SOUTH BIG HORN CONSERVATION DISTRICT LONG RANGE PLAN

2023-2028

Table of Contents

Board of Supervisors 3
Personnel 4
District staff 4
NRCS Staff 4
Rules & Regulations 5
Mission statement & purpose 6
Introduction 7
Authority & Governmental subdivision of the state 9
Coordination, cooperation & collaboration 11
Federal involvement 12
SBHCD Natural resource land use planning process 14
SBHCD GOals & policy 15
Water quality & quantity 16
Range, Pasture & Cropland; Tree Plantings & Maintenance 17
Economic & production & government 18
Legislative & District operations 19
Information & education & special projects 20
Resource characteristics 21
Vegetation 27
Wildlife 38
past board of supervisors 41
Resolution of adoption 45

BOARD OF SUPERVISORS

George Kelso, Chairman, Rural
gkelso@bighornfederal.com
Member since 1999

Walter Hibbert, Vice Chairman, Rural
Walterwhibbert20@gmail.com
Member since 1997

Linda Hamilton, Secretary, Rural
lhamilton2272@gmail.com
Member since 1996

Janet Johnson, Treasurer, Urban
cjj@tctwest.net
Member since 2019

Howard Wildman
Howardwildman87@gmail.com
Member since 2014

PERSONNEL

DISTRICT STAFF

Ashley Coenen, District Manager
Ashley.coenen@wy.nacdnet.net
Staff since 2017

NRCS STAFF

Laura Galloway, District Conservationist
laura.galloway@usda.gov
Staff since

Curtis Johnson, Range Management
Curtis.johnson2@usda.gov
Staff since 2016

Hannah Stinson, Soil Conservationist
Hannah.stinson@usda.gov
Staff since 2019

Chad Foster, Civil Engineering Technician
Chad.foster@usda.gov
Staff since 2020

Brianne Patrick, Administrative Assistant
Brianne.patrick@usda.gov
Staff since 2021

RULES & REGULATIONS

I certify that the attached is a true and correct copy of the rules of South Big Horn Conservation District relating to the Natural Resource Land Use Plan adopted in accordance with Wyoming Statute, 11-16-103 to "provide for the conservation of the soil and water resources of this state, and for the control and prevention of soil erosion and for flood prevention or the conservation, development, utilization, and disposal of water, and thereby to stabilize ranching and farming operations to preserve natural resources, protect the tax base, control floods, prevent impairment of dams and reservoirs, preserve wildlife, protect public lands, and protect and promote the health, safety and general welfare of the people of this county.

Prior to adoption, this rule was made available for public inspection on _____ and notices of intended adoption were mailed to all persons requesting notice of proposed rules.

The attached rule is effective immediately upon filing with the Big Horn County Clerk.

Signed this 5 day of July, 2022.

George Kelso

George Kelso, Chairman

MISSION STATEMENT & PURPOSE

"Encourage sustainable, multiple use of natural resources, provide leadership, education and technical guidance to landowners and residents of the district concerning natural resource issues, and support agriculture through the use of locally led, economically viable and voluntary programs to accomplish these objectives."

Purpose

The purpose of the South Big Horn Conservation District (SBHCD) is to share and implement the visions of planning for existing and future sustainability of South Big Horn County through the conservation and wise multiple use of our natural resource base, coupled with maintaining our custom and cultures and a healthy economic base.

Through the efforts of cooperation and communication among the local people, our community will have a beneficial impact on sustaining a strong and viable multiple use of our public and private lands, including agricultural, industrial, mineral production, commercial, recreational, and historical uses, which together will provide the continued ability to generate wealth and the growth and need of our community.

The SBHCD has long been respectful of the constitutional concept of private property rights. It is the intent of this plan to be a guide for the citizens of the SBHCD and others, for identifying and respecting the customs, culture, economic visibility, social stability, and quality of life found in this unique area, and then applying those values to resource conservation, planning, growth, development, and such changes as they may occur within the SBHCD through time.

INTRODUCTION

The Dust Bowl, also known as "the Dirty Thirties," started in 1930 and lasted for about a decade, but its long-term economic impacts on the region lingered much longer.

Severe drought hit the Midwest and Southern Great Plains in 1930. Massive dust storms began in 1931. A series of drought years followed, further exacerbating the environmental disaster.

By 1934, an estimated 35 million acres of formerly cultivated land had been rendered useless for farming, while another 125 million acres-an area roughly three-quarters the size of Texas-was rapidly losing its topsoil.

Regular rainfall returned to the region by the end of 1939, bringing the Dust Bowl years to a close. The economic effects, however, persisted. Population declines in the worst-hit counties-where the agricultural value of the land failed to recover-continued well into the 1950s. (www.history.com/topics/dust-bowl)

In March 1941, the State Legislature passed an enabling act that established Conservation Districts in Wyoming. Conservation Districts were to direct programs protecting local renewable natural resources. To establish a Conservation District, a referendum was held whereby every landowner could cast a vote as to whether they wished to have a district. When the referendum showed that enough wanted to have a district the Greybull Valley Conservation District was formed in 1945. The South Big Horn and Shell Valley Conservation Districts were organized in 1947. The Greybull Valley and Shell Valley Conservation Districts combined and became the Greybull-Shell Conservation District in 1968. In 1977, the South Big Horn and the Greybull-Shell Conservation Districts decided to merge and at that time became known as the South Big Horn Conservation District (SBHCD).

Over one hundred dedicated ranchers and area residents have served as District Supervisors over the past seventy-three years. The board consists of five supervisors: three rural, one urban and one at-large who are elected during the General Election and serve staggered four-year terms. They receive no compensation for their services. Recognition must be given for the great work of all those in the District's history. Who they were, what they stood for, and what was accomplished should not be lost.

The issues Conservation Districts have been dealing with will continue to be a challenge and provide opportunities to learn. Issues the District faces are becoming more complex, requiring more dedication, and work. Through the Conservation District, citizens have a chance to voice their concerns and give possible solutions to problem areas.

The SBHCD Natural Resource Land Use Plan has been developed in partial fulfillment of the requirements of the Wyoming Department of Agriculture (WDA) Base Funding Criteria as per "Wyoming Conservation District Law" (W.S. 11-16-101 through 11-16-134).

AUTHORITY & GOVERNMENTAL SUBDIVISION OF THE STATE

Authority

The SBHCD, pursuant to W.S. 11-16-122 (iv) and (xvi) of the Wyoming Conservation Districts Law is authorized to develop plans for the SBHCD and to file said plans in the office of the Big Horn County Clerk.

Governmental Subdivision of the State

The SBHCD is a local government and a governmental subdivision of the state as defined and established by the Wyoming Statutes at Title 11, Chapter 16, et seq, entitled- "Wyoming Conservation Districts Law". The Board of Supervisors of the SBHCD (5 members) are elected by the people of the SBHCD at General Elections, by popular vote. The elected member represents both the rural and urban populations within the SBHCD. The Supervisors are the only elected board charged specifically with the responsibility of representing local people on natural resource issues. A Conservation District Supervisor serves the community and district voluntarily and without pay. The SBHCD Board of Supervisors employs a District Manager to implement the projects and programs of the SBHCD. The SBHCD programs and administration is supported by a½ mill levy, which is voter approved, revenue generating projects and by grants. The SBHCD has been funded by a ½ mill levy since 1992 when voters approved it.

The SBHCD is guided by the legislative declarations and policy of the Wyoming State Legislature with the following charge:

AS PRINTED FROM: W.S. § 11-16-103 Legislative Declarations and Policy

It is hereby declared that the farm and grazing lands of Wyoming are among the basic assets of the state; that improper land use practices cause and contribute to serious erosions of these lands by wind and water; that among the consequences which would result from such conditions are the deterioration of soil and its fertility and the silting and sedimentation of stream channels, reservoirs, dams and ditches; that to conserve soil, and soil and water resources, and prevent and control soil erosion, it is necessary that land use practices contributing to soil erosion be discouraged and that appropriate soil conserving land use practices be adopted.

It is hereby declared, to be the policy of the legislature to provide for the conservation of the soil, and soil and water resources of this state, and for the control and prevention of soil erosion and for flood prevention for the conservation, development, utilization, and disposal of water, and hereby to stabilize ranching and farming operations, to preserve natural resources, protect the tax base, control floods, prevent impairment of dams and reservoirs, preserve wildlife, protect public lands, and protect and promote the health, safety and general welfare of the people of this state.

The above, being the charge of direction of the Wyoming Legislature for all Conservation Districts within the State of Wyoming, the SBHCD's responsibility to the cooperators of the district is measurable and accountable by the actions the SBHCD takes to accomplish the direction given by the Wyoming Legislature.

The District Board of Supervisors, an elected body, and a local government, is the local guide to the management of lands within the jurisdiction of the SBHCD and is accountable to the citizens of the district.

