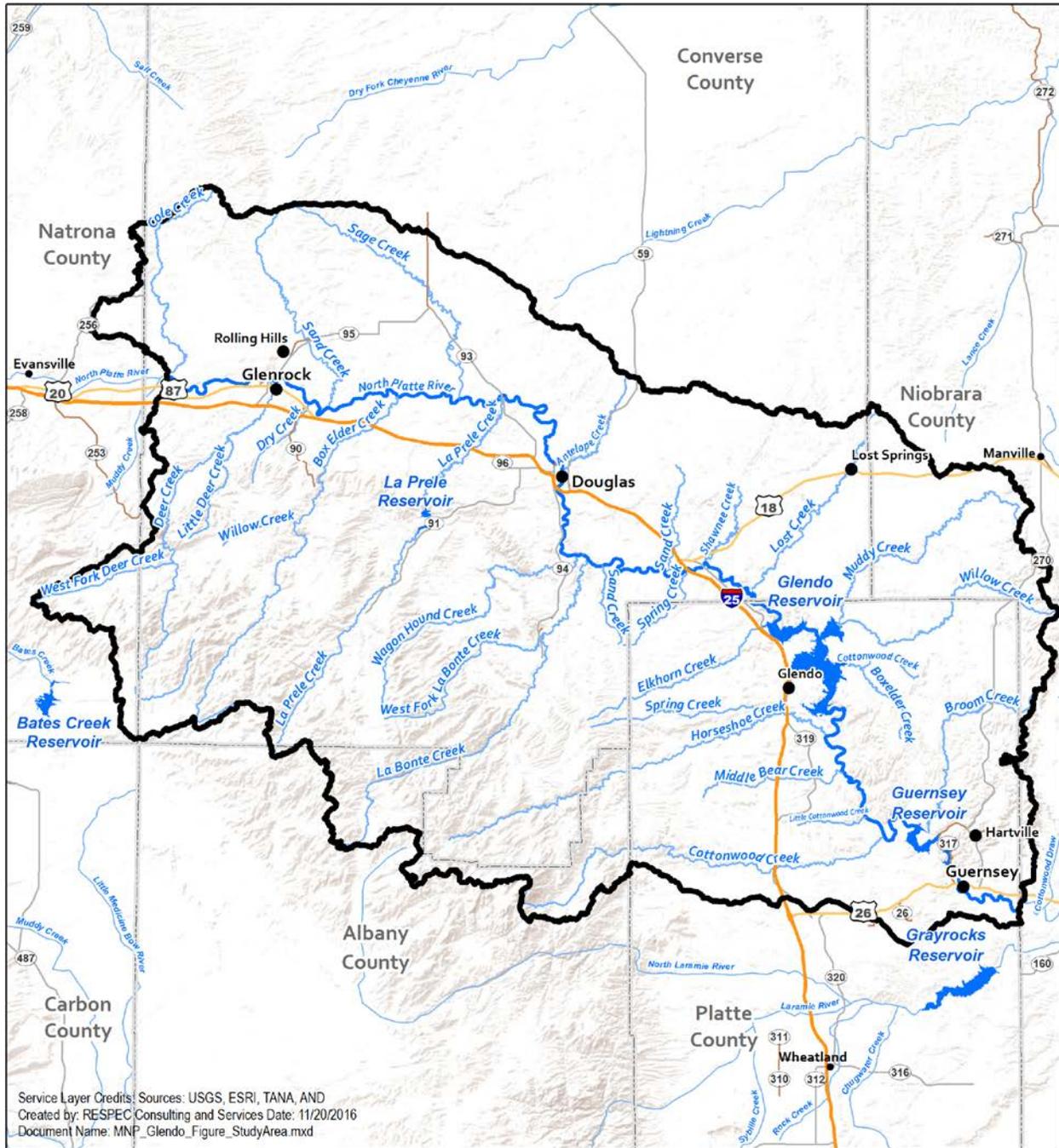
The watershed is approximately 50 miles north-south and 80 miles east-west and is bounded on the north by the Cheyenne drainage. The study area's west and northwest borders are bounded by the Middle North Platte–Casper drainage. On the southwest and east, the study area boundary is along the Laramie Mountain Range and the Guernsey to State Line drainage, respectively.

