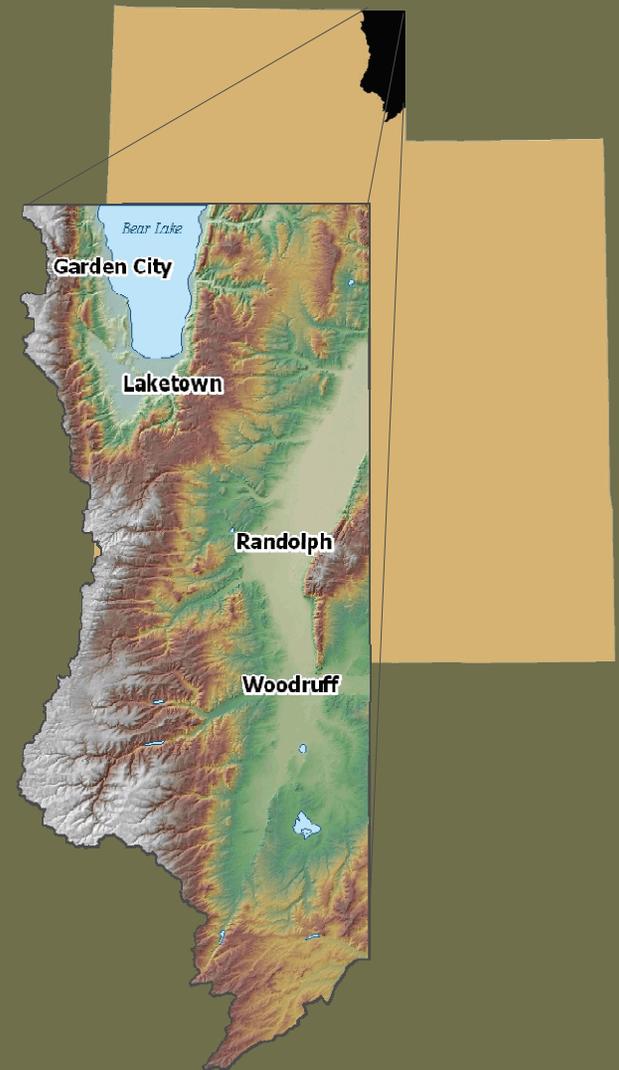


RICH COUNTY RESOURCE ASSESSMENT

APRIL 2011

Conserving Natural Resources For Our Future

RICH COUNTY CONSERVATION DISTRICT



Acknowledgments

Rich County Conservation District

with the:

Utah Association of Conservation Districts
Utah Department of Agriculture and Food
Natural Resources Conservation Service

in partnership with the:

Utah Conservation Commission

Utah Conservation Districts Zone's 1 through 7
Utah Department of Environmental Quality
Utah Department of Natural Resources
Utah Grazing Board (Chair and Vice-Chair)
Utah School and Institutional Trust Lands Administration
Utah State University Extension
Utah Weed Supervisor Association

UtahPCD

State Agencies and Organizations:

Utah Department of Community and Culture
Utah Department of Environmental Quality
Utah Department of Natural Resources
Utah Resource Conservation & Development Councils
Utah School and Institutional Trust Lands Administration
Utah State University College of Natural Resources
Utah State University Cooperative Extension Service
Utah Energy Office

Federal Agencies:

U.S. Department of Interior
Bureau of Land Management
U.S. Fish and Wildlife Service
Bureau of Reclamation
U.S. Department of Agriculture
U.S. Forest Service
Natural Resources Conservation Service
Agriculture Research Service
Farm Service Agency

Other

State Historical Preservation Office
Governor's Office of Planning and Budget
Rich County Commission

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Rich County Resource Assessment: Executive Summary

Photo courtesy of Krista Payne



Farming, ranching, and recreation are important to Rich County's economy.

Why a Resource Assessment?

The Rich County Conservation District has developed this resource assessment with the goal that conservation efforts in the county address the most important local resource needs. This report identifies natural and social resources present in Rich County and details specific areas of concern. Local, state, and regional entities can use this assessment to develop county resource management plans or to target conservation assistance needs.

We recognize that all who could have provided information may not have had the opportunity. This document is dynamic and will be updated as additional information is available. Your comments are requested:

Rich County Conservation District
195 N. Main St./P.O. Box 97
Randolph, Utah 84604

Natural Resource Priorities and Concerns

The Rich County Conservation District has identified five natural resource priorities and concerns. These priorities receive special emphasis because of their immediate significance to Rich County:

Locally Important Farmland: Designation for Locally Important Soils beyond Prime and Statewide Soils

Noxious Weeds: Perennial pepperweed, musk thistle and Canada thistle

Irrigation Canals: Recent Utah legislation has focused attention on the risk/importance of canals

Grazing Land: The Rich County consolidated grazing project proposes to make comprehensive changes in management on five BLM allotments in the county

Sage Grouse Habitat: Improving sage-grouse habitat

General Resource Observations

Natural and social resources are categorized as Soil, Water, Air, Plants, Animals and Humans (SWAPA + H). This assessment describes the general condition of these resources and highlights additional concerns in each category. As opportunities become available to address these issues, and as circumstances change, their emphasis should be elevated accordingly:

Soil: Erosion related to grazing management

Water: Irrigation water management, impaired waterways

Air/Climate: No significant concerns at this time

Plants: Brush management

Animals: Sensitive species, wildlife depredation

Humans: Bear Lake development, oil & gas development, recreational use of county resources

Introduction

The Conservation Movement

The Dust Bowl of the 1930's brought the beginning of national programs to conserve soil and water resources in the United States. On April 27, 1935, Congress declared soil erosion “a national menace” and established the Soil Erosion Service. Since then, the agency was changed to the Natural Resources Conservation Service (NRCS). In May of 1936 farmers were allowed to set up their own districts to direct soil conservation practices. Today, Utah has thirty-eight conservation districts divided into seven zones.

Conservation Progress

The Rich County Conservation District was established in 1952. Since then, great strides have been made toward improving and sustaining natural resources in Rich County. The 2005 resource assessment listed the most critical resource concerns as 1) water quantity and quality, 2) grazing lands, 3) noxious weeds, and 4) wildlife habitat. The 2010 resource assessment provides an opportunity to evaluate the progress made during the last five years and to set new goals to address the highest priority conservation needs in Rich County.

Resource Assessment Outreach

In July 2010, the Rich County Conservation District surveyed local landowners and public officials to find out how they view the county’s natural resources and what conservation issues were most pressing. Respondents indicated that water quantity and quality are still major concerns as well as properly managing grazing land to maintain a sustainable agricultural industry. Other top concerns included: weeds, particularly perennial pepper weed and dyer’s woad; irrigation canal improvements and maintenance; protecting sage-grouse habitat; and maintaining current levels of recreational opportunities in Rich County.



Dust Bowl Farm, 1936-1938



Photo courtesy of Krista Payne

Rich County farmland, 2010

Rich County Overview

Background

Rich County, in the northeast corner of Utah, occupies a long, narrow area approximately 18 miles wide and 56 miles long, extending north of Echo Canyon. It is bordered on the east by Wyoming and on the north by Idaho with the southern half of Bear Lake extending into the county. Rich County has a total land area of 654,840 acres, or about 1,031 square miles.¹

Rich County takes its name from Mormon colonizer Charles C. Rich, who was called by Brigham Young to lead colonies and make settlements in the area. The first settlements in what is now Rich County resulted from previous settlements made in the Bear Lake Valley in Idaho. Charles C. Rich had led a colony from Cache County into the Bear Lake Valley in 1863. In the fall of 1864, settlers who had spent the previous winter in Paris and surrounding communities in the Bear Lake Valley moved southward into what is now Rich County, Utah.¹

All the communities within Rich County are rural and remote from the larger urban areas of Utah. In 2009, the entire population of Rich County was 2,329, one of the lowest county populations in the state.² Median family income was \$52,148 (in 2009 inflation-adjusted dollars) compared to the state median of \$63,426.³ Rich County's racial makeup is primarily white: 97% of the total.