COORDINATION, COOPERATION & COLLABORATION

This plan is intended to provide a positive guide for the people of the SBHCD and local, state, and federal agencies in coordinating their management activities. This should be done in a manner consistent with locally led planning efforts. The intent is to ensure that agency actions provide additional benefits to local citizenry. Coordination with the local government, such as the SBHCD, can help achieve this important goal.

Statutes exist that outline the roles of local government in planning activities. These statutes generally outline the need to coordinate land use planning activities with state agencies, boards, commissions, and departments; and provide technical assistance, information and education to the state, counties, municipalities, regions, and political subdivisions of the state, relative to land use planning.

The SBHCD, and its citizens, recognize that federal law outline a multiple use management paradigm of federal managed lands. The SBHCD has long supported multiple use, not only for federally managed lands but also for State managed lands. Sustaining multiple uses includes preservation of historic and traditional economic uses on federally and state managed lands within the affecting SBHCD.

Upon gaining Statehood, the State of Wyoming retained concurrent civil and criminal jurisdiction by the State of Wyoming on all lands ceded to the federal government, (W.S. 3610-103). To this end, local government works in coordination with federal agencies.

It is the intent of the SBHCD to ensure communication with federal and state agencies on proposed actions that affect resources that lie within jurisdictional boundaries of the SBHCD. Where appropriate, the SBHCD board will coordinate with federal and state agencies in planning and implementation of those actions. When formal communication is required, official notification and delivery of information and documents should be directed to the attention of the Chairman of the South Big Horn Conservation District, 408 Greybull Avenue, Greybull, Wyoming 82426. Electronic correspondence should be sent to sbhcd1@gmail.com.

FEDERAL INVOLVEMENT

Federal laws governing land management require coordination by the managing agency. The federal agencies' authorities provided or cited throughout this plan are given direction on cooperating with local government and other agencies. In the Executive Order for Facilitation of Cooperative Conservation, August 26, 2004, guidance is given to federal government agencies.

In 36 CFP Part 219.1 (National Forest...Planning) Interaction with private landowners, it is clearly indicated that:

> *"The responsible official must seek to collaborate with those who have control or authority over lands adjacent to or within the external boundaries or national forests of grasslands to identify:*
>
> *(a) Local Knowledge.*
>
> *{b) Potential actions and partnership activities.*
>
> *(c) Potential conditions and activities on the adjacent lands that may affect management of National Forest lands or vice versa; and*
>
> *(d) Issues {Sec. 219.4).*

In 36 CFR Part 219.14 (National Forest...Planning) Involvement of State and Local Governments, it states that:

> *"The responsible official must provide early and frequent opportunities for State and local governments to: (a) Participate in the planning process, including the identification of issues; and (b) Contribute to the streamlined coordination of resource management plans or programs.* [11]

In 40 CPR Part 1506.2 (Council on Environmental Quality) Other Requirements of NEPA it states:

> *(b) Agencies shall cooperate with state and local agencies to the fullest extent possible to reduce duplication between NEPA and state and local requirements, unless the agencies are specifically barred from doing so by some other law. Except for cases covered by paragraph (a) of this section, such cooperation shall to the fullest extent possible include:*
>
> *(1) Joint planning processes.*
>
> *(2) Joint environmental research and studies*
>
> *{3) Joint public hearings (except where otherwise provided by statute)*
>
> *(4) Joint environmental assessments*

43 CFR Part 1610.3-2 outlines that:

"State Directors, district and area managers shall, to the extent practicable, keep apprised of state and local governmental.... policies, plans and programs, but they shall not be accountable for ensuring consistency if they have not been notified in writing, by state and local governments... if an apparent inconsistency.

43 U.S § 1701, the Federal Land Policy and Management Act (FLPMA), declared the National Policy to be that:

"The national interest will be best realized if the public lands and their resources are periodically and systematically inventoried and their percent and future use is projected through a land use planning process coordinated with other federal and state planning efforts" (43 U.S.C 1701 (a) (21).

43 U.S.C. § 1712 © of FLPMA, sets forth the "criteria for development and revision" of land use plans. Section 1712 © (9) refers to coordinate statue of a county which is engaging in land use planning, and requires that the Secretary {of interior}

"Shall…coordinate the land use inventory, planning and management and activities…with the land use planning and management programs of…local governments within which the lands are located."

43 U.S.C § 1712, also provides that the Secretary of Interior:

"Shall…assist in resolving, to the extent practical, inconsistencies between federal and nonfederal government plans, "and" shall…provide for meaningful public involvement of state and local government officals…in the development of land us programs, land use regulations, and land use decisions for public lands."

It is reasonable to assume that "meaningful involvement" refers to consultations and involvement throughout the planning cycle not merely at the end of the planning cycle. This latter provision of the state also distinguishes the elevated statue of local government officials from members of the general public or special interest groups of citizens in the decision-making process.

43 U.S.C. § 1712 (c) (9) provides that the Secretary of Interior assure that the BLM's land use plan be "consistent with State and local plans" to maximize extent possible under federal law and the purposes of the Federal Land Policy and Management Act.

The provisions of 43 U.S.C, § 1712 (c) (9) of FLPMA set forth the nature of the coordination required by the Bureau with respect to the planning efforts by local government officials. Subsection (f) if Section 1712 sets forth an additional requirement that the Secretary of Interior "shall allow an opportunity for public involvement" which again includes local governments. The "public involvement" provisions of Subsection (f) do not limit the coordination language of Section 1712 (c) (9) or allow the Bureau to simply lump local government officials in with State government, special interest groups of citizens or members of the public in general. The coordination requirements of Section 1712 (c) (9) set apart for special involvement those government officials who are engaged in the land management and resource conservation planning process, as is the SBHCD. Engaging in the land management and resource conservation planning process fulfills the SBHCD Board's obligation to plan for future management and uses.

Additionally, the National Environmental Policy Act (NEPA) requires that all federal agencies consider the impacts of their actions on the environment and on the preservation of the culture, heritage and custom of local government.

In 42 U.S.C, § 37 4331 (a) the law provides:

"..it is the continuing responsibility of the Federal Government, in cooperation with State and Local governments, and other concerned public and private organizations, to use all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of American."

SBHCD NATURAL RESOURCE LAND USE PLANNING PROCESS

The public was asked to give input on where it was felt that SBHCD should focus our efforts under each goal. Public input within the 45-day public comment period was incorporated to update the goals and SBHCD policies.

Through the adoption of the plan, the Board of Supervisors have incorporated the results of the public participation sessions, questionnaire information, and public comments, with existing SBHCD information and the existing Long-Range Plan adopted by the board in 2018.

Current specific goals of the SBHCD can be outlined as follows, recognizing that significant programmatic overlap occurs. For example, education is a necessary component of all operations to some degree:

- Water quality and quantity
- Range, pasture, and cropland
- Tree plantings and maintenance
- Economics and production
- Government
- Legislative
- District Operations
- Information and education
- Special projects

It is recognized that the South Big Horn Conservation District will continue to experience change driven by a variety of social, economic, and natural resource issues and concerns, resulting in programmatic evolution through time.

The SBHCD has been a Government Cooperator in the Big Horn National Forest's Forest Plan Revision, cooperating agency in the BLM Big Horn Basin RMP revision, cooperator in Alkali Creek/Leavitt Reservoir, Big Horn County Natural Resource Plan, and is currently a cooperator in the BLM Sage Grouse Initiative Revision plan.

The SBHCD particularly relies on the USDA-NRCS for technical assistance and other support.

SBHCD anticipates continuing membership in the Wyoming Association of Conservation Districts and the National Association of Conservation Districts.

SBHCD GOALS & POLICY

For each operational goal, the district adopted policy based upon the communities' input in the development of the Natural Resource Land Use Plan.

The SBHCD Board of Supervisors have adopted the following general policies which will help in the operation and administration of the SBHCD.

- The SBHCD will cooperate and consult with cooperators and residents of the SBHCD, and the several public institutions/government agencies in the conservation of the water, soil, plants, and wildlife resources in the SBHCD, within budgetary constraints
- The SBHCD will provide technical and material assistance in an equitable fashion to the cooperators of the SBHCD, within the budgetary constraints.
- The SBHCD will conduct their statutory responsibilities in their entirety, in cooperation and with the trust and acceptance of the district's cooperators.
- The SBHCD will review, study and comment, when possible, on all local, state, and federal legislation, rules and regulation promulgated or revised that may have an effect on the SBHCD Natural Resource Land Use Plan and our Cooperators.
- The SBHCD Board of Supervisors will continue to be aware of natural resource issues and concerns within the boundaries of the SBHCD and create information sources to share with the cooperators of the SBHCD in their on-the-ground soil and water resource management projects, to help sustain long term economic base for future generations.
- The SBHCD recognized the natural background which is prevalent in our perennial, intermittent and ephemeral streams. The district will strive to define the water cycle to include the natural backgrounds effect on water quality in our jurisdiction.
- The SBHCD Board of Supervisors reserve the right to appeal local, state, and federal decisions that adversely affect the South Big Horn Conservation District Natural Resource Land Use Plan.