1.3 PROJECT OUTREACH

Public involvement and landowner participation were important elements of the study effort because of the amount and complexity of the water and land issues and concerns within the study area. Therefore, considerable emphasis was placed on gathering background information and preparing for planned scoping meetings. Scoping meetings, open houses, landowner meetings, and on-site field visits were conducted by RESPEC staff in cooperation with the CCCD, NCD, and PCRD.

Scoping meetings included formal presentations to present information about the study area and obtain input from landowners. Invitations to the two scoping meetings (held in Douglas and Glendo) and three open houses (held in Douglas, Wheatland, and Lusk) for the watershed study were sent to more than 1,100 addresses within the watershed on three different occasions. The scoping meetings and open houses were advertised in local newspapers, including the *Douglas Budget*, *Glenrock Independent*, *Platte County Record-Times*, *Guernsey Gazette*, *Lusk Herald*, and the *Wyoming Livestock Roundup*. The CCCD created a webpage on their website (<http://www.conserveconverse.org/>) that included information about the watershed study.

A total of 12 landowners attended the scoping meeting in Douglas, and 24 landowners attended the scoping meeting in Glendo. In addition to the scoping meetings and open houses, RESPEC staff presented information about the study to over 25 irrigators at the LID's annual meeting in Douglas. Landowners interested in participating in the study contacted the consultant, CCCD, PCRD, or NCD staff. Individual landowner meetings were then scheduled where water-resource concerns were discussed. RESPEC staff met with 13 landowners during three open houses and met with 17 landowners during field visits.



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<p>Legend</p> <ul style="list-style-type: none"> Level I Watershed Major Tributaries Cities and Towns Counties Reservoirs North Platte River 	<p style="text-align: center;">N</p> <p style="text-align: center;">Miles</p> <p style="text-align: center; font-size: 2em; font-weight: bold;">RESPEC</p>	
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Figure 1.1. Middle North Platte–Glendo Watershed Level I Watershed Study Area.

1.4 WATERSHED INVENTORY

The objective of the inventory was to gather, review, and compile information, which included geology, hydrology, soils, climate, plants, wildlife habitat, infrastructure, irrigation, stream conditions, and upland conditions, to describe problems and identify water development opportunities within the watershed. The spatial data that were gathered during the study were mainly obtained from Albany, Converse, Goshen, Niobrara, Natrona, and Platte Counties; WWDC, LID, the Wyoming State Engineer's Office (SEO); Wyoming Oil and Gas Conservation Commission (WOGCC); the Wyoming Department of Environmental Quality (WDEQ); the Wyoming Geographic Information Science Center (WyGIS); the Wyoming Game and Fish Department (WGFD); the US Department of the Agriculture's NRCS and Forest Service (USFS); the US Department of the Interior's US Bureau of Reclamation (USBR); the Bureau of Land Management (BLM); and the US Geological Survey (USGS). The collected data were compiled into a GIS, which can be used to complete permits, applications, and maps for proposed and future watershed projects.

The topography of the watershed results in a variable climate with annual precipitation rates that range from 9 inches per year in the northwest and central portion of the watershed to over 30 inches per year in the Laramie Mountains. The watershed's growing season ranges from 100 days near Glenrock to 149 days near Guernsey. Approximately 78 percent of the watershed's land cover consists of grass and shrub lands, which are typically used for livestock grazing. The remaining 22 percent of the study area consists of evergreen forest, pasture and hay, barren land, and water. The predominant grass and shrub community is the Northwestern Great Plains Mixedgrass Prairie, and the predominant forest community is the Northwestern Great Plains-Black Hills Ponderosa Pine Woodland and Savanna. Wetlands cover approximately 1.3 percent (28,006 acres) of the study area.

A variety of geological features and rocks occur within the study area that range from Precambrian igneous and metamorphic rocks to Quaternary alluvium along creeks. The predominant surficial geologic units in the watershed are residuum mixed (in-place decomposed rock mixed with alluvium, eolian, slopewash, grus, and/or bedrock), slopewash (soil and rock that has been moved downslope by gravity, possibly assisted by water), and bare bedrock. The bedrock geologic units that underlie the watershed study area predominantly consist of Tertiary sedimentary units and Precambrian rock. Soils are diverse because of the watershed's geology, topography and elevation, climate, precipitation, and vegetation attributes. The NRCS has published seven soil surveys that cover 87 percent of the watershed and include 459 soil map units that were mapped within the study area.