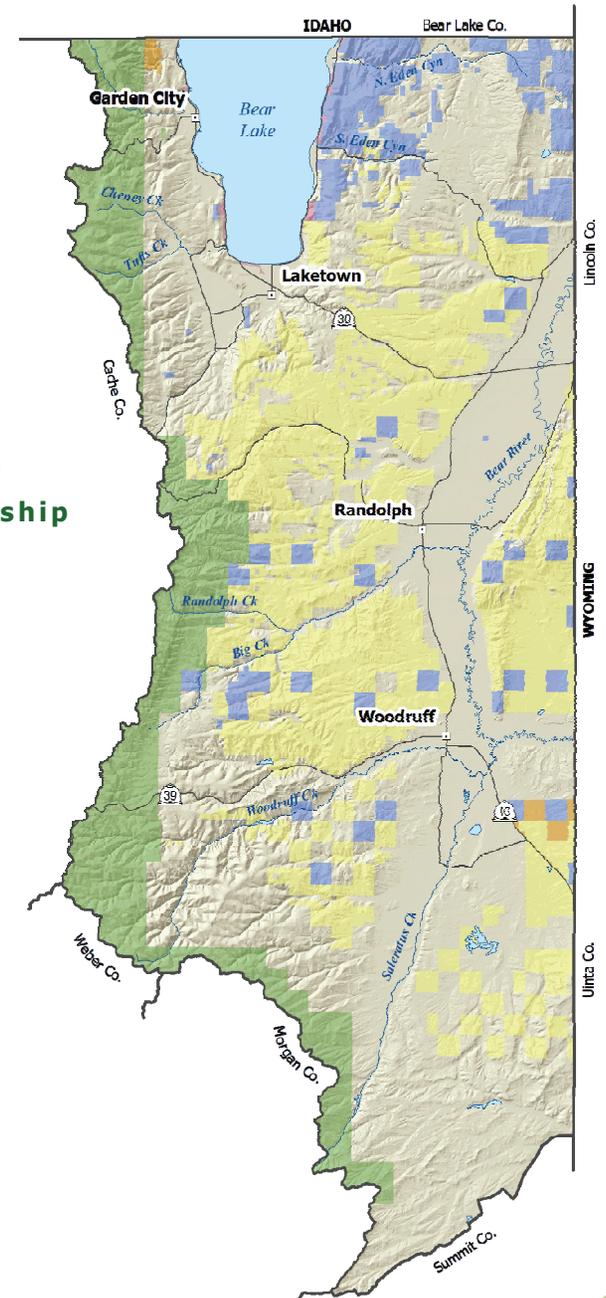
Rich County elevation ranges from 5,294 at Bear Lake to 9,148 feet at Monte Cristo Peek. Even though much of the county is highland, it also has fertile lowlands that support productive farms and livestock, and three fourths of the county's land is used for agriculture, primarily grazing.¹ The average frost free growing season is 55 days in the valleys, where most crops are grown. This short growing season limits the choice of crops grown to small grains, grass hay and alfalfa. Irrigated cropland and pastureland are in the Bear River Valley and Bear Lake Basin. The milder climate and higher precipitation of the Bear Lake Basin make it more favorable than the rest of the county for the production of food crops. There is a small raspberry industry along Bear Lake.

¹ www.richcountyut.org

² Utah Department of Workforce Services

³ U.S. Census Bureau

Rich County Land Ownership





RICH COUNTY

Photos (clockwise from top left): Garden City, by Chris Rabussay; Fields, calf, and canal in Rich County, by Krista Payne; Bear Lake Raspberry Days, www.utah-travel-secrets.com; Local ranchers gather at the gas station in Randolph Utah, www.telegraph.co.uk

Natural Resource Priorities and Concerns

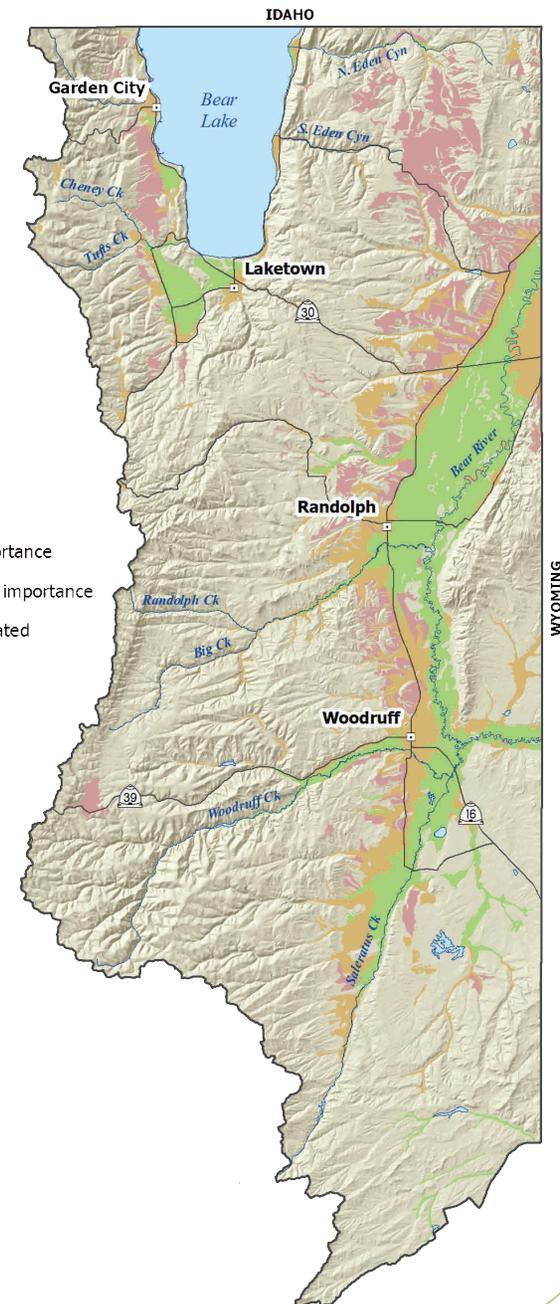
LOCALLY IMPORTANT FARMLAND

Rich County has soil designations for prime farmland and farmland of statewide importance but there are other soils that provide significant benefit to the county for the production of food, feed, fiber and forage. The Rich County Conservation District, Natural Resources Conservation Service, Farm Service Agency, and USU Cooperative Extension Service have initiated the process to have important Rich County soils designated as “locally important farmland.” This will improve the opportunity for applicants seeking federal assistance through federal Farm Bill programs. At this time, there are two classifications being considered to designate locally important farmland:

- First, many irrigated pastures and hay land have a historically and/or seasonally high water table. Because of this, they do not qualify as Prime or Statewide Important. The committee has proposed that, because of local value, these lands be given a locally important designation as long as they are irrigated. It is estimated that 53,130 acres of farmland will fit this category.
- Second, the majority of potential Prime and Statewide Important soils do not have irrigation and therefore are not designated. These soils, however, are some of the most productive rangeland sites. The locally important soils committee has considered options for designating Prime and Statewide important soils that are not irrigated as locally important rangeland soils. Initial research shows that this has not been done elsewhere in the U.S. Additional research is needed before proceeding on classifying these soils as locally important.

Rich County Important Farmland Designations

- Farmland of local importance
- Farmland of statewide importance
- Prime farmland if irrigated



Soils qualifying as prime and of statewide importance meet the criteria given below. The map at left shows their location in relationship to the proposed locally important farmland.

Prime Farmland

This is a national designation for land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor, and without intolerable soil erosion. There are potentially 45,570 acres of prime farmland in Rich County; however, these must be irrigated to qualify for this designation.

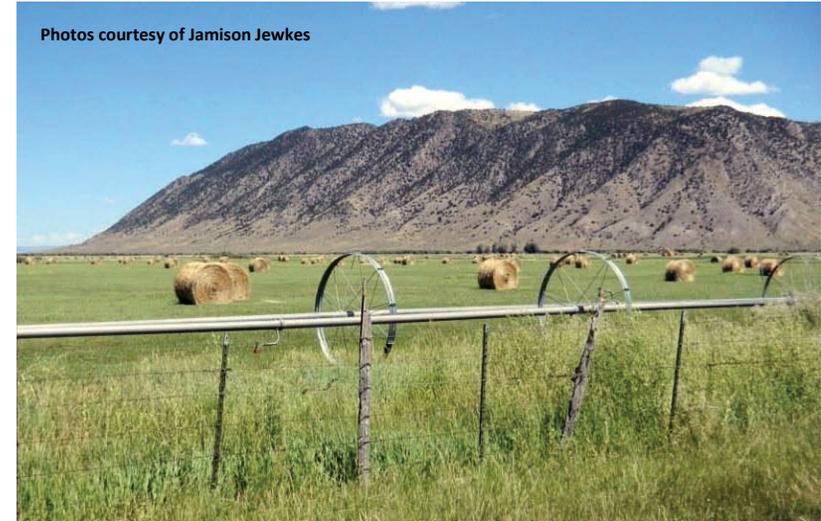
Farmland of Statewide Importance

Land identified by state agencies as important for agricultural use, but not of national significance can be designated as statewide important farmland. Rich County has approximately 35,256 acres of potentially statewide important farmland, but the actual is less due to a requirement for irrigation.