WATER QUALITY & QUANTITY

Goal: To protect water quality and quantity for use now and for future generations.

Water quality and quantity objectives:

- Obtain grant money or cost share to facilitate Best Management Practices (BMP) development.
- Promote education of water conservation and water quality to landowners, operators, and schools.
- Assist landowners and operators with Best Management Practices to reduce non-point and point source pollutants.
- Improve watersheds and riparian zones through education and conservation practices such as the Russian olive/salt cedar removal and revegetation and grazing management projects.
- Participate in World Water Monitoring Day and other conservation programs.
- Maintain the districts water quality monitoring program to gather scientifically credible date (chemical, physical and biological) on local watershed health.
- Provide education to landowners to reduce the contribution of non-point and point source pollution on streams concerning septic systems and livestock waste.
- The district will support water development projects that increase water quantities for beneficial use within the district, while conserving the traditional custom, culture, and economy.
- Use the information from the level 1 studies and continue to promote projects for Small Water grants.

RANGE, PASTURE & CROPLAND; TREE PLANTINGS & MAINTENANCE

Range, Pasture & Cropland

Goal: To protect and improve productivity of South Big Horn County's rangeland, pasture and cropland while maintaining the local tax base.

Range, Pasture & Cropland Objectives:

- Provide information on range, pasture, and cropland management
- Assist other resource agencies in the fight against noxious weeds
- Promote and encourage landowners to use the on-site NRCS web soil survey
- Promote BMPs on rangeland and irrigated cropland to reduce erosion and maintain productivity
- Work to sustain the agriculture resource base
- Encourage proper grazing management planning and water storage development for livestock
- Pursue other funding in the future such as Water Smart and/or NWQI

Tree Plantings & Maintenance

Goal: Establish new windbreaks for habitat, energy savings, resource conservation and aesthetics.

Tree Plantings & Maintenance Objectives:

- Promote and successfully establish tree plantings for energy savings, environmental benefits, and wildlife
- Assist communities in proper planting, care, and maintenance of trees
- Promote and encourage revegetation of lands treated for Russian olive/salt cedar removal
- Continue the annual seedling tree sales
- Assist landowners with the design of windbreaks
- Support the County Fire Wise Committee

ECONOMIC & PRODUCTION & GOVERNMENT

Economic & Production

Goal: Encourage a sustainable economy for future generations

Economic and Production Objectives:

- Sustain and protect land-based production enterprises in South Big Horn County while ensuring the local tax base
- Work with others to obtain economic development in South Big Horn County
- Support multiple use of public lands throughout the community, state, and national levels

Government

Goal: Provide expertise on local natural resource issues

Government Objectives:

- Identify and build rapport with Local, State and Federal agencies; establish common ground for mutual concerns
- Increase awareness of the need for more local control and fewer blanket rules and regulations
- Maintain partnerships with Local, State and Federal agencies to provide technical assistance and/or funding to local landowners
- Provide input on threatened and endangered species within the district boundary
- Keep County Commissioners and elected officials informed of natural resource issues and district activities
- Be a liaison between policy making agencies and South Big Horn County citizens on natural resource issues
- Participate on public lands and other issues, socioeconomics, and cultural issues
- Support the protection on private property rights

LEGISLATIVE & DISTRICT OPERATIONS

Legislative

Goal: The South Big Horn Conservation District will be active in following Local, State and National issues regarding natural resource.

Legislative Objectives:

- Communicate with County Commissioners and State Legislators pertaining to natural resource concerns
- Hold one legislative meeting per year in conjunction with surrounding Conservation Districts before the Wyoming Legislative session commences

District Operations

Goal: Be a useful resource to communities within the district.

District Operations Objective:

- Increase resource library materials and utilization
- Increase community involvement in conservation activities
- Continue to see other funding sources, in addition to current support, to fulfill conservation needs in Big Horn County
- Provide subdivision reviews as required by law
- Continue the partnership with the Natural Resource Conservation Service
- Enhance and promote the education of staff and supervisors to better serve constituents
- Assist and oversee Watershed Districts as required by statute

INFORMATION & EDUCATION & SPECIAL PROJECTS

Information and Education

Goal: To initiate and coordinate educational and informational programs supporting the wise use and conservation of natural resources within the boundaries of the South Big Horn Conservation District.

Information and Education Objectives:

- Provide and promote educational opportunities through tours, seminars and displays
- Promote and provide hands-on activities to make natural resource studies more interesting and practical to students
- Promote conservation efforts and provide natural resource information through internet and newspapers
- Provide citizens with information on technical assistance to them through the natural resource agencies
- Inform residents of Local, State and National conservation issues
- Educate landowners about BMPs for water quality projects
- Work with small acreage landowners in providing education on natural resource management
- Sponsor scholarships for educators to attend natural resource seminars and workshops

Special Projects

Goal: Provide assistance to address specific resource needs

Special Projects Objectives:

- Maintain a strong working relationship with NRCS and local work groups
- Provide education to citizens concerning non-point source pollution
- Increase urban conservation programs regarding non-point source pollution

RESOURCE CHARACTERISTICS

The SBHCD includes 2,200 square miles of Big Horn County. In 2021, the estimated population of Big Horn County was 11,632 (U.S. Census, 2021). Big Horn County experienced a 1% decrease from April 1, 2020, to July 1, 2021. Only 16.6% (240,250 acres) of South Big Horn County is privately owned. Public lands include Bureau of Land Management 60.5% (874,724 acres), Big Horn National Forest 18.7% (269,974 acres), State 3.6% (51,712 acres) and Local Government 0.1% (2084 acres). Irrigated agricultural land covers 117,425 acres and non-irrigated acres covers 1,329,387 acres. (Suitewater, 2021).

Big Horn County, on the west side of the Big Horn Mountains, takes up most of the northeastern portion of the much larger Bighorn Basin, which stretches from the Owl Creek Mountains to the Pryor Mountains in southern Montana. On its east and west sides, the basin is rimmed by the Bighorn Mountains and Absaroka Range.

The Bighorn rivers flows from south to north through the county, with the Greybull and Shoshone rivers flowing into it from the west. In the 1800s, canals tapping into these three main waterways furnished water for irrigation. (wyohistory.org)

Greybull was named after the Greybull River, which was named for an albino bull buffalo. It became a town in 1909 when the railroad bought land from John Borner who had built a cabin in 1888 along the Big Horn River close to where the Greybull River and Shell Creek flow into the river.

Basin was founded by Winfield S. Collins in 1897. Basin City, as it was originally named, became involved in a newspaper duel with the neighboring town of Otto to see which town would become the county seat. Basin won.

Manderson originally called Alamo, was established in 1901. Manderson was renamed in 1906 in honor of Charles F. Manderson, chief legal counsel for the Burlington Railroad.

Burlington was settled by a colony of Mormon settlers in 1893 and was named for the Burlington Railroad. It was hoped the railroad would make its way to Burlington and make it a larger town, but it never materialized. The farming and ranching did help to develop the town.

Shell was settled in the spring of 1886 and named for the abundance of fossil shells located in the area. Nearby exposed formations such as the Cloverly Formation and the Morrison Formation has yielded numerous fossils of dinosaurs and other animals. West of the town is

the Red Gulch Dinosaur Track Site, a rare collection of dinosaur tracks from the Jurassic period.

Emblem was first settled in the early spring of 1899 when a group of German Lutheran colonist who had been living in the western part of South Dakota and Nebraska arrived and started clearing for homestead sites and worked on finishing the bench canal.

Otto was named for Otto Franc, a local cattle baron who owned the Pitchfork Ranch in the Big Horn Basin. Otto has the distinction of being the first town surveyed in the Big Horn Basin. It was once a contender for county seat but was beat out by Basin when an election was held to select a county seat for the newly created Big Horn County.

Hyattville was established in 1886 at the junction of the Medicine Lodge and Paintrock Creeks. Samuel Hyatt started a store and post office and Hyattville was named for him. After a fire destroyed the store in 1900, he remained and became a rancher.

Attractions: Bighorn National Forest and Cloud Peak Wilderness, Pryor Mountain Wild Horse Refuge, Medicine Lodge Archaeological Site, Greybull Museum, Red Gulch Dinosaur Track Site, Big Horn Canyon National Recreational Area (also known as Yellowtail Reservoir), Shell Falls, Paintrock, and the ancient Medicine Wheel. Outdoor recreationalists find a wealth of wild game, fish, and outdoor scenery.