Land ownership within the watershed is predominantly private lands that cover 75.5 percent of the watershed. The state of Wyoming owns 12.0 percent of the watershed, and 11.3 percent of the study area is managed by federal BLM, USFS, and Department of Defense agencies. Approximately 91 percent of the range and forest grazing lands occur on private land; another 97 percent of the irrigated acres also occur on private lands within the watershed. Transportation and energy corridors are concentrated in the watershed along Interstate 25 (I-25) between Glendo and Glenrock, US Highway 26 from Guernsey to Glendo, and US Highway 18 from Orin Junction to Lusk. US Highway 59 extends north from Douglas to Gillette along with local roads and unimproved trails in the study area. The Burlington Northern and the Colorado and Wyoming Railroad are located within the watershed along with abandoned rail lines.

Power and energy development includes hydropower facilities and wind power complexes with several power transmission lines located throughout the study area. Two hydropower facilities are located in the eastern portion of the study area: one at the outlet of Glendo Reservoir and the other below Guernsey Dam on Guernsey Reservoir. In 2014, 276 industrial wind turbine locations existed on six wind farms within the study area. Several power transmission lines traverse the watershed.

Irrigation is primarily used for livestock forage production within the watershed. Grass and alfalfa hay are predominantly grown on irrigated lands within the study area. In 2006, approximately 55,150 acres of irrigated acres were identified within the study area, which comprised 2.6 percent of the watershed. Only 36,112 acres within the watershed were irrigated in 2012 because of the severe drought. Approximately 85 percent of the irrigated lands are located along the North Platte River, Deer, La Bonte, La Prele, and Wagon Hound Creeks and consist mainly of flood-irrigated meadows and pastures.

The LID is the only irrigation district located within the study area. The LID distributes water to 103 users who irrigate 11,462 acres west and south of Douglas through 94 miles of canals and laterals that are supplied with water from La Prele Creek and stored in LaPrele Reservoir. LaPrele Reservoir is owned and operated by the LID and has a permitted capacity of 21,000 acre-feet for irrigation, domestic, and industrial uses. The LaPrele Dam, which is a hollow, reinforced concrete structure, and its distribution system were constructed in 1909 and rehabilitated in 1983.

A total of 69 irrigation canals, laterals, and ditches convey 5 cubic feet per second (cfs) or more through 234 miles of conveyance. Of these, 33 canals, laterals, and ditches with 94 miles of conveyance (approximately 40 percent) are located within the LID. Field evaluations focused on irrigation systems operated by participating irrigators. RESPEC staff evaluated assessed structural conditions, determined operational functionality, documented the facility's appearance, and mapped structure's location.

A total of 15 proposed projects with 40 associated components were identified for rehabilitation and/or replacement on the 16 irrigation systems that were evaluated during the irrigation system infrastructure field inventory effort. Most of the systems that were inventoried during the study involved weakened or deteriorated diversion and headgate structures along with laterals and ditches that had seepage and erosion issues. Nine systems were inventoried within Converse County, and six systems were inventoried within Platte County. Seven of the inventoried systems were associated with the LID; another eight systems were more individual in nature within the watershed.

Grazing is the predominant land use in the watershed. Approximately 92 percent (1.92 million acres) of rangelands and forestlands are located in the watershed. A total of 167 BLM and 39 USFS grazing allotments are located on an estimated 957,533 acres of federal rangelands and forestlands. State land covers 12.9 percent of the rangelands and 10 percent of the forestlands within the study area.

Existing livestock and wildlife water sources were mapped and evaluated within the study area. The results of water-source inventory and mapping indicated that 82 wells, 11 springs, and 423 stock ponds and reservoirs are viable sources for livestock and wildlife watering within the watershed. Of these 423 ponds and reservoirs, 10 were dry and held no water, 2 facilities had breached dams, and 3 facilities were at risk of being breached because of headcuts below the dam and spillway.

The Wyoming State Historic Preservation Office (SHPO) maintains a database of inventoried historic sites, which indicates that 46 historical monuments and markers are located within the study area. Significant historic sites include the Pioneer Trails and Fort Fetterman. The Pioneer Trails that traverse the watershed include the Bozeman Trail, Oregon-California-Mormon, Oregon-California-Mormon-Pony Express, and Rock Creek-Fort Fetterman Stage Road. Fort Fetterman was established in 1867 and is located north of Douglas on a plateau above the valleys of LaPrele Creek and the North Platte River.