Rich County Ag Land Use Designations	Acres
Irrigated cropland	12,600
Irrigated hayland	40,500
Irrigated pastureland	25,000
Range and forestland	594,720
Dry cropland	3,130
CRP	8,470

Ag Land Use data obtained from the Rich County Farm Service Agency.

As Rich County continues to grow and develop planners and land managers will need to consider the role productive farm lands and soils play in maintaining the economic viability of agriculture in the county.



Wet meadow— baying/ grazing system



Non-irrigated land

Natural Resource Priorities and Concerns

NOXIOUS WEEDS

The most problematic weeds in Rich County are perennial pepperweed (a.k.a. tall whitetop), musk thistle and Canada thistle. Black henbane, leafy spurge, and dyer's woad are of special concern, but have not reached significant populations and/or widespread distribution.

The Rich County Conservation District is especially concerned about the increasing impact of tall whitetop (*lepidium latifolium*). Locally it is referred to simply as whitetop. It is now found along many streams, canals, and other waterways. Wet meadow pastures and hayland are also being invaded.

Rich County is part of the Highlands Cooperative Weed Management Area (CWMA). The CWMA includes Rich County, Bear Lake, Caribou, and a portion of Bonneville County in Idaho, and Lincoln County, Wyoming. Rich County needs to maintain a working relationship with this CWMA.

The county has a weed control program that employs one person. It is difficult for a single person to effectively treat the entire county because of the short time window in which treatment is effective. In 2010, the conservation district contributed funds from the state to the county for purchasing chemical for landowners to control tall whitetop on their property. Additional resources are needed to effectively control tall whitetop and other troublesome weeds in Rich County. Though weed control is often considered a county function, every citizen has a responsibility to control noxious weeds on their own property and hopefully will work adjacent right-of-ways as well.

Eradicating noxious weeds is every citizen's responsibility. Thank you for doing your part to protect our precious natural resources!

Potential Sites for Noxious Weeds

Utility Corridors

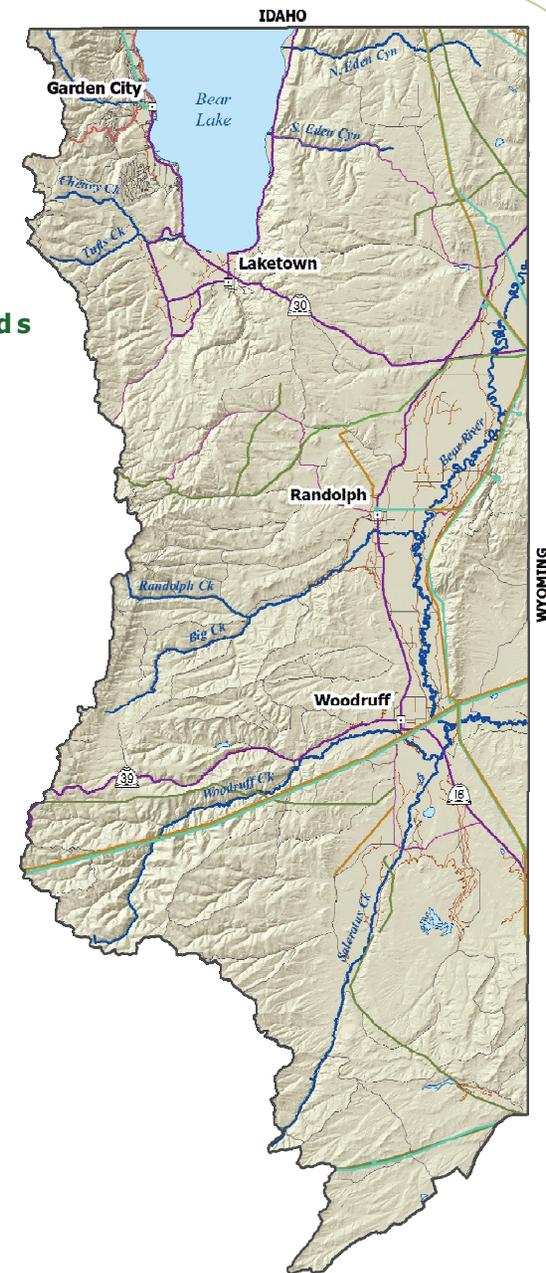
- Electrical line
- Transmission line
- Oil/gas pipeline
- Other pipeline

Hydrography

- Irrigation canal
- River or stream
- Lake or pond

Roads

- US highway
- State highway or secondary road
- Secondary two-track road
- Local/rural/city road



Perennial Pepperweed (*lepidium latifolium*)

Perennial Pepperweed grows one to three feet tall with bright green leaves. Flowers are white, in dense clusters near the top. Roots as deep as 9 feet make this weed difficult to control as it can store large amounts of resources and sprout stems following cutting, grazing, or herbicide treatments. Each mature plant can produce thousands of seeds per year, but it more commonly reproduces through laterally creeping roots. Roots and seeds float and can be transported long distances by water to establish new populations. Stands of Perennial Pepperweed can grow 50 stems per square yard, crowding out all other desirable vegetation.

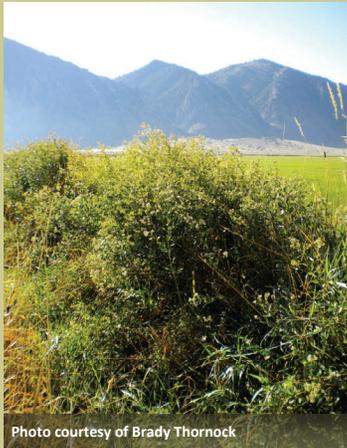


Photo courtesy of Brady Thornock

Stand of Perennial Pepperweed along an irrigation ditch

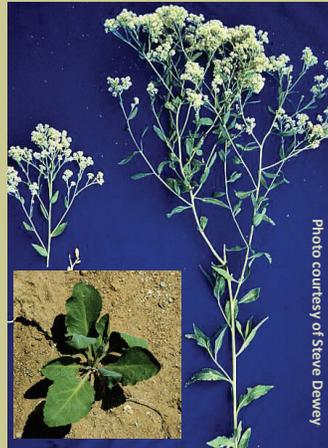


Photo courtesy of Steve Dewey

The first year rosette and second year plant

Rich County Noxious Weeds

The following weeds are officially designated as noxious for the State of Utah⁴, as per the authority vested in the Commissioner of Agriculture, under Section 4-17-3, Utah Noxious Weed Act. Rich County's highest priority weeds are in bold:

- Bermudagrass (*cynodon dactylon*)
- **Blackhenbane** (*Hyoscyamus niger*)
- **Canada thistle** (*cirsium arvense*)
- **Dalmatian Toadflax** (*Linaria dalmatica*)
- Diffuse knapweed (*centaurea diffusa*)
- **Dyers woad** (*isatis tinctoria L.*)
- Field bindweed (Wild Morning Glory) (*convolvulus spp.*)
- **Hoary cress** (*cardaria drabe*)
- Houndstongue (*cynoglossum officinale L.*)
- Johnsongrass (*sorghum halepense*)
- **Leafy spurge** (*euphorbia esula*)
- Medusahead (*taeniatherum caput-medusae*)
- Musk thistle (*carduus nutans*)
- Oxeye daisy (*chrysanthemum leucanthemum L.*)
- **Perennial pepperweed** (*lepidium latifolium*)
- Perennial sorghum (*sorghum halepense L. & sorghum alnum*)
- **Poison Hemlock** (*Conium maculatum*)
- Purple loosestrife (*lythrum salicaria L.*)
- Quackgrass (*agropyron repens*)
- Russian knapweed (*centaurea repens*)
- Salt Cedar (*tamarix ramosissima Ledeb.*)
- Scotch thistle (*onopordum acanthium*)
- Spotted knapweed (*centaurea maculosa*)
- Squarrose knapweed (*centaurea squarrosa*)
- St. John's Wort (*hypericum perforatum L.*)
- Sulfur cinquefoil (*potentilla recta L.*)
- Yellow starthistle (*centaurea solstitialis*)
- Yellow toadflax (*linaria vulgaris Mill.*)

⁴ Utah Dept. of Agriculture and Food

Natural Resource Priorities and Concerns

IRRIGATION CANALS

Recent Utah legislation has brought increased attention to the risk/importance of canals and requires owners and/or operators to improve communication with cities, towns, and counties. Canals with diversions on the Bear River are part of the Upper Bear River Distribution System. Remotely sensed stream gauges measure diversions from the Bear River and efforts to automate headgates have begun. Canals should maintain records documenting water use and when appropriate file required applications for non-use or change in use of water rights with the state engineer.