The land within the boundaries of the South Big Horn Conservation District is quite diverse with the Big Horn Mountains to the east, flanked by the fertile foothills just west of the Big Horns and then the sedimentary soils of the basins at the lower elevations. Generally, the mountain soils are shallower with a low pH while the basin soils are more alkaline but with varying soil depths. Irrigated farmland and arid desert rangeland comprise the large, low elevation basin with wetlands and riparian areas bordering the streambeds. Mountainous areas are comprised of coniferous forest and tundra.

The South Big Horn Conservation District includes all lands in the southern part of Big Horn County. The SBHCD and the Shoshone Conservation District border one another on the north. The western boundary borders Park County and the southern boundary borders Washakie County. The SBHCD occupies the central part of the Big Horn Basin.

The Big Horn Basin is a plateau region and intermontane basin, approximately 100 miles wide, in north-central Wyoming. It is bounded by the Bighorn mountains on the east, the Pryor mountains on the north, the Absaroka Range on the west, and the Owl Creek mountains and Bridger mountains on the south. It is drained on the north by tributaries of the Big Horn River, which enters the basin from the south, through a gap between Owl Creek

and Bridger mountains, as the Wind River, and becomes the Big Horn as it enters the basin. The region is semi-arid, receiving only 6-10 inches of rain annually.

An examination of a buffalo petroglyph near Greybull, WY indicated that 1,000-1,500 years ago showed that the Shoshone and Crow Indian tribes lived in the Big Horn Basin before the arrival of white men.

The basin was explored by John Colter in 1807. Just west of Cody, he discovered geothermal features that were later popularly called "Colter's Hell". In 1823 the first group of white fur trappers led by Jedediah Smith passed through the Big Horn Basin and later spent their first winter with a band of Crow Indians. The region was later transverse by the Bridger Trail, which was blazed in 1864 by Jim Bridger to connect the Oregon Trail to the south with Montana. The route was an important alternative to the Bozeman Trail, which had crossed the Powder River Country, but had been closed to white settlers following Red Cloud's War.

Big Horn County was organized in 1896. The county was created from parcels taken from Johnson, Fremont, and Sheridan counties. Big Horn County was named for the Big Horn or Rocky Mountain Sheep, which were numerous in the county in the early days.

Climate

South Big Horn County is in a region of extreme weather and contrasting climates. The mountains, foothills, canyons, and basin topography contribute to the weather patterns we see. Temperatures can reach as high as 100 F in the summer, with winter lows commonly dipping to -30 F. Precipitation varies as well. Mean annual precipitation is 21.6, rainfall is an average of 5-8 inches in the lower portion of the Basin. Snow in the Big Horn Basin is very light with annual averages from 15-20 inches in the lower portions and 30-40 inches on the sides of the Basin where elevations range from 5,000 – 6,000 feet. The mountains receive much more snow than the lower portions and in the higher ranges annual amounts are over 200 inches.

Nearly 50% of the precipitation in the low elevations come between April 1 – June 30th. The hottest months are generally July and August, while the coldest are January and February. South Big Horn County is one of the least windy areas in Wyoming.

Geology

The physical diversity found in the area is largely due to the tremendous geologic spectrum of the Big Horn Basin. The geologic treasures found in the Southern Big Horn County include the Red Gulch Dinosaur Track Site, various dinosaur bone digs and discoveries, and incredible rock formations. The landscape of the basin and surrounding mountains has been shaped by many different geologic processes including folds, faults, uplifts, glacial action,

and fluvial erosion and sedimentation. During the early Eocene epoch (52 million years ago), a large inland freshwater lake covered most of the Big Horn Basin. The Absaroka volcanic plateau was also formed during the Eocene. During this period, volcanic ash fell into the great lake and formed the numerous bentonite beds found in this area. The Big Horn Mountains began to rise as the result of and anticlinal uplift, about 60 million years ago. Formation of the Big Horns and Absaroka Mountains required long periods of glacial activity, which carved the canyons, valleys, and foothills of the area. Surface geology significantly determines the soil development and vegetation growing in the area.

Economically important minerals are located in the geologic formations of southern Big Horn County. Bentonite is found in the Frontier Formation, Mowry Shale and Thermopolis Shale. Gypsum outcrops, usually associated with the Gypsum Springs Formation are mined as well. Oil and gas producing fields throughout the basin.

Soils

The soils in the southern Big Horn County are very diverse. The soil survey can be accessed by going to the NRCS website. Each soil found in the area is dependent on parent geology, inter-relationships with weather, water, vegetation, and the activities of man. Most soils found along streams and rivers are adequately fertile to produce grass and alfalfa hay. On irrigated lands, the major limiting soil factors in producing crops are the concentration of salts in the soil surface, soil structure, permeability, and porosity. In areas where alkaline salts such as sodium, calcium and potassium have accumulated on the surface, the production of the land is reduced.

The most productive soils are located along the rivers and streams, where there is organic composition and good drainage. These sites are a product of fluvial deposition, which layers sand, silts, and clays in gradients, depending on the valley slope and the distance from the parent geology. These soils have been fertilized and farmed to increase production. Soils in the desert have surface organic layers of less than five inches and are more susceptible to erosion. Saline uplands are common in the desert where salt bush is the dominant plant, and salt concentrations are high in the soil. The salts are a product of geologic periods when the basin was covered with water, and salt precipitated out of the water into the underlying material. Production in these areas is commonly less than 500 pounds an acre.

The mountain area soils are generally better drained but vary in productivity. Soil in the foothill slope and valleys is generally deep, high in organic material and very productive, producing up to 2,500 pounds of forage per acre. Forest soils usually have lower pH due to pine needle litter, which inhibits the growth of grasses and forbs. The alpine regions generally have shallow soils and lower organic matter. Alpine soils may only produce 750 pounds of forage per acre. Riparian soils throughout the mountain

areas contain much higher amounts of organic material, are usually deeper and are generally more productive.

Agriculture

Agriculture is the primary basis for Big Horn County's economy. The agricultural operations use techniques that have helped conserve and build up the soil on farms and ranches.

The irrigated areas are used for growing sugar beets and malt barley, which are the main cash crops and are high value crops. Other crops grown locally include alfalfa hay, beans, grass hay, alfalfa seed, feed barley, native grass, and corn. Some of the irrigated areas are used for irrigation pastures as well.

The livestock industry accounts for a large portion of South Big Horn County's agricultural income and is the oldest continuing industry in the county and is still the single largest land user. Many of the ranches have summer range on the Big Horn Mountains and some operate on rangeland year-round, supplementing the range grass with hay during the winter and spring. Livestock raised in the area is primarily cattle and sheep, however, there are several breeders of good quality saddle horses in the area.

Industry, Minerals, Oil and Gas Development

Natural gas, oil and bentonite constitute the minerals in South Big Horn County and a variety of industries operate in the county. Many residents find employment in the mining and processing of minerals and with the railroad that runs through the basin. Bentonite is mined east of Greybull and processed in plants just north of Greybull.

Tourism & Recreation

Tourism and recreation in the Big Horn Basin has been increasing in recent years. There has been in increase in the number of cabins that have been built in the mountains near streams and creeks and in increase in the different types of recreation enjoyed by those visiting or moving to this area. Some of the recreation enjoyed within the SBHCD includes off-road vehicle use, snowmobiling, hunting, and fishing, rock climbing, rock-hunting, horseback riding, mountain biking, camping, hiking, searching for artifacts, bird- watching and enjoying the abundant wildlife of the area.

The SBHCD has several historical sites and area attractions, which include:

- Bighorn Scenic Byway: follows US-14 beginning in Shell and moving through Shell Canyon into Bighorn National Forest. The road winds up the Bighorn Mountain, showcasing craggy limestone outcroppings, colorful stacks of granite, and sandstone filled with fossil shells.
- Bighorn National Forest: covers more than 1.1 million acres of fir, pine, spruce, and aspen trees in north-central Wyoming and encompasses the Cloud Peak Wilderness area.
- Shell Falls: halfway into Shell Canyon, Shell Falls drops 3,600 gallons of water per second as it follows a course carved by fractures in granite.

- Red Gulch Dinosaur Track Site: located near the Red Gulch/Alkali National Back Country Byway close to Shell, Wyoming and one of only a few worldwide from the Middle Jurassic Period with dozens of dinosaur tracks dating back 167 million years.
- Medicine Lodge Archaeological Site: located in Hyattville has long been known for its Indian petroglyphs and pictographs and are directly associated with important human habitation sites for thousands of years.
- Bridger Trail-: a trail blazed by Jim Bridger west of the Bighorn Mountains that was safer than the Bozeman Trail.
- Devil's Kitchen: located 5 miles east of Greybull. Colorful, eerie rock formations are part of the sequence of colorful sediments containing important dinosaur remains Floral Design: at the west of Greybull Avenue, A 35-foot tribute.
- Midway Golf Club: located 5 miles south of Greybull is a 9-hole course that is member owned and opened to the public.
- Sheep Mountain: the oldest layers of rock exposed in Sheep Mountain are found in the walls of a spectacular canyon by the Big Horn River north of Greybull. These rocks are called the Madison Limestone Formation and were originally laid down in a shallow sea. The Sheep Mountain anticline boasts and arch of over a thousand feet.