Mining in the watershed dates back to the Paleoindian Period (12,000–8,000 before present, or BP) on a site near Hartville where Paleo-Indians mined ochre for paints and orthoquartzite for tools. Coal mining began near Glenrock and Douglas in 1883, but the only significant production in the study area occurred at the Dave Johnston Coal Mine from 1958 to 2000. No active coal mines exist within the watershed. The study area contains over 40 operating non-coal mines. The largest non-coal operation within the study area is the Smith-Highland Uranium Mine, which is operated by Cameco Resources on over 30,000 acres. Sand/gravel mines comprise the majority of permitted mine operations within the study area.

Oil-and-gas development is an important industry in the watershed with oil-and-gas fields producing approximately 825,000 barrels (bbls) of oil, 2 million cubic feet (mcf) of natural gas, and 6.7 million bbls of water in 2015. Approximately 126,300 acres of oil-and-gas fields and hundreds of miles of pipelines exist within the watershed. Scott Field produced nearly one-quarter of all of the oil in the study area and was also the largest producer of natural gas. The largest water production occurred at Sussex and Glenrock South Fields, with combined production at approximately 5 million gallons of water in 2015.

Wildlife is abundant and diverse within the watershed. Approximately 57 fish species, 41 big game populations or herd units, 29 nongame mammals, as well as reptiles and amphibians, trophy game, fur-bearing animals, predatory animals, small game, and birds are known or expected to occur within the area. Rainbow, brook, brown, and cutthroat trout have been stocked throughout the basin. Big game species, including antelope, bighorn sheep, black bear, elk, mountain lion, mule deer, and whitetail deer, are known to occur within the study area. Nearly 21 percent of the study area is classified as crucial range for antelope, bighorn sheep, elk, mule deer, and whitetail deer. Common mammals in the watershed include coyotes, jackrabbits, red fox, raccoon, skunk, cottontail, and ground squirrels. Approximately 183 nongame bird and raptor species are found in the study area. Turtles, lizards, and snakes are the most common reptiles that generally occur in the study area.

The greater sage-grouse and the black-footed ferret are also known to occur within the study area and are recognized as sensitive species. Executive Order 2015-4 was signed by Governor Mead in July 2015 and requires state agencies to encourage development outside of the sage-grouse core areas. The core areas for sage-grouse cover 6.5 percent of the study area. Only one endangered species is known to occur in the study area: the black-footed ferret (*Mustela nigripes*). Three threatened species occur within the study area: Canada lynx (*Lynx canadensis*), grizzly bear (*Ursus arctos arctos*), and Preble's meadow jumping mouse (*Zapus hudsonius preblei*).

Groundwater in the watershed is important for livestock/wildlife water, private domestic wells, and municipal water. Aquifers within the watershed can be divided into three systems based on geologic age: Tertiary, Mesozoic, and Paleozoic. The aquifers within these systems that currently supply groundwater include the White River Formation, Cloverly Formation, Sundance, Casper, Madison

Limestone, and Flathead Formation. Unconsolidated alluvium, especially along the North Platte River, has large permeability and saturated thicknesses. Approximately 5,900 SEO-permitted water wells are located within the study area. The majority of wells are stock (1,645), domestic (1,616), or both stock and domestic (1,046). Nearly 300 springs and seeps within the study area provide the base flow of streams within the area. In general, the potential to develop a large-scale groundwater supply is low because of low recharge, aquifer depth, potential interference with existing surface or groundwater rights, and locally poor-quality groundwater.

As a result of water scarcity and over-appropriated surface-water rights on the North Platte River, many of the aquifers with hydrologic connection to surface water are unavailable for development because of the 2001 Modified Decree. “Green Area” maps have been developed by the SEO to depict these areas in which the groundwater at any depth is deemed nonhydrologically connected; therefore, well construction and groundwater use are not subject to the 2001 Modified Decree. Approximately 40 percent of the watershed is a groundwater “Green Area.”