Rich County canals are generally considered in good condition with few potential hazards. Annual maintenance and repair is the responsibility of the respective company.

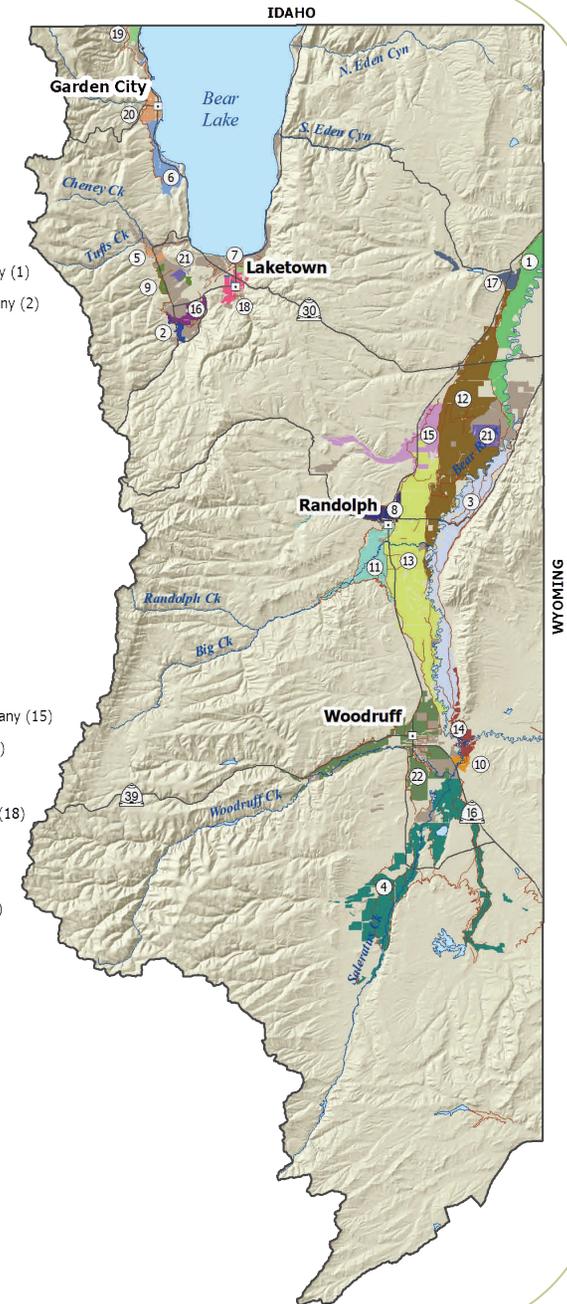
Potential Areas of Concern

In general, existing and new development near or adjacent to canals is not a concern in the Bear River Valley. Record precipitation in spring 2010 increased flows to near or above design capacity. The Beckwith/Quinn Canal breached at approximately 300 CFS. Repairs were required, yet damage was limited to temporary interruption in the delivery of irrigation water and flooding of adjacent farm fields. There are a few isolated areas along the Randolph Woodruff Canal, Neville Canal, Beckwith/Quinn Canal, and the Sage Creek Canal with elevated banks and subsiding concerns.

In the Bear Lake Valley the Swan Creek Canal and the Hodges Canal have potential areas of concern related to development or potential development. These areas should be identified by the respective land use authority. Development should not occur where conditions exist that would present a potential hazard. If allowed, site-specific assessments are needed and measures required to protect the public's safety and/or reduce the potential for property damage.

Rich County Irrigation Companies⁴

- 1 Beckwith-Quinn Westside Canal Company
- 2 Cottonwood Water and Reservoir Company
- 3 Crawford Thompson Canal Company
- 4 Farmland Reserve Inc. - LDS Church
- 5 Frank E Weston & Sons Partnership
- 6 Hodges Irrigation Company
- 7 Laketown Irrigation Company
- 8 Little Creek Reservoir Company
- 9 Meadowville Canal
- 10 Putnam Ranch
- 11 Randolph Irrigation Company
- 12 Randolph Sage Creek Canal
- 13 Randolph Woodruff Canal Company
- 14 Rees Land and Livestock
- 15 Rich County Otter Creek Irrigation Company
- 16 Round Valley Dam & Canal Company
- 17 Six Mile Creek Irrigation Company
- 18 State of Utah Board of Water Resources
- 19 Swan Canal Company
- 20 Swan Creek Irrigation Company
- 21 Weston Ranch & Livestock Company
- 22 Woodruff Irrigation Company
- Unknown
- Ditch or canal
- River or stream



Rich County Irrigation Companies

Canal Company	Service Area Acres	Main Canal/ Ditches Miles	Parcels
1	4,356	12.13	179
2	205		32
3	5,148	28.77	259
4	8,215	40.89	466
5	141	1	25
6	1,288		92
7	113		6
8	978	4.89	81
9	294	4.28	37
10	258		23
11	2,368	4.75	177
12	9,044	29.60	345
13	8,898	26.18	378
14	925	1.82	76
15	2,427		173
16	606	5.14	38
17			
18	589	1.94	154
19	344		20
20	588		67
21	974	0.92	43
22	4,174	20.78	292
Unknown	9,977		991
Totals:	61,907	183.09	3,954

Prepared from GIS data and tabular records at the Utah Automated Geographic Reference Center and Utah Divisions of Water Resources and Water Rights.⁵ Data not available for all canals.

The Upper Bear River Distribution System diversion records are available at www.bearriverbasin.org for canals, rivers, and Bear Lake. Measurements are real time from remotely sensed stream gages.

Other Issues & Opportunities

Canals and ditches can potentially receive and transport nonpoint source pollution from agriculture fields, animal feeding operations, and storm water runoff from roads and municipal uses. Improvements in irrigation systems and water management including measurement, automation, and remote sensing will increase the efficiency of water delivery, especially helpful in drought years. Shareholder assessments should not only pay yearly operation and maintenance, but allow for future capital improvements.

Piping the Woodruff Irrigation Company and a section of the Randolph Woodruff Canal running through the city has been considered. The benefit did not justify the \$1 million per mile cost.

New EPA regulations are a future concern for irrigation companies and commercial applicators of pesticides. A state general permit will be required, under certain conditions, when pesticides are applied that could potentially enter canals or ditches that transport water beyond an operator's property.

The Woodruff Narrows Reservoir Company, which supplies storage for irrigation companies along the Bear River in Utah and Wyoming, is in the process of identifying flood-prone areas that could be affected if the dam failed. A proof is being prepared for submission to the state engineer that will update the reservoir water right for each irrigation company.

Outreach

In 2010, the Rich County Conservation District mailed each canal company a brochure describing the requirements of H.B. 60 and H.B. 298 and two maps of their canal, as available, one on a topographic background and one on a digital orthophoto background. The district informed the canal companies of the assessment's purpose, requested review of the information provided, and asked for additional information to ensure the accuracy and completeness of the geographic data.



One of twenty-one individual maps prepared from GIS data showing the location of canals, ditches, and service area.⁵

Natural Resource Priorities and Concerns

GRAZING LAND

Ranching is the most common economic activity in Rich County. Since settlement, the local economy has largely depended on livestock production. Sheep numbers have declined dramatically to only 8,900. Private ranchers traditionally possess permits to graze cattle and sheep on upland ranges administered by the Bureau of Land Management (BLM), the U.S. Forest Service, Utah School and Institutional Trust Lands Administration (SITLA), and/or private land during the summer months. Often livestock using these permitted allotments are under-managed by ranchers who are unable to make dramatic changes in grazing plans due to regulatory, financial, and technical complications.

Public Land & Management

Livestock producers are facing pressure from federal agency land managers, other public land users and interests to restrict, or eliminate, grazing on public lands. The threat of appeals and related litigation of government agency land management plans delays implementation of these plans and has the potential to reduce the numbers of livestock allowed and/or the restrict the time livestock are permitted to graze an allotment.

Ranchers who possess the grazing permits on allotments found west of Randolph are considering a consolidation project to improve grazing management. The project's management plan uses cattle and sheep grazing to provide maintenance on a large landscape or watershed area. The cooperation of ranchers, land managers, and other interests is critical to the health and sustainability of public and private rangelands in Rich County and the rural economy.