Museums

- Museum of Flight and Aerial Firefighting: an assemblage of retired aircraft. The museum is promoted as a dedication to educating people about the several types of aircraft and retardant systems that have evolved over the years.
- Greybull Museum: pioneer history with many cultural artifacts.

Bighorn Basin Geoscience Center: great geological and paleontological (dinosaur) displays.

VEGETATION

The types of plants growing in a region are mostly influenced by the precipitation, temperature, and soils. As southern Big Horn County has several different precipitation and temperature zones, and a variety of soil types, the area also contains many different types of vegetation communities. These plant communities provide important habitat for wildlife, important commodities such as timber and livestock grazing, and add to the recreational and aesthetic value of the land.

Vegetation Community Types

Several well-known botanists have presented vegetation community type delineations of the Big Horn Basin area, usually including it in a larger scale map of either the State of Wyoming, or the entire nation. Using these for reference, as well as data collected by Ecologic Services, it provides the vegetation community types of southern Big Horn County.

Alpine Tundra

These areas lie above timber line {9,500 ft. to 13,000 ft.) and are dominated by low growing shrubs, forbs, and grasses. Trees of these areas are low grazing and often grouped into krummholz growth forms, with dense branching at the base of the tree and a spindly truck having branches on only one side. Although plenty of rain and snow fall in these areas, production is limited by heat deficiency and wind. Because alpine areas in Wyoming are on the tops of mountains, the extent of the tree line may reach higher up the mountain depending on the aspect. Trees on the eastern and southern slopes tend to grow higher on the mountain than those on the western and northern slopes, primarily due to exposure to wind on the west, and shade on the north cooling the area.
Forage production is usually less than 800 pounds per acre but may reach 1500 pounds per acre where water accumulates. Plants common in these areas include aquatic sedge, small wing sedge, alpine rush, Idaho fescue, tufted hair grass, oat grass, bistort, alpine forget-me- not, phlox, mountain big sagebrush, booth willow, wolf willow, snow willow, Engelmann spruce and sub-alpine fir.
Alpine areas are important sources of water and often contain large snowfields or glacier which supplies water to streams late in the summer and fall. The highest precipitation zone in the area is at these sites where precipitation of both snow and rain is high.

Mountain Coniferous Forests

The mountain forest of this region is dominated by lodge pole pine, which creates a band

of trees between 8,000 and 10,000 feet on the western slope of the Big Horn Mountains. Forests may occur much lower on the mountain, such as on the north facing slope of Shell, Trapper and Paintrock Canyons. These areas get less sun, which lowers the evapotranspiration and allows trees to grow. In the upper limits of this type, spruce and sub-alpine fir may dominate, especially where fires are not common. In the lower limits of this type, Douglas fir may dominate. Understory vegetation consists of several types of bluegrasses, trisetum, reed grass, bent grass, dropping wood reed, heart leaf arnica, pine drops, huckleberry, russet buffalo berry, ground juniper and aspen. As forest shade the ground, they are an important part of the watershed, because snow accumulated here melts slower, providing an extended runoff period and increasing infiltration into the soil. With this vegetation type are dry parks, which due to the shallowness of the soil or the lack of moisture accumulation in the soil, remain treeless. These areas are dominated by grasses and forbs. Important wildlife and bird habitat is provided here, where ecological diversity is maintained.

Wildfire is an important component of this vegetation type, and fire suppression has significantly increased the extent of density of coniferous forests on the western slope on the Big Horn Mountains. Most fires follow the ground, burning off the understory of plants, duff, and wood debris, seldom reaching the branches of trees. These types of fires have historically been common, occurring every 50 to 250 years, and served to thin the forest, eliminate fuels, cycle nutrients, and prevent the forest from moving into a higher serial stage, as well as release seeds from serotinous cones. As fire suppression persists, forests become thicker, fuels accumulate on the floor, and later seral species such as sub-alpine fir and Engelmann spruce dominate, thereby increasing the chance of crown fires. Crown fires are much more destructive to the forest for the short term. Following fires, herbaceous and shrub type vegetation dominates during early succession, followed by sun tolerant trees such as lodge pole pine and aspen. Aspen may suddenly occupy areas that did not appear to have the proper habitat to support aspen.

Timber harvesting on the Forest Service lands has been significantly reduced over the last several years. Most timber harvested in southern Big Horn County is on private and state lands.

Mountain Meadows and Riparian

Areas adjacent to streams or naturally sub-irrigated, form areas of much higher plant diversity and productivity. These areas remain green through the drier seasons when upland herbaceous vegetation has become dormant. There are several types of wet

meadows and riparian areas in the Big Horn Mountains, depending on the depth of soil, time of saturation, and the various types of riparian vegetation growing in the area. Most riparian areas on the mountain will contain one or more of the following species: Baltic rush, aquatic sedge, Nebraska sedge, tufted hair grass, alpine timothy, bent grass, reed grass, Kentucky bluegrass, saxifrage, bistort, mountain bluebell, elephant head, gold cup cinquefoil, shrubby cinquefoil, plane leaf willow, Geyer willow, wolf willow, Bebb willow, booth willow, bog birch and aspen.

Riparian and wet meadow areas occupy very little of the mountain landscape, however, these areas are a very important component in the mountain ecology. Forage production is extraordinarily, reaching as high as 3,000 pounds per acre at some sites. The high production supports higher levels of ungulate grazing, as well as habitat for bird nesting, beaver dam building, insect breeding habitat, cover for fish and other aquatic fauna such as frogs and muskrat. Wet and sub-irrigated meadows also filter water, maintain water quality, absorb water during wet periods and slowly release water during drier times maintaining stream flow, slow overload flow, and lower peak flood flows.

As these locations are very productive and remain green while the other areas are dry, livestock and wildlife are attracted and often concentrate on these riparian zones. This has caused some real headaches for livestock permittees running their animals on the mountain rangelands. Livestock operators are now required to limit their use in these green areas as to as set "stubble height" on Forest Service riparian areas.

In addition, many range allotments have implemented grazing rotations, and installed water improvements such as pipelines and troughs or reservoirs. These management plans have been met with some success, depending on the terrain, the commitment of the Forest Service and the ability of the permittee to implement the plan and install the improvements.

Mountain and Foothill Sagebrush Steppe

The area dominated by big sagebrush occupying un-forested lands in southern Big Horn County, between 4,500- and 9,000-feet elevation, is labeled the sagebrush steppe. These areas are by far the largest vegetation community types in the area and cover portions of the entire county. Most grazing in the region occurs on these types of lands, and both livestock and wildlife are dependent on these areas for extended periods during the year. Sagebrush is not considered a palatable forage, but it has high forage value, especially in late winter when the herbaceous forage value is very low. Many birthing and winter habitat areas for elk, deer, and other wildlife species lie in the sagebrush steppe.

Forage production varies depending on soil types, aspect, and elevation from 500 pounds per acre, to over 2,000 pounds per acre. As this vegetation type occurs over a wide spectrum of land types, plant species commonly found in this area are very

diverse. Vegetation commonly observed includes needle and thread, blue bunch wheatgrass, bottle brush squirrel tail, red three awn, Idaho fescue, prickly pear cactus, scarlet globe mallow, phlox, mile vetch, evening primrose, penstemon, Wyoming big sagebrush, basin big sagebrush, silver sagebrush, bud sage, fringe sage, greasewood, shadscale, Gardner's saltbush, broom snakeweed, green rabbit brush, rubber rabbit brush, aspen, juniper, and limber pine. The tree species are more likely found at the higher elevations and higher precipitation zones, and the low shrubs such as broom snakeweed are more common at the lower elevations with lower precipitation. Precipitation is greater in the foothills and mountain areas of this vegetation type. Snow accumulates here and collects where brush is dense. The sagebrush and other plants in this area prevent quick runoff during spring melt or following thunderstorms and other precipitation events. These features, as well as its immense size, make the sagebrush steppe important components of watersheds.

As in the pine vegetation community type, fire is an important factor in sagebrush vegetation types as well. Sagebrush contains volatile oils which when dry, readily fire, and enable the sagebrush canopy to burn quickly, without scorching the soil. This characteristic of sagebrush dominated vegetation types prevented sage from becoming too dense, thereby allowing herbaceous plants, which frequently survive fires to flourish. Fires typically produce a mosaic of burned and unburned sagebrush, which encourages diversity and healthy habitat for a variety of wildlife. Fire prevention efforts, firebreaks such as roads, and managed grazing have reduced the frequency of wildfire in the sagebrush type, causing increases in sagebrush density and lower productivity of grasses and other palatable forage. Prescribed burning of Natural Resource Land Use Plan rangelands has successfully mimicked the effects of wildfires on limited areas of land.