The North Platte River and its major tributaries (Box Elder, Deer, Horseshoe, LaPrele, LaBonte, Sage, Sand, and Wagon Hound Creeks) are located within the study area. The headwaters of multiple tributaries to the North Platte River are located along the southwest border of the study area, within the Laramie Mountain Range. These tributaries generally flow north and east until they reach the North Platte River. Approximately 9,590 stream miles are located within the watershed; approximately 1,144 stream miles are classified as perennial. The watershed also contains some tributaries (Broom, Cottonwood, Elkhorn, Muddy, and Willow Creeks) that do not flow into the North Platte River but flow instead into Glendo Reservoir and Guernsey Reservoir.

Currently, a total of 40 (3 active and 37 inactive) USGS gages are located within the watershed. The SEO has eight gaging stations that currently collect streamflow within the study area; although, three stations are operated by the USGS. The remaining five stations are located on tributaries to the North Platte River and irrigation ditches above and below LaPrele Reservoir. The USBR operates four automated hydrologic monitoring stations (HYDROMET) within the study area. No WWDC temporary gaging stations were installed within the watershed as part of this Level I study.

A Level I geomorphic classification was completed for this study by using the Rosgen Stream Classification, which is based on channel morphology parameters such as sinuosity, slope, width/depth ratio, and substrate size. Many streams were classified as either C-Type or F-type channels. Some of the streams that were visited during the inventory had nickpoints and reaches that were adjusting to disturbances from natural and/or man-made events. In the case of many streams in the watershed, channels appear to have stabilized or be in the process of stabilizing after episodes of incision.

The watershed has 20 Wyoming Pollution Discharge Elimination System (WYPDES) point-source discharge permits with a total of 68 outfalls, which includes sanitary wastewater permits for Douglas, Glenrock, Hartville, and Guernsey. The WDEQ has classified 72 surface waterbodies in the watershed for water quality standards designation and attainment. The WDEQ completed assessments on the North Platte River, Horseshoe Creek, and Glendo Reservoir within the study area. No waterbodies in the watershed are listed as impaired or requiring development of a total maximum daily load (TMDL).

Water-storage development has been impacted by the 2001 Modified Decree, which limits new reservoir projects or enlarging existing storage reservoirs. Water-storage investigations focused on existing stock ponds and potential upland water-storage facilities that are less than 20 acre-feet. Three major reservoirs exist in the study area: Glendo Reservoir, Guernsey Reservoir, and LaPrele Reservoir. Glendo Reservoir is the largest water-storage facility within the study area with a storage capacity of 763,039 acre-feet. Guernsey Reservoir is the second largest facility and is located downstream of Glendo Reservoir. This reservoir's storage capacity is 45,612 acre-feet. LaPrele Reservoir is the third largest facility in the study area and has a storage capacity of 21,000 acre-feet. Additionally, a total of 758 minor ponds and reservoirs are permitted by the SEO within the study area. Of these facilities, approximately 396 have a storage capacity from 1 to 19 acre-feet, while another 125 reservoirs range in capacity from 20 acre-feet–650 acre-feet. Another 237 ponds and reservoirs have a capacity of less than 1 acre-foot. These 758 minor ponds and reservoirs have a combined potential storage of 11,427 acre-feet.

Since the 1930s, 22 previous studies on potential reservoir development have been completed by the state of Wyoming and the WWDC within the watershed. The reservoir and dam projects that were proposed in different studies within the watershed included the following sites: Deer Creek Reservoir, Foxton Reservoir, Horseshoe Creek Reservoir, LaPrele Reservoir, Pine Glen Reservoir/South Elkhorn Creek, Schneider Reservoir/Virden Creek, Tully Bucklin Reservoir/Muddy Creek, Wagon Hound Reservoir, Duck Creek Reservoir, Box Elder Reservoir, Little Deer Creek, and Banner Draw.

1.5 WATERSHED MANAGEMENT AND REHABILITATION PLAN

The Watershed Management and Rehabilitation Plan was developed using information from the inventory and provides recommendations for improvements for the following:

- Irrigation system rehabilitation components
- Livestock/wildlife upland watering opportunities
- Grazing management opportunities
- Storage opportunities
- Stream-channel condition and stability
- Wetland enhancement opportunities.

Table 1.1 lists the irrigation system rehabilitation components of the plan. Table 1.2 presents the livestock/wildlife watering components. The 2017 costs were estimated for the conceptual proposed projects by using the NRCS Environmental Quality Incentives Program (EQIP) cost data, costs for similar projects, and manufacturers' and vendors' advertised product prices.