Water Quality

Unrestricted livestock access to stream banks impacts riparian corridors and is a source of sediment and nutrient loading. Changing livestock management will provide the greatest water quality improvement at the lowest cost. The use of rest-rotational grazing systems in the upland areas of the Upper Bear River Watershed will reduce nutrient loading and sedimentation improving stream and river turbidity, pH, and dissolved oxygen. Confined animal feeding operations require management to prevent nutrients from entering water courses.



Cattle grazing by Cranford mountain range near Randolph. Rich County livestock includes 41,000 head of cattle and 8,900 sheep.



Grazing riparian area, a resource concern addressed by improved management.

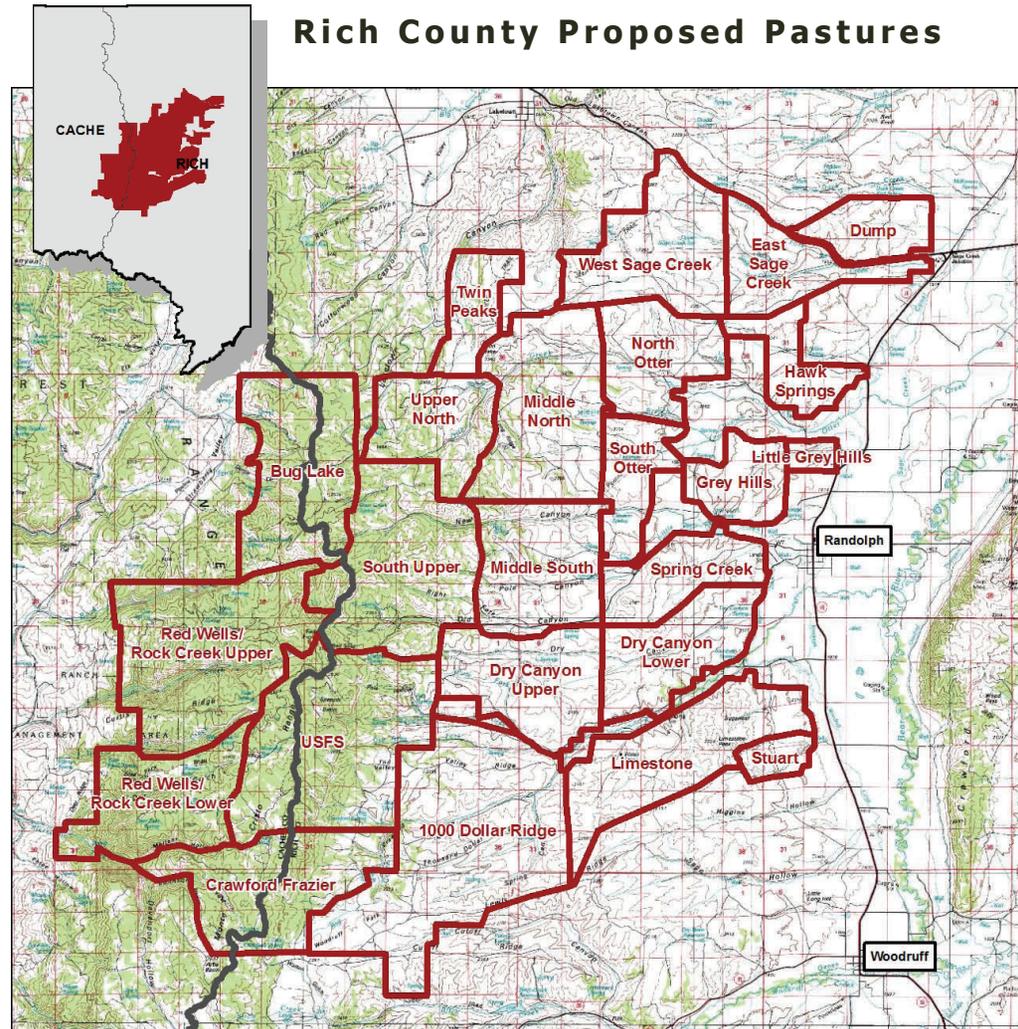
Other nonpoint source pollution concerns are eroded stream banks and degraded riparian corridors. Currently, it is unknown how much impact winter feeding on lowland pastures has on water quality. There is need for additional study in this area.

Rich County Grazing Consolidation

The consolidated grazing project proposal is to make comprehensive changes in management on five BLM allotments (Big Creek, New Canyon, Sage Creek, Stuart, and Twin Peaks) and three Forest Service allotments (North Randolph, South Randolph and Rock Creek/Red Wells). A variety of range and habitat improvements are proposed. These include improved water distribution, additional fencing, prescribed burns, and brush management. Changing the timing and duration of livestock grazing will offer the greatest benefit. Rather than season long grazing in some of the allotments, livestock would be combined into two herds. Each herd would be concentrated to graze smaller areas for shorter durations and then moved. Grazed pastures would then have the opportunity to grow back. Some pastures would be rested on a rotational basis. These changes will lead to improved wildlife habitat, improved water quality, improved plant diversity and improved livestock management.

Making changes in grazing management will be a critical step in long-term sustainability on both public and private ground. It is imperative to have collaborative working relationships among agencies and private producers. Private land within the consolidation project could be developed in the future. These properties need easements to preserve the integrity of the project.

Rich County Proposed Pastures



Proposed new pastures for Rich County consolidated grazing plan. This demonstration project, expected to be approved by permittees, will be a model for how to improve rangeland condition through better management.

"This project can provide economic and ecological sustainability."
 Bill Hopkin, Director, Utah Grazing Improvement Program,
 Utah Department of Agriculture and Food

Natural Resource Priorities and Concerns

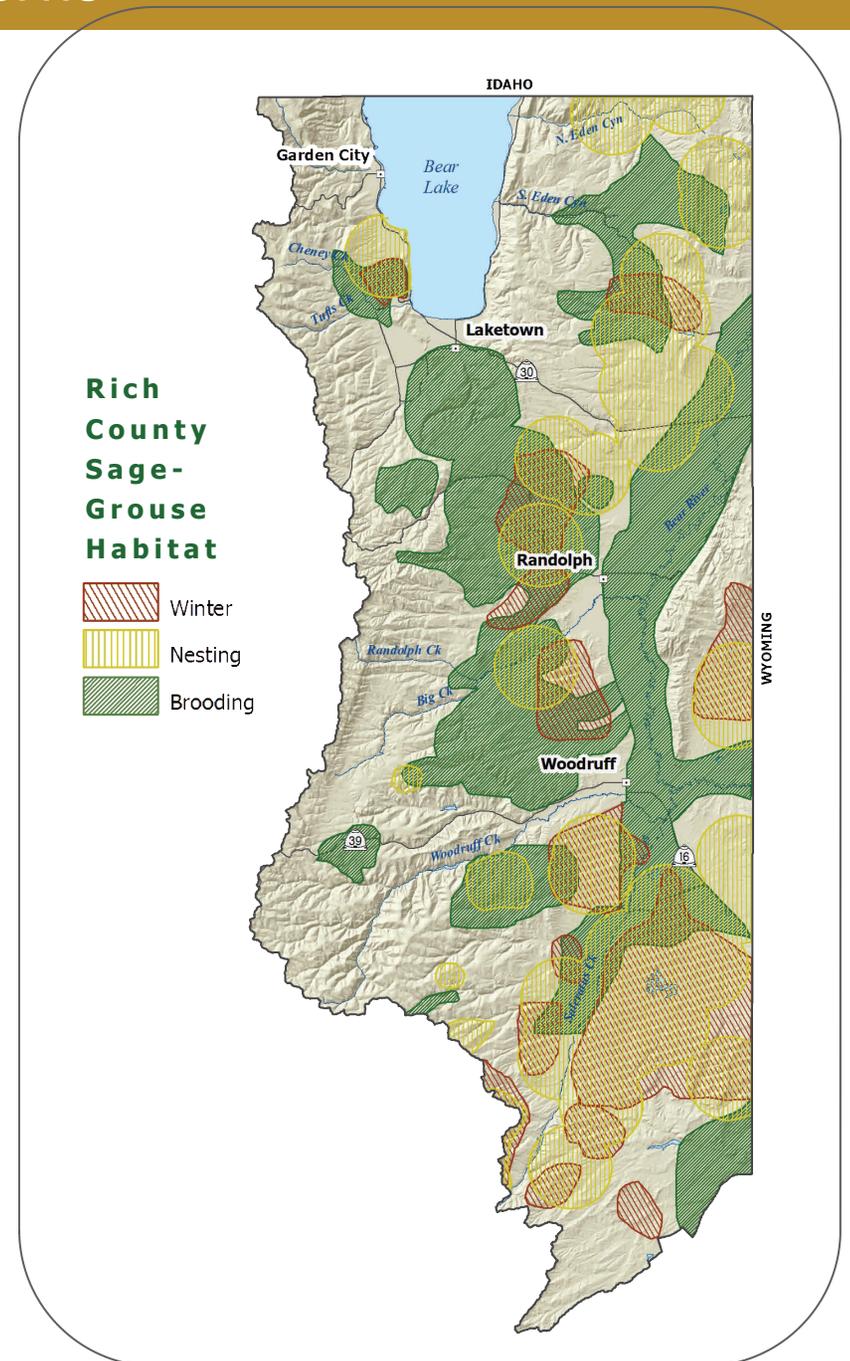
SAGE-GROUSE HABITAT

In March 2010 the U.S. Fish and Wildlife Service announced that “the greater sage-grouse warrants the protection of the Endangered Species Act but that listing the species at this time is precluded by the need to address higher priority species first.” The agency’s announcement reaffirmed that states would continue to be responsible for managing the bird and that voluntary conservation agreements, federal financial and technical assistance, and other partnership incentives are needed.⁶