Juniper Woodlands

Areas of similar precipitation and elevation as the sagebrush steppe, with very shallow soil, very steep terrain, or sometimes southern exposure, tend to better support Rocky Mountain juniper and various associated species. The most prominent area of this vegetation type is on the mountain foothills east of Hyattville. These consist of juniper savannahs or open woodlands, with trees scattered into locations where they can establish roots. Herbaceous vegetation is sparse, consisting mainly of bunch and rhizomatous grasses such as blue bunch wheatgrass, western wheatgrass, Indian rice grass and red three awn. Sub-dominant shrubs and trees are more prevalent, such as common juniper, big sagebrush, shadescale, skunk brush, spiny hopsage, greasewood and limber pine.

The role of fire in juniper woodlands is similar to its role in sagebrush landscapes. Historically, juniper stands would burn on thirty to sixty-year intervals. Juniper may, however, become so dominant that a fire cannot spread from tree to tree, due to the

loss of fine fuels in the understory. Unless there are very strong winds and very low humidity when a lightning strike occurs, wildfires may not ever burn large areas dominated by juniper. It is much more difficult to prescribe burn in this situation and may involve individually burning each tree.

Basin Riparian and Wetland

The basin riparian vegetation community type is restricted to perennial streams and rivers in the Big Horn Basin, and some intermittent and ephemeral streams in the foothills.

Irrigation and farming activities have extended this type into areas that did not previously support these types of plants. This type is characterized by narrow leaf and plains cottonwood forests, with sub-dominate trees and shrubs such as skunk bush sumac, water birch, boxelder, red-osier dogwood, Russian olive, salt cedar, western virgins bower, coyote willow, booth willow, Geyer willow, plane leaf willow, snowberry, wood rose and greasewood. Herbaceous plants include basin wild rye, reed grass, Kentucky bluegrass, foxtail barley, meadow barley, orchard grass, Nebraska sedge, water sedge, iris, and bluebells. This assortment of plants creates a multiple canopy effect, creating cover for many types of animals, and nesting habitat for a variety of birds. The plants also bind the soil, preventing erosion, and creating undercut banks that are important for fish habitat. Also, vegetation shades the water, keeping it cool in the summer and maintaining a livable medium for trout.

Vegetation communities within this type are often categorized as wetlands under the Army Corps of Engineers Wetland Delineation Manual (1987), which limits activities witch as dredging and filing. Riparian and wetland areas provide ground water recharge, act as water filters and store or slow flood flows.

Salt Desert Shrub

Areas with high salt accumulation in the soil, shallow slopes and low annual precipitation create a perfect habitat for Gardner's saltbush. These areas are generally lower in elevation then the sagebrush steppe and are often located between the sagebrush steppe and ephemeral washes. Gardner's saltbush may constitute 100% of the plant composition for several hundred acres, such as landscapes east of Greybull. Other salt tolerant plants able to survive in this area are inland salt grass, western wheatgrass, alkali sacatoon, red three awn, blue grama, prickly pear cactus, woods phlox, winter fat, rubber rabbit brush, shadscale and greasewood. Salt desert shrub vegetation types provide an important winter habitat for several wildlife species and important rangelands for livestock. Saltbush is both palatable and very nutritious, especially in the winter when grasses have lost their nutrient value. As these areas have sparse vegetation and very little ground cover, precipitation will quickly run off. Snow accumulating in the winter will melt early in the spring or even during warm winter

days, wherefore the salt desert is not an important water storage area. Snow melt or long drizzling rains are more likely to infiltrate into the soil and add to the soil moisture. During the summer months thunderstorms are much more common, producing water that flows off the land, with very little infiltration. The plants that grow in this environment make do with the marginal moisture that makes it into the soil profile.

The Big Horn Basin is one of the driest areas in the United States, and residents of the county are fortunate to have abundant water resources when compared to other areas of Wyoming. The Big Horn Mountains on the eastern boundary and the Absaroka Mountains to the west collect large quantities of snow. The mountain snowpack acts like large reservoirs throughout the winter, slowly releasing water in the spring into the streams and rivers which flow into the fertile Big Horn Basin. The Big Horn River flows from southern mountains, supplying our area with plentiful water during the growing season. In addition, southern Big Horn County overlies limestone, dolomite and sandstone formations which form aquifers, containing tremendous quantities of high-quality water. These sources of water have been extensively developed for domestic, agricultural, municipal, and industrial uses, enhancing land value, wildlife, fisheries, and other natural resources.

To analyze hydrologic characteristics, areas are often broken up into watersheds to make quantifying water resources easier. The major watersheds in southern Big Horn County are the Nowood River, Paintrock Creek, Greybull River, Shell Creek, Beaver Creek, Dry Creek and Bear Creek.

Streams and Watersheds

Due to the aridity of the area, streams and rivers are of higher economic and social importance than in other areas of the nation. Virtually all the communities in Big Horn County are near the Big Horn River or its major tributaries. Most commercial crops are irrigated with water diverted from one of these streams, and streams have historically supplied most of the domestic and municipal water.

Watersheds are defined as areas of land where water flows to a common point within the watershed before it leaves the watershed. This creates an area of specified boundaries determined by ridges and divides, and not crossing a naturally flowing stream except where the main stem stream leaves the watershed.

Each watershed has unique characteristics, derived from the geology, soils, climate, elevation, and vegetation which exist in the watershed. The principal stream in southern Big Horn County is the Big Horn River, which flows into Big Horn County from the south, and continues to flow north until it leaves the county and enters Montana. Of the Big Horn River tributaries, the Nowood River has the largest watershed, the longest main

stem length, the highest sinuosity, and highest mean annual discharge. Bear Creek is the smallest stream in all respects, although discharge is not available. The steepest and least sinuous are Beaver Creek, Trapper Creek and Medicine Lodge Creek, which are all tributary streams and flow almost entirely in the Big Horn Mountains. Peak discharges normally occur in the spring of the year during run off and snow melt. Watersheds containing large portions of mountain snowpack will peak differently than watersheds lying predominately in the basin.

The only stream not rising from the mountains is Dry Creek, which as expected, has the lowest mean annual discharge, the shallowest stream and watershed slope, and the second highest sinuosity. Irrigation wastewater discharges contribute a significant portion of flow to Dry Creek, especially in the late summer, fall and winter. Most other streams beginning in the basin are ephemeral.

Streams emerging from the mountains are normally less sinuous and steeper for the first several miles, and when they enter the basin meandering increases and slope decreases. This is due to elevation changes, plus the resistance of high elevation geology, such as granite and limestone, to erosion. Shell Creek has low sinuosity and steep slopes above the Shell Town site and the measurement of the entire stream, which includes flow in the Big Horn Basin between Shell and Greybull, shows higher sinuosity and shallower slopes.

Ground Water

Water below the earth's surface is classified as ground water. When water has saturated voids in soil or rock and is in sufficient quantity to supply flow to the surface in either springs or wells, the water bearing material is called an aquifer. Ground water may lie in unconfined conditions, known as water table aquifers, where water is at surface atmospheric pressure, or in confined aquifers, where water is held in usually deeper geologic formations at pressures higher than surface atmospheric pressure. Ground water is expressed at the surface as springs, wells, or artesian wells.

Water in geologic formations is under either confined or unconfined conditions. The highest yields are generally from confined deeper aquifers. These geologic formations are characterized as far from the earth's surface, thick, permeable, and porous limestone, dolomite, or sandstone. The Tensleep, Madison Limestone, Big Horn Dolomite and the Flat Head Sandstone geologic formations supply the largest quantity and highest quality water of the deep confined aquifers. Wells from these aquifers are usually under pressure, causing water to flow up the pipe until it reaches the hydraulic head of the aquifer. These are artesian wells. If the water flows from the pipe at the ground surface, the well is a flowing artesian well.

Groundwater quality problems may be man induced or natural. Only natural water quality impairments have been identified in south Big Horn County. Fluoride contamination to groundwater has been found in different locations of the county but this does not mean widespread contamination, only that samples taken from some local wells have elevated levels of fluoride.

The aquifers with the highest potential for development to supply water are closer to the surface and generally under unconfined conditions. Unconfined aquifers which meet quantity and quality requirements for wells are composed of sandstone such as the Lance, Mesa Verde and Frontier formations, and fine-grained sediments of shale mudstone, siltstone, and claystone, found in the Willwood, Gypsum Spring, and Chugwater formations. Wells developed in these formations supply limited quantities of water, usually for domestic use.