1.6 PERMITS

Information was provided regarding clearances, environmental reviews, agency coordination, and determination of potential impacts that may be necessary in implementing the proposed projects. In general, irrigation and livestock/water project activities on private lands are not subject to local, state, and federal agency review and/or approval. However, almost all of the proposed projects that were included in the Watershed Management and Rehabilitation Plan would require some amount of review and/or approval from the appropriate local, state, or federal agency because these projects typically involve constructing a permanent facility such as a water well, irrigation diversion, or storage reservoir.

In addition to the statutory requirements, additional review and/or approval may also be necessary if local, state, or federal funds and/or technical services are used in implementing the project. These requirements are program-specific and depend on current programmatic criteria of the funding agency.

Table 1.1. Estimated Costs Associated With Each of the Proposed Irrigation Rehabilitation Projects of the Watershed Management Plan

Item Number	Project Name	Description	Total Project Costs (\$)
I-01	LaPrele Main Canal Diversion	Diversion and Headgate Project	235,998
I-02	LaPrele Westside Canal Diversion	Diversion and Headgate Project	118,000
I-03	LaPrele Lateral No. 1	Diversion, Headgate, and Pipeline Project	340,310
I-04	LaPrele Lateral No. 9A Sublaterals	Headgate and Pipeline Project	105,491
I-05	LaPrele Lateral No. 4 Sublateral	Headgate and Pipeline Project	31,152
I-06	LaPrele Lateral No. 2A Sublateral	Headgate and Pipeline Project	24,545
I-07	East Side No. 3 Reservoir	Regulating Reservoir	99,118
I-08	J A Moran Ditch Regulating Reservoir	Regulating Reservoir	123,900
I-09	Walker No. 3 Ditch	Headgate and Pipeline Project	130,743
I-10	Hoffman Ditch and Diversion	Diversion, Headgate, and Pipeline Project	116,348
I-11	Johnson Pump Lift (Cassa Ditch)	Diversion and Channel Stability Project	126,966
I-12	Wright No. 2 Ditch	Diversion, Headgate, and Pipeline Project	114,695
I-13	Wright No. 2 Ditch (Enlargement)	Diversion, Headgate, and Pipeline Project	88,500
I-14	Seepage Saddle Ditch and Diversion	Diversion, Headgate, and Pipeline Project	127,910
I-15	Carey Ditch No. 2 Ditch	Headgate and Pipeline Project	131,215
Total			\$1,914,891

Some of the proposed projects described in this study could involve permitting and funding programmatic requirements and would be subject to state agency review and approval that requires application, coordination, and/or notification with the SEO, WDEQ, SHPO, WGFD, and the Office of State Lands and Investments (OSLI). Some projects involve federal lands and funding that would be subject to the National Environmental Policy Act (NEPA) and other federal regulations. Local zoning ordinances, building and floodplain permits, and road or utility right-of-way may be required within incorporated towns, cities, and counties or from irrigation districts, road districts, and utility or energy entities.

1.7 FUNDING

Funding for the opportunities in the Watershed Management and Rehabilitation Plan depend on local coordination and voluntary cooperation between landowners, managers, irrigators, organizations, and agencies in addressing the land- and water-resource concerns. The CCCD, PCRD, NCD, LRPCD, NCCD, LFLCD, or LID could serve as a sponsor for those funding sources that require a sponsoring entity. For example, the WWDC’s Small Water Project Program (SWPP) participates with land management agencies and sponsoring entities in providing incentives for improving watershed condition and function. By combining funding from additional sources (i.e., NRCS Farmbill or USBR WaterSMART funding), total costs could be potentially reduced for the participants. Additionally, state and federal

agencies, including but not limited to the WGFD, BLM, USFS, USBR, and NRCS, have conservation programs and could potentially assist with project implementation. More information about funding projects is available in the WWDC’s Water Management and Conservation Assistance Programs Directory, which is available from the website (<http://wwdc.state.wy.us/wconsprog/wconsprog.html>).