The BLM is expected to coordinate with state fish and wildlife agencies and their technical committee in the development of a range-wide habitat map. The mapping project, not intended to replace individual state fish and wildlife agency core habitat maps, will identify priority habitat for sage-grouse within each of the western states.

Rich County is home to one of the largest populations of sage-grouse in Utah. There are eight lek complexes in Rich County with a total of forty-six active and historic lek sites. The Utah Division of Wildlife Resources (UDWR) has been monitoring sage-grouse lek sites in Rich County since 1959. Historical data makes it appear that populations have been increasing, but this is due, in part, to increased intensity of monitoring through the years.

Private landowners and public land agency managers have been proactive in their response to concerns that the sage-grouse is petitioned for listing as an endangered species. The county has coordinated their efforts through the Rich County Coordinated Resource Management (CRM) Plan and the Rich County Sage-grouse Working Group. The goal is to maintain and improve



greater sage-grouse (*Centrocercus urophasianus*) populations and their habitat, while taking into consideration historical land uses and long term social economic issues. Emphasis is to address the U.S. Fish and Wildlife Services' five listing factors:

1. Present or threatened destruction, modification, or curtailment of habitat or range
2. Over-utilization for commercial, recreational, scientific, or educational purposes
3. Disease or predation
4. Authorities and inadequacy of existing regulatory mechanisms
5. Other natural or man-made factors affecting continued existence

The intent of the CRM plan is to maintain and, where possible, increase sage-grouse populations and improve habitat conditions by:

1. Implementing management strategies to conserve the sage-grouse and their habitats
2. Increasing communication with stakeholders and the state through outreach, information distribution, and education
3. Addressing threats and prioritizing management solutions
4. Identifying and pursuing funding sources or supporting partners in obtaining funding for projects

Efforts to improve sage-grouse habitat, reduce predation, and other factors must be a high priority because listing of the greater sage-grouse would have significant social and economic impacts. Private landowners' management and financial objectives should be considered. Based on long-term data from Rich County, the Grazing Consolidation Project, discussed on pg. 10 of this report, is expected to have a significant positive effect on the habitat of sage-grouse and other wildlife species.

Related Resource Concerns

- Grazing Land (see pp. 9 & 10)
- At-Risk Species (see p. 21)

Greater Sage-Grouse



The Greater Sage-Grouse inhabits sagebrush plains, foothills, and mountain valleys. Sagebrush is the predominant plant of quality habitat. A good understory of grasses and forbs, and associated wet meadow areas, are essential for optimum habitat.

Greater Sage-Grouse are native to Utah and are listed as a sensitive species by the Utah Division of Wildlife Resources.

Sources: Utah Conservation Data Center source data from Biotics Database, 2005. Utah Division of Wildlife Resources, NatureServe, and the network of Natural Heritage Programs and Conservation Data Centers.

General Resource Observations

SOIL

As is typical of the soils in the Intermountain West, Rich County soils are comprised of such variety to make it difficult to generalize characteristics. Parent material is typically derived from sandstone and limestone formations. The Bear River Range and Crawford mountains are dissected by many streams and other small drainage ways. The lowlands along the Bear River, Bear Lake, and other waterways are often limited by poor drainage.⁷

Information on the soils in Rich County can be obtained from the Web Soil Survey: websoilsurvey.nrcs.usda.gov. The soil survey provides data and information produced by the National Cooperative Soil Survey, a nationwide partnership of federal, regional, state and local agencies, and private entities and institutions. The Web Soil Survey (WSS) allows a user to 1) define an area, 2) view the survey boundaries and soil types overlaid on a photo, 3) explore various interpretations, and 4) print maps and descriptive information.

The soil survey delineates and describes large areas of similar soils. Common uses are evaluating soil suitability for dwellings with basements, landscaping, roads, and septic systems, measures for vegetative productivity, chemical and physical properties. Using this information agricultural producers, agencies, counties, and municipalities know the various soil suitabilities and are alerted to soil limitations. This basic resource information is critical when making land-use and management decisions.

When limitations are identified, on-site investigations should be conducted by a soil scientist or soil engineer.

Soil limitations identified in soil surveys include but are not limited to frequent flooding, ponding or standing water, shrink/swell properties, settling after saturated with water, high erosion properties, potential excavation difficulties, subsidence properties, and danger of sliding on slopes.

Local Soil Priorities

- Locally important farmland (pg. 3)
- Erosion related to grazing management

Soil Survey near Garden City



Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
ABF	Agassiz-Richville complex, 10 to 60 percent slopes	5.3	3.5%
AFD	Ant Flat silt loam, dry, 10 to 25 percent slopes	3.8	2.5%
DHB	Despain variant gravelly loam, 1 to 3 percent slopes	93.5	62.2%
SC	Saleratus variant-Canburn variant complex	6.8	4.5%
SHF	Solak gravelly loam, 10 to 50 percent slopes	11.5	7.6%
TBB	Thatcher silt loam, warm, 3 to 6 percent slopes	10.7	7.1%
VAF	Vanni loam, 30 to 50 percent slopes	16.3	10.8%
W	Water	2.5	1.7%
Totals for Area of Interest:		150.3	100.0%

Web Soil Survey map showing selected area east and west of Garden City and table describing soil types.

Web Soil Survey

Three examples of Web Soil Survey (WSS) interpretations showing suitability and limitations for the selected area: dwellings with basements, septic tank absorption fields, and available water holding capacity. Complete description for each category can be obtained at websoilsurvey.nrcs.usda.gov. The WSS is a free online service that provides information on a large variety of soil concerns for any selected land area or parcel.

Soil Limitations for Dwellings with Basements



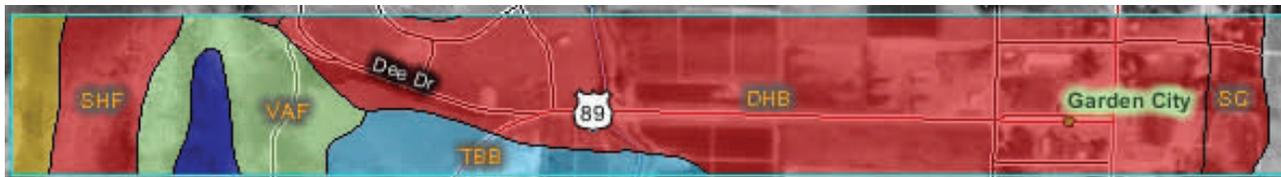
Dwellings are single-family houses of three stories or less. For dwellings with basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7 feet. The ratings for dwellings are based on the soil properties that affect the capacity of the soil to support a load without movement and the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding,

Septic Tank Absorption Fields



Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 60 inches is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Saturated hydraulic conductivity (Ksat), depth to a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. . . .

Available Water Capacity



Available water capacity (AWC) refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in centimeters of water per centimeter of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are content of organic matter, soil texture, bulk density, and soil structure, with corrections for salinity and rock fragments. Available water capacity is an important factor in the choice of plants

General Resource Observations

WATER

The Bear River and Bear Lake are the largest bodies of surface water in Rich County. They are fed by springs, storm runoff, and snowmelt from the surrounding mountains and foothills, and by ground water discharge. Bear Lake and numerous smaller reservoirs in the watershed provide for irrigation water, power generation, recreation, stock water, and flood control. Water for domestic use in towns is supplied mainly from springs and wells.