Aquifers of unconsolidated material such as alluvium and other glacial and fluvial deposits are affected by up gradient geology and surface water infiltration. The alluvial aquifer associated with Paintrock Creek contains high concentrations of calcium bicarbonate and emerges from springs in limestone and dolomite aquifers and flows over this geology high in the watershed. The alluvial aquifer lying below Shell Creek contains calcium sulfate, which originates in the Gypsum Springs Formation, commonly exposed in the Shell area of the watershed. The sodium sulfate and sodium calcium sulfate water in alluvium and colluvium adjacent to the Nowood and Greybull Rivers indicates that water flowing into these aquifers has been exposed to marine or carbonaceous shales found in the Big Horn Basin.

Lakes and Reservoirs

Lakes and reservoirs are an important natural resource in our area, which provide habitat for fish and other aquatic species, supply water storage and offer many forms of recreation. Because of the various topography and ecology zones in the area, there are different types of lakes and reservoirs.

Many high elevation lakes in the Big Horn Mountains are unique as they receive cold, clear, high-quality water. In these lakes, light can penetrate deep into the lake, allowing fish to be viewed several feet below the surface. Lakes that meet these water quality criteria are termed oligotrophic lakes and have a low level of primary productivity. These types of lakes provide pristine habitat for trout and many other aquatic species that rely on very high-water quality, as oligotrophic lakes contain high concentrations of oxygen and low levels of harmful elements such as silt and phosphorus. Lakes such as the Medicine Lodge Lakes, Shell Lake and Lake Solitude are good examples of

oligotrophic lakes.

Other lakes in the mountains, foothills and in the basin are not as clear as the oligotrophic lakes. These lakes contain higher levels of primary productivity, which creates turbidity in the water and causes light to be absorbed. Fish cannot be seen in these types of lakes unless they are close to the surface. These lakes are termed mesotrophic lakes.

Mesotrophic lakes are valuable also, because they too offer quality habitat, and the higher production increases the growth of fish. However, as aquatic plants die in the winter and sink to the bottom of the lake they decompose, which deoxygenates the water. If the deoxygenated water is extensive, and rises close to the ice level, winter fish kills will occur. Examples of mesotrophic lakes are Meadow Lark Lake and Renner Reservoir.

Water Quality

Many factors contribute to the quality of both surface and ground water. Water emerging from springs and wells has been exposed to the geologic formations of its origin. Geochemical processes, which may take several years, dissolve material from rocks and increase the soluble load in the water. As water ponds or flows over the earth's surface, material is again dissolved and contributes to the soluble load in the water. These dissolved constituents may be inorganic such as ionic salts, man-made pollutants such as pesticides, or naturally hazardous materials such as selenium. Water also picks up loose particles as it flows and suspends these solids in the water column. The suspended load consists of rock, soil, or organic matter such as dead plant material. Suspended solids will remain if water flows with enough energy to keep it in suspension. Material that bounces along the bottom of a stream never becoming suspended is termed bedload and is separated from the dissolved and suspended material flowing in the stream. The dissolved load, suspended load and bedload combined equal the total load of sediment flowing in a stream.

Water quality sampling techniques are as important as what is being sampled. There are several proper sampling protocols for analyzing water quality indicators, and sampling dissolved or suspended constituents in flowing water, as well as methods used to care for the sampled water as outlined by the U.S. Environmental Protection Agency and Geological Survey. If the sample is used for loading estimates, the sample must be both width and depth integrated using a specialized sediment sampler for this purpose.

Surface water quality in the Big Horn Basin is most influenced by the frequency and magnitude of storms in the basin. When storms occur in the basin, turbidity in

streams increases drastically due to suspended sediment picked up from the sparsely vegetated desert and dry washes.

Alternately, dissolved constituents tend to decrease in concentration following storms. Water emerging from wells and springs in the basin may contain high levels of dissolved salts, calcium carbonate and trace mineral elements. Precipitation flowing on the surface has not been exposed in the ground water geology, therefore when spring water and precipitation mix, the rainfall dilutes the dissolved concentration in the water. During the hot dry summers, evaporation will increase the concentration of the water and will increase the concentration of total dissolved solids (TDS) in the water. Streams that originate in the basin usually have TDS concentrations greater than 1,000 mg/L, while streams originating in the mountains have TDS concentrations less than 1,000 mg/L.

Phosphorus increases in streams are due to both natural and human sources. Natural sources of phosphorus include soil and precipitation, while human sources include phosphate detergents in sewage and agricultural fertilizers. Problems associated with phosphorus loading include increased primary production, algae blooms, and deoxygenation of water. Phosphorus is most attached to soil particles, therefore when total suspended sediments (TSS) increase, an increase in phosphorus loading in the stream may also be seen. Irrigation wastewater maintains elevated levels of phosphorus in streams and rivers of the county, however, the levels are not high enough to cause concern, although phosphorus loading causes algae growth in irrigation ditches, which is a costly nuisance.

Wells completed in confined bedrock aquifers such as the Madison Limestone, Tensleep Sandstone, Big Horn Dolomite, and the Flathead Sandstone Formations tend to have low and varying concentrations of dissolved solids, depending on the formation type, depth, and location. The TDS concentration tends to increase the further the well is from the outcrop of the formation. The Lance, Willwood, and Frontier Formations are generally unconfined, closer to the surface and have higher dissolved concentrations. Many water bearing formations, such as the Mowry Shale, do not meet water quality standards for even livestock use, and wells are seldom completed in these formations.

Municipal water for domestic use must meet federal drinking water standards. Municipal water within the county is supplied by the Big Horn River, Paintrock Creek, Nowood River, Greybull River, Lance Formation, Madison Formation, and the Flathead Formation.

Generally, groundwater is considered easier to treat and of higher quality, however, it is usually harder, which decreases the lathering capabilities in soap, and leave carbonate deposits or lime in plumbing fixtures and sinks.

Water Rights

The State of Wyoming has ownership of all water within the boundaries of the state, and the responsibility to manage its water for the benefit of the people of Wyoming. The Wyoming State Engineer and the Board of Control supervises and administers water rights matters, according to the Prior Appropriation of Beneficial Use Doctrine. Water rights are attached to real property and cannot be separated from the property without petitioning the Board of Control. Water cannot be appropriated unless it is specifically put to the beneficial use which the state has defined, and the water right holder must continue to put the water to beneficial use or risk losing the water right.

The right to divert water from a stream and applying it to farmland is essential to raising crops in most of southern Big Horn County. The Wyoming State Engineers office has granted water rights to thousands of acres in the area, not only for irrigation diversion, but for storage, municipal, domestic, and industrial uses.

WILDLIFE

The wildlife resources in southern Big Horn County are recognized as valuable and unique assets. In this part of the state, hunting and fishing are a premier pastime, which are not only a form of recreation, but also a means of income for many residents of the county. As a result, management decisions concerning wildlife and wildlife habitat often produce emotional and volatile comments and reactions. Fortunately, the fisheries and game herds are healthy and there is plentiful habitat which with proper management, insures a sound resource for the long term.

Wildlife and fish in Big Horn County are the property of the State of Wyoming, and their management is the responsibility of the Wyoming Game and Fish. The management of wildlife and fisheries requires the management of their habitat, which are owned by either the federal government, the state or private landowners. Cooperative efforts between these entities are essential for the proper management of these important resources.

Antelope

Antelope in southern Big Horn County range from the Big Horn Mountains to the western edge of the county. These areas provide adequate habitat and ample forage. Antelope like open plains, fields, grasslands, brush, deserts, and basins. Antelope in Wyoming occupy areas within three to five miles of water. During the winter months, antelope probably get most of their water from snow, in areas with low precipitation antelope use unfrozen water sources.

White-tailed Deer

White-tailed deer habitat includes heavy protective cover such as riparian areas, forested areas, or damp, brushy draws. The ideal habitat for white-tailed deer is in the lower elevation areas with alfalfa, corn, or small grain croplands located adjacent to streamside cottonwood-willow riparian habitat, wetland marshes, or interspersed woodlots with intermixed abandoned farmsteads reverting to brushy cover areas. (http://www.wyomingextension.org/agpubs/pubs)

Mule Deer

The only big game species that is found all over southern Big Horn County, from the alpine zones to the driest portions of the basin, is the mule deer. Mule deer are very adaptable and may be found in the forest, open juniper woodlands, sagebrush foothills and the desert. Mule deer get most of their water from foods such as vegetation that is growing near water. Mule deer depend on permanent streams, springs, and seeps for

daily water intake when vegetation and ponds dry up in the late summer and early fall. Mule deer spend a significant portion of time on private farmland, primarily in the winter and early spring. They easily live-in contact with people foraging on gardens in the summer and hedges in the winter.

Elk

South Big Horn County contains excellent elk habitat, as the Big Horn Mountains supply spring, summer, and fall habitat, and the foothills offer cover, calving areas and wintering grounds. Elk generally do not venture too far from the mountain, although sightings near Greybull and Manderson are not uncommon. Elk like the balance of forage and cover on the mountain, where the dense forests, parks and alpine ridges provide all they need for most of the year. Elk are common on remote farmland during some periods of the year, such as late summer on alfalfa fields, or during early rut and winter. Unlike mule deer, elk prefer to keep a distance from people, unless living in man's company is necessary to find forage and thermal cover. The amount of suitable winter and calving habitat is most likely the limiting factor in elk populations in this area.