Table 1.2. Estimated Costs Associated With Each of the Proposed Livestock/Wildlife Water Projects of the Watershed Management Plan

Item Number	Project Name	Description	Total Project Costs (\$)
LW-01	East Draw	Stock Ponds Project	120,850
LW-02	Lone Tree	Spring Development and Tank Project	49,832
LW-03	Lawrence No. 1	Well, Pipeline, and Tank Project	87,302
LW-04	Section 11	Well Rehabilitation Project	63,925
LW-05	Prado 1	Well, Pipeline, and Tank Projects	123,531
LW-06	Section 7	Well, Pipeline, and Tank Projects	69,381
LW-07	T-J-T No. 2	Pipeline and Tank Project	29,566
LW-08	Rock House No. 1	Spring Development and Tank Project	44,238
LW-09	Buggy Hub	Spring Development and Tank Project	40,918
LW-10	Upper Draw	Spring Development and Tank Project	40,918
LW-11	Larime No. 1	Stock Reservoir and Tank Project	79,902
LW-12	Rodeman Livestock No. 2	Pipeline and Tank Project	12,456
LW-13	CT 2A	Stock Pond/Reservoir Project	44,950
LW-14	Pullman	Stock Reservoir Project	44,950
LW-15	Westfork No. 1 (Blue Downey)	Stock Reservoir Project	44,950
LW-16	Bill Young Spring No. 1	Spring Development and Tank Project	61,686
LW-17	Bill Young Spring No. 2	Spring Development and Tank Project	43,693
LW-18	Back 55	Pipeline and Tank Project	103,189
LW-19	Don Sommers No. 2	Well, Pipeline, and Tank Project	94,523
Total			\$1,200,760

1.8 CONCLUSIONS

The following sections describe the inventory efforts, proposed projects, opportunities, and recommendations that were developed as part of the Watershed Management and Rehabilitation Plan.

1.8.1 Irrigation System Components

- Proposed projects and associated components for issues that were identified during field inventories for irrigation system infrastructure were completed for 15 irrigation systems.
- A total of 15 proposed projects with 40 associated components were identified during field inventories for irrigation system infrastructure that were completed for 16 irrigation systems.



- Most of the systems that were inventoried during the study involved weakened or deteriorated diversion and headgate structures along with laterals and ditches that had seepage and erosion issues.
- Nine systems were inventoried in Converse County, and six systems were inventoried in Platte County. Seven inventoried systems and proposed projects were associated the LID, and another eight systems were more individual in nature within the watershed.
- Recommended improvements to existing irrigation systems mainly involve replacing and/or rehabilitating existing diversion and headgate structures and replacing earthen ditches with buried pipelines to reduce conveyance losses and decrease erosion and sedimentation.
- The participants identified rehabilitating their diversion and headgate structures as a priority; the ditch-to-pipeline components were included for potential water-saving opportunities.
- Most of the proposed irrigation system projects would require minor involvement or permitting from regulatory agencies to be completed.
- The proposed work that is involved with the diversion and headgate structures for the LID's Main and Westside Canals would require permitting and associated consultation with the US Army Corp of Engineers (USACE), the SEO, the WDEQ, and the SHPO.

1.8.2 Livestock/Wildlife Upland Watering Opportunities

- Livestock grazing and ranching occurs throughout the watershed with other land uses including mining, wind power, oil-and-gas production, wildlife habitat, and recreation.
- Opportunities to improve range and riparian conditions require installing and operating well-distributed, reliable water sources and watering facilities for livestock and wildlife.
- When a future project is planned and would occur on federal land, coordinating with the BLM and the USFS is necessary when developing proposed livestock/wildlife water-supply projects beyond the conceptual-level projects included within the study report.
- All of the proposed projects and pipeline components were conceptually mapped and located only on private property or state lands within the watershed.
- A total of 19 proposed livestock/wildlife water projects were identified for development, which resulted from an effort that evaluated available water sources in coordination with participating landowners and state land lessees.
- The 19 proposed livestock/wildlife water projects included conceptual plans and component descriptions along with associated cost estimates for each of the proposed projects.
- The project components included 6 wells, 10 solar pumps, 6 spring developments, 21,430 feet of buried pipelines, 22 stock tanks, and 8 stock ponds/reservoirs, which would require additional final planning, design, and permitting to be completed before construction commences.
- The proposed projects and components would need to be installed, operated, and maintained by the landowner or manager in accordance with current standards and specifications to realize the expected benefits within the proposed project areas and to the watershed.