The Utah Division of Water Resources Bear River Basin Water Planlast published in 2004 can be obtained at www.water.utah.gov/planning/SWP/bear/bearRiver-1A.pdf. Water related land use, including GIS information, can be found at www.water.utah.gov/planning/landuse/index.htm.

Irrigation Water

Rainfall in the county is not adequate to produce maximum crop yields; therefore, irrigation is used to supplement plant requirements. The Bear River and its tributaries are the main sources of water for irrigation. Twenty-eight irrigation companies service approximately 62,000 acres with four companies accounting for roughly 50 percent of the water diverted from the Bear River. Irrigation canals are a priority resource and additional information is included in the Irrigation Canals section of this report. Irrigation improvements should be implemented, when appropriate, to replace aging on-farm infrastructure and improve irrigation water management. Some irrigation delivery systems, long past their effective lifespan, are not addressed with current funding mechanisms.

Water Quantity and Storage

Seventeen lakes and reservoirs in the county contain approximately 727,718 acre-feet of water. Bear Lake makes up 97 percent of this total. Neponset, Woodruff Creek, and Birch Creek Reservoirs make up most of the remaining three percent. Bear Lake contributes little irrigation water to the county, but is a major recreation attraction. Additional water storage is of interest to Rich County irrigators.

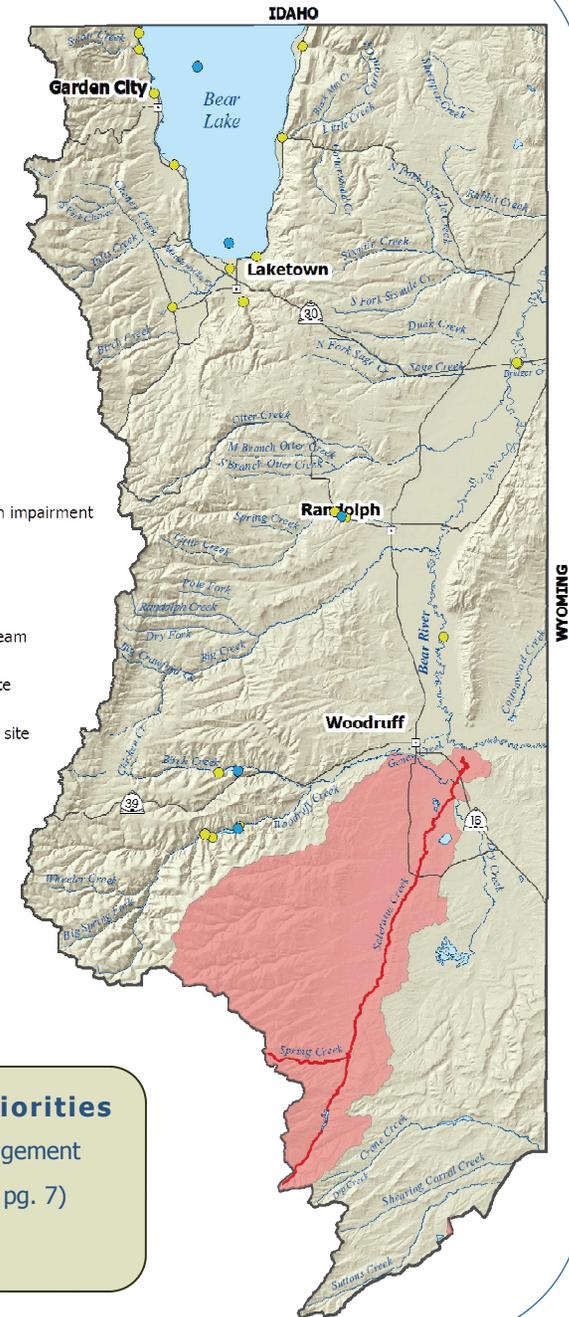
Ground water recharge in the county is mainly from precipitation and excess irrigation water. In the Bear River Valley, the principal water-

Rich County Impaired Waters

- Assessment Unit with impairment
- Lake or pond
- River or stream
- Impaired river or stream
- Lake monitoring site
- Stream monitoring site

Local Water Priorities

- Irrigation Water Management
- Irrigation Canals (see pg. 7)
- Impaired Waterways



bearing deposits are the flood plain of the Bear River. The water supply for towns is derived mainly from springs. The present water supply is adequate to meet the current needs of most towns; however, additional water will be needed to stimulate economic growth and accommodate recreation needs in the future. Real time information for the Upper Bear River Distribution System including flows and diversions on the Bear River and the water elevation for Bear Lake can be obtained at www.bearriverbasin.org.

Water Quality

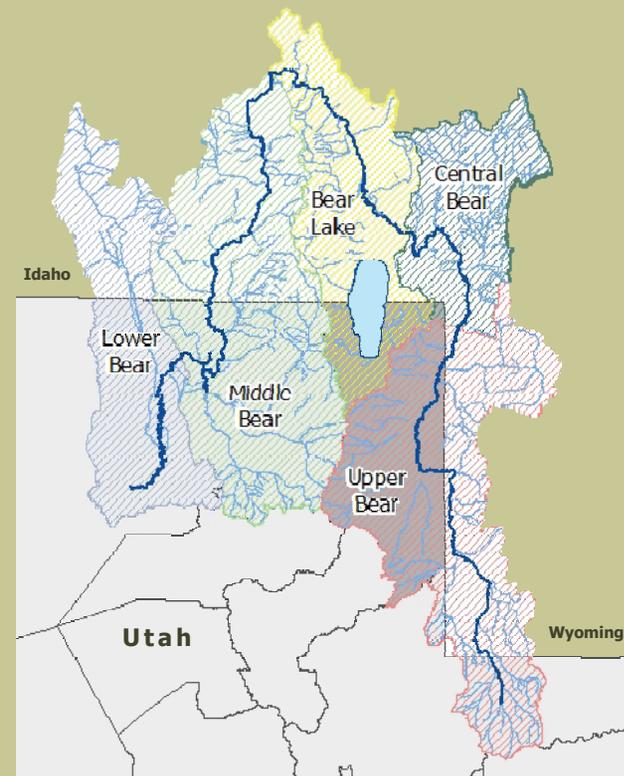
Rich County is within the Upper Bear River Watershed. The Utah Division of Water Quality (UDWQ) has classified the Bear River as impaired for not meeting state standards for dissolved oxygen. Sediment, nutrients, bacteria, and high water temperatures are also concerns. Big Creek, southwest of Randolph is classified as impaired. Otter Creek and Sage Creek are additional priorities for projects to improve water quality.

Improving grazing management on riparian areas is an important priority. Livestock and wildlife in direct contact with streams can contribute to stream-bank erosion as well as nutrient and bacteria loading. In various locations, high background levels of phosphorous from naturally occurring geologic features contribute to the eutrophication of downstream reservoirs. Winter feeding of livestock is common throughout the county. Some pastures are close to waterways and there is potential for spring runoff and irrigation return flows to transport animal waste and its associated bacteria and nutrients into the Bear River and its tributaries.

The UDWQ Upper Bear River Watershed Total Daily Maximum Load (TMDL)⁸ is the State guideline for water quality improvements. The Rich County Conservation District is the local sponsor for Clean Water Act Section 319, Nonpoint Source water quality projects addressing TMDL priorities. Project funding has and is currently available for protection and improvement of riparian areas and upland area best management practices to reduce sediment and nutrient loading into surface waters.

The UDWQ regularly conducts monitoring of surface waters to assess water quality.⁹ An Integrated Report is provided to EPA and the public to report assessment results and account for the state's progress in addressing TMDL requirements.

Bear River Sub-Watershed Boundaries



Rich County is located in the Upper Bear River and Bear Lake sub-watersheds of the Bear River Watershed. The Natural Resources Conservation Service (NRCS), encourages local people to lead a voluntary, coordinated and integrated watershed approach to address natural and human resource conservation needs. planning based on watersheds.