Moose

Moose is the largest big game animal in Wyoming. Moose live in higher elevations during the summer close to aspens and Lodgepole Pine forests. In the winter months, moose generally live in the lower elevations near riparian/deciduous shrub vegetation. In the Big Horn Mountains, moose rarely exhibits elevational movements seasonally. They move from willow riparian habits to conifer habitats during the winter.

Bighorn Sheep

Although bighorn sheep were natives of this area, the population was close to extinction in southern Big Horn County before reintroduction efforts. Bighorn sheep have been reintroduced into the Big Horn Mountains at different times since the late 1950's with limited success. In 1959, 1964, and 1965, bighorn sheep were reintroduced into the Paintrock Canyon area. In 1973 and again in 2004 and 2006 they were planted in the Devils Canyon area. In 1992, 1993 and 1994 sheep were reintroduced into the Shell Canyon area.

Trophy Game

Mountain lion and black bear are the trophy game species living in southern Big Horn County. Mountain lions are pure carnivores, preying on big and small wild mammals and livestock. Black bears are omnivorous, feeding on carrion, insects, berries, seeds, and roots. When natural food supplies are limited, black bear commonly raid camp sites and garbage dumpsters. Although both lions and bears mostly inhabit mountainous habitats, they occasionally move down stream corridors and can be observed near urban and rural areas.

Upland Game

Upland game birds include sage grouse, ruff grouse, blue grouse, mourning dove, Hungarian partridge, chukar, wild turkey and pheasant. Sage grouse, blue grouse and mourning doves are native, while the others were introduced. Sage grouse have become a species of concern due to habitat alteration and fragmentation.

The proper mixes of tall sagebrush, short sagebrush, herbaceous vegetation, and open ground are needed for different stages of the sage grouse yearly and life cycles. The sage and desert areas of southern Big Horn County have adequate habitat to support huntable populations of sage grouse. Blue grouse are found in the conifer forests a ruff grouse prefer the aspen woodlands. Chukars and Hungarian partridge stay predominately in the sagebrush and desert habitats, using the badland and cheatgrass dominated rangelands, although dense cheatgrass can limit partridge populations. Pheasants and wild turkey concentrate in riparian and farm areas where they have ample cover and forage.

Waterfowl

As the suitable waterways for ducks and geese in the area are limited, waterfowl are not as prolific as in other parts of the country. The most common species of ducks in the area include mallard, teal, wood duck, goldeneye, shoveler, ruddy duck, and merganser. Farm ground provides excellent forage areas for geese and ducks after harvest in the fall. Land developments such as livestock watering ponds, irrigation canals, and large reservoir developments provide additional habitat for waterfowl.

Non-game Animals

Non-game species include songbirds, birds of prey, non-game mammals (such as squirrels, porcupines, and rabbits), reptiles, and amphibians. Non-game species are an important component of the ecosystem, and their abundance or disappearance may indicate ecological disturbances or trends.

Fish

Game fish found within the water of southern Big Horn County include cutthroat trout, brown trout, brook trout, splake, golden trout, rainbow trout, lake trout, grayling, mountain whitefish, bluegill, small mouth bass, largemouth bass, rock bass, black crappie, yellow perch, sauger, black bullhead, channel catfish, burbot (ling) and walleye. Other non-- game fish include darter, carp, sucker, shiner, minnow, and dace.

Southern Big Horn County has excellent warm and cold-water fisheries and different types of fishing for the angler to enjoy. The clean cold water found in mountain streams and lakes support brook, rainbow, cutthroat, and even golden trout. Streams and rivers of the foothills support mainly rainbows and browns. The warm water fisheries follow the Big Horn River, as well as reservoirs throughout the Big Horn Basin. The most common warm water fish in the river include channel catfish, sauger and bullhead.

PAST BOARD OF SUPERVISORS

Greybull Valley	Years of Service
A.O. Porter	1945-1947
M.W. Anderson	1945-1946
Walter Preis	1945-1968
Ross D. Wardell	1946-1948
Blake Partridge	1946-1948
John C. Snyder	1946-1955
Lazell Preator	1947-1956
Bob Sawyer	1948-1954
Cliff Aagard	1948-1952
Claude Trumbull	1952-1955
Ollie Kukla	1954-1957
Ora J. Gould	1955-1958
Gene Lewis	1955-1958
James McNiven	1956-1959
Ira Ilg	1958-1965
Lou Dobson	1958-1961
Lyle McPeek	1958-1967
Arlan Preator	1959-1965
Edgar Woods	1961-1963
Lee Allen	1964-1966
Charles Ondracek	1965-1968
Hy Williams	1965-1967
Bert Snyder	1967
Stanley Preator	1968
Amos Howe	1968
John Anderson	1968

Shell Valley	Years of Service
Thales Smith	1947-1949
J.R. Douglas	1947-1950
John P. Forbes	1948-1953
John Lampman	1948-1951
James M. Whaley	1948-1957
Scott Smith	1949-1952
Maxon Ewen	1951-1954
Jack Linderman	1952-1956
Metz Smith	1953-1965
Edwin Shaffer	1955-1959
George Hinman	1955-1959
Oral Harvey	1957-1963
Martin Howe	1957-1966
Wayne Barnett	1959-1967
Lloyd Smith	1959-1962
John Anderson	1962-1968
Orville Greer	1965
Jack Clucas	1964-1965
Paul Herren	1966-1968
Morris D. Stoddard	1966-1968
Norman E. Collingwood	1966-1968
Amos Howe	1968

Greybull-Shell	Years of Service
Walter Preis	1968-1970
Charles Ondracek	1968-1969
Stanley Preator	1968-1977
Amos Howe	1968
John Anderson	1968-1974
Norman Collingwood	1969-1974
Jonathon Davis	1970-1977
Ferril Riley	1971-1973
Tom Wamhoff	1974
Don T. Clucas	1975
Lyle J. Neves	1975-1977
Jerome Kurtz	1976-1977
Dixie Johnson	1977

South Big Horn	Years of Service
Ralph Mercer	1947 & 1951
Roy Feusner	1947 & 1949
J.H. Bishop	1948 & 1950
Roy Burris	1948 & 1951
Franklin Johnson	1950, 1956-1957 & 1968-1973
Dean Doyle	1951 & 1955
Glen Evans	1951 & 1956-1957
Floyd Akin	1952 & 1955
Art Wrigley	1954-1955
Martin Pervinas	1953-1954
Ted Skovgard	1955-1957 & 1959
Jack Turner	1955-1968
Art Johnson	1957-1960
LP. Hulshizer	1957-1960
Rex D. Allison	1958-1972
Charles Vonberg Jr	1959-1962
Clarence Mobley	1960-1965
Charles Fritz	1960-1963
Art Brown	1962-1965
Jim Rubis	1963-1974
Jerry Lewis	1965-1976
Walter Schwartz	1966-1968
Claude Craft	1969-1974
George Shirran	1973-1976
Earl Cross	1974-1976
Vern Estes	1975-1976
Larry Jones	1975-1976
Sterling Spann	1977-1978
Jerry Kurtz	1977-1979
Bud Shirran	1977-1991
Jonathan Davis	1977-1990
Stanley Preator	1977-1984
Maxson Ewen	1979-1986
Frank Hinckley	1979-1985
Lyle J. Neves	1985-1992
Mary Clucas	1986
Dale Urbigkit	1987-1989

Robert Walton.....1987-1990
Earl Jensen.....1990-2004
Dave Grabbert.....1995-1998
DuWayne Gernant.....1995-1998
Linda Hamilton.....1992-Present
Walter Hibbert.....1993- Present
George Kelso.....1999-Present
Mitch (Michael) Vigil.....1999
Richard Russell.....2001-2003
Nancy Joyce.....2003-2014
Ted Zier.....2005- 2018
Howard Wildman.....2014- Present
Janet Johnson.....2019-Present

RESOLUTION OF ADOPTION

The district, as developed and prepared by the Board of Supervisors in cooperation with individuals, and other organizations, is hereby adopted as the official work program of the South Big Horn Conservation District.

We believe that it will provide a comprehensive means of coordination the efforts of landowners, operators, and natural resource users in South Big Horn County.

Thus, we hope to obtain maximum and proper use of all lands and our natural resources to meet objectives through the application and proper conservation principals and practices.

The updated long-range goals and objectives have been approved and adopted by the South Big Horn Conservation District Board of Supervisors at their regular monthly meeting held this 5 day of July, 2022.

George Kelso, Chairman

Walter Hibbert, Vice-Chairman

Linda Hamilton, Secretary

Janet Johnson, Treasurer

Howard Wildman, Member