1.8.3 Grazing Management Opportunities

- Reliable water-supply projects need to be developed and constructed in areas with inadequate water sources before grazing management alternatives could be made.
- Developing reliable water sources and associated watering facilities can aid in distribution, timing, and frequency of grazing animals. However, additional measures (e.g., cross fencing, low-stress herding, mineral/salting, and grazing density) should be evaluated as part of the site-specific grazing management inventory and plan.
- Available tools such as the Ecological Site Description (ESD) and the State and Transition Model (STM) can be used by landowners and managers so that they can be aware of the growth potential of desirable vegetation and predicted responses on a particular range sit.

1.8.4 Surface-Water Storage Opportunities

- Institutional issues and constraints related to the 2001 Modified Decree and/or the Platte River Recovery and Implementation Program (PRRIP) limit the opportunity to create new reservoirs or increase existing reservoirs through enlargement within the watershed.
- Storage evaluations focused on existing stock pond/reservoir facilities and potential upland water-storage facilities less than 20 acre-feet that were identified by study participants where conditions limited the ability to store water within the study area.
- One existing storage reservoir (East Side No.3 Reservoir) was proposed for rehabilitation. One new storage reservoir (J A Moran Ditch Regulating Reservoir) was proposed for construction.
- Two existing stock reservoirs (Larime No.1 and Westfork No. 1 [Blue Downey]) were proposed for rehabilitation, and six new stock ponds/reservoirs (Prado 1, CT 2A, Pullman, and East Draw) are proposed for construction within the watershed.

1.8.5 Channel Stability

- Stream channels on the lower reaches of Cottonwood Creek, Horseshoe Creek, Hunton Creek, and La Prele Creek are affecting diversion, headgate, and ditch structures along with stream stability but would require additional investigation and coordination with multiple landowners.
- Site-specific improvements could be developed to alleviate the channel impairments and restore riparian/wetland function as part of the Watershed Management and Rehabilitation Plan.

1.8.6 Other Upland Management Opportunities

- Coordination with the weed and pest control districts should continue, especially regarding beneficial projects such as noxious weed control, planting of desirable vegetation in conjunction with upland water development, and weed eradication on canals or laterals.
- Noxious weed and invasive species control were used to assist range and forest management in accordance with range inventories, applicable ESDs, and state and transition models.

1.9 RECOMMENDATIONS

Several proposed conceptual projects, identified opportunities, suggested alternatives, and initial conclusions have been presented and discussed within this report. The recommendations listed below are also included for consideration:

- The LID's irrigation water-storage and distribution system was too vast to inventory during this study. Although the study effort initially evaluated the LID's priority components of the system, the facilities and infrastructure are aged and require rehabilitation; therefore, the LID is encouraged to submit an application to the WWDC for consideration to complete an Irrigation Master Plan to inventory and assess the LID's system, investigate conveyance losses, and prioritize necessary repairs within the LID.
- Several irrigation system rehabilitation projects and livestock/wildlife water projects could be eligible to apply for funding through the WWDC's SWPP.
- Priority projects should be reviewed and selected, and components should be implemented when the necessary technical and financial requirements are determined.
- Landowners or managers who seek to participate in the SWPP should consult and coordinate with the CCCD, PRCD, NCD, LRCD, NCCD, and/or the LFLCD, which are eligible sponsors of SWPP applications and project agreements.
- Proposed project narratives, conceptual plans, and cost estimates could be used by local sponsors in developing SWPP applications. Preliminary project benefits were included to also assist in program application submittal.
- Several of the proposed projects require additional planning that would include site-specific engineering, cultural resource, geologic, groundwater, and wetland investigations and surveys.
- Although the study effort attempted to address all of the participants' requests, more projects from additional landowners will probably be identified after the study is completed. These projects are also eligible for SWPP funding because of their location within the watershed but will need additional planning assistance.
- The study's GIS and digital library should be used as a tool in planning and developing projects and should be updated as necessary from available information sources.
- Innovative strategies for coordinated project funding and financing involving private, local, state, and federal sources such as current partnership efforts between the LID, CCCD, LRCD, PCRD, NCD, NCCD, LFLCD, NRCS, US Fish and Wildlife Service (USFWS), and the Nature Conservancy should be considered in association with WWDC programs to address resource concerns within the watershed.
- A coordinated approach that is based on local, collaborative endeavors and that integrates more than one watershed issue that results in achieving multiple benefits, is essential.