8 Upper Bear TMDL Water Quality Study
9 Bear River Management Unit

General Resource Observations

AIR AND CLIMATE

Generally the climatic conditions in Rich County would be regarded as severe, characterized by low humidity, generally low precipitation on the valley bottoms, and wide ranges in temperature. Abundant sunshine occurs during the growing season, but is restricted during winter when strong temperature inversions develop. Killing frosts are common early and late in the short growing season. The average annual rainfall is about nine inches, with an average annual temperature of 40 degrees F. The moderating effects of Bear Lake, makes the area around the lake slightly warmer than the southern end of the county. The elevation of the Bear River valley is about 6,400 ft.¹

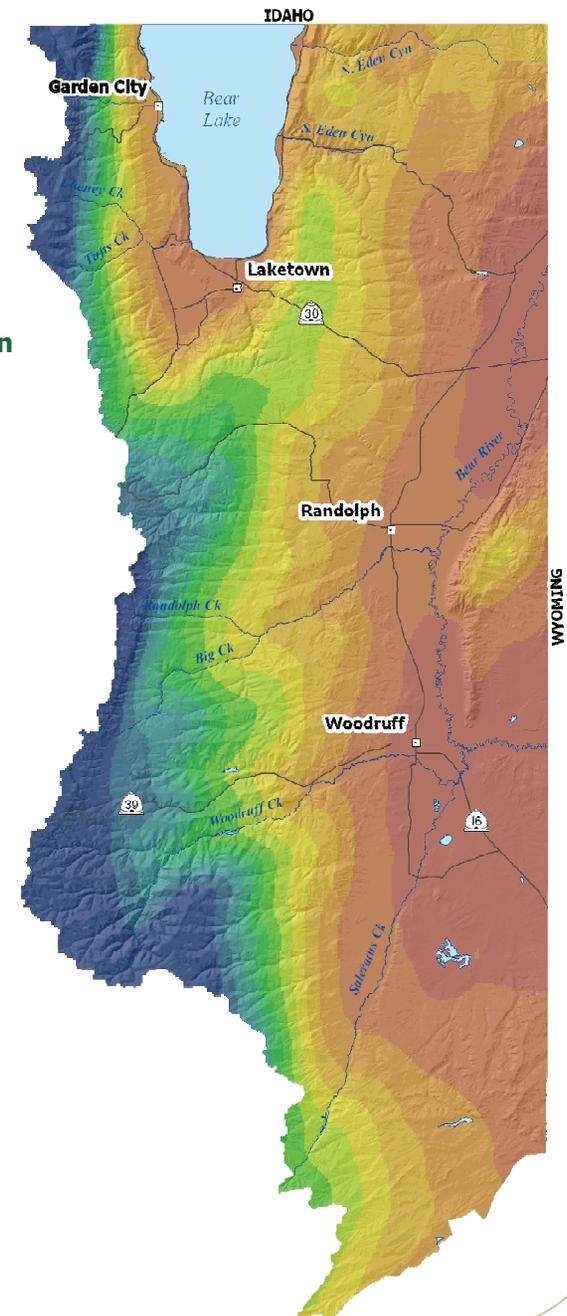
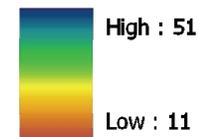
Most of the precipitation in winter falls as snow. The seasonal accumulation is quite variable, ranging from only 40 inches on the lower valley bottoms to nearly 200 inches at the higher elevations on the west side of the county. The normal annual precipitation ranges from a little less than 10 inches in the driest part of the county to nearly 50 inches at higher elevations.

Frost has been reported throughout the year in almost all parts of the county. The average length of the frost-free season is limited by the formation of intense temperature inversions during most of the year. The intense inversion also accounts for some extremely cold temperatures in winter. The coldest temperature has been recorded at 50 degrees below zero. Summertime maximum temperatures are typically in the low to mid 90s.

Utah Climate and Water Report

Data on precipitation, soil moisture, soil temperature, reservoir storage, and streamflow are analyzed and presented in the Utah Climate and Water Report, Sept. 2010 at www.ut.nrcs.usda.gov/snow/climate/. These data analyses can be used to increase irrigation efficiency and agricultural production. As with all data and analyses, there are limitations due to data quality, quantity, and spatial application.

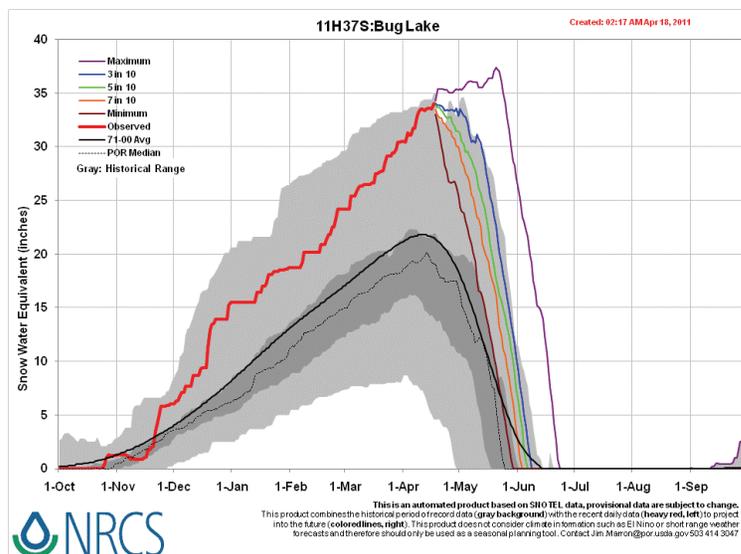
**Rich County
Average
Annual
Precipitation**
INCHES/YEAR



NRCS Snow Survey

The NRCS Snow Survey Program provides mountain snow pack data and stream flow forecasts for the western United States. Common applications of snow survey products include water supply management, flood control, climate modeling, recreation, and conservation planning. Timing and amount of snow pack, along with temperature fluctuations throughout the spring and summer months, impact the amount of water available for irrigation throughout the growing season. The Utah Snow Survey provides valuable data that is used to help maximize water usage. During dry years, providing adequate water to landowners is a challenge. It is common to have inadequate water resources available to sufficiently supply the land with irrigation needs for maximum crop growth.

In Rich County, NRCS operates one SNOTEL (SNOWpack TELEmetry) site that monitors conditions at Bug Lake (7950 ft) in the Bear River drainage.



The graph above uses historical average data to predict expected available water throughout the growing season. For more information check out Natural Resources Conservation Service's Utah Snow Survey Program at www.ut.nrcs.usda.gov/snow.

Soil Climate Analysis Network

The NRCS Soil Climate Analysis Network (SCAN) is a nationwide climate network that provides near real-time soil moisture and temperature data coupled with additional climate information for use in natural resource planning, drought assessment, water resource management, and resource inventory. The stations are remotely located and collect hourly atmospheric and soils data from spatially representative soils and landscapes. Sites are located on agriculturally important areas that best represent current irrigated and non-irrigated practices.

Soil Climate Analysis Network (SCAN) stations are primarily located on low to mid-elevation, agriculturally important landscapes that maintain representative soils. Elevations range from 3,000 to 7,000 ft. The SCAN network provides real-time soil moisture and temperature data coupled with additional climate information for use in natural resource planning, drought assessment, water resource management, and resource inventory. SCAN stations are situated on non-irrigated, native soils, are remotely located, and collect hourly atmospheric and soils data that are available to the public online.

SCAN data are used by global climate modelers, soil scientists, ecologists, drought managers, and farmers to support various activities including soil surveys, water management and irrigation schedules, crop production models, planting schedules, and other natural resource management issues.

The Buffalo Jump SCAN site is located in Rich County, and is situated on productive rangeland within the boundaries of Deseret Land and Livestock. For access to data, visit <http://www.wcc.nrcs.usda.gov/scan/Utah/utah.html>.

For additional information contact randy.julander@ut.usda.gov for SNOTEL and karen.vaughan@ut.usda.gov for SCAN.

General Resource Observations

PLANTS

Crops and Pasture

Irrigated crops in Rich County are alfalfa, small grain, and raspberries. Most of the small grain and alfalfa is used locally for supplemental feed for livestock. Irrigated pastures consist of native, introduced and improved grasses. Low precipitation and a short growing season are the main factors limiting the production of non-irrigated crops in the county. Wheat is the principle non-irrigated crop. Steep sloping areas of non-irrigated cropland and moderately to severely eroded areas should be converted to permanent pasture or rangeland. Maintaining these marginal areas in grass provides better protection from erosion. Noxious weeds are of increasing concern. Roads and waterways are particularly impacted corridors.

Rangeland

Rangeland is the most important agricultural resource in Rich County, at approximately 494,000 acres. Dominant vegetation includes perennial grasses, shrubs, and forbs; some areas support aspen, juniper, and coniferous trees.

Rangeland is used primarily as forage for cattle, sheep, and big game or upland game species. Generally, slopes are less than thirty percent, though some are much steeper. Livestock are wintered in hayland areas and are supplemented with hay harvested from the hayland. Fires and excessive use have caused deterioration of some rangelands and grazing improvements are a high priority. Some areas have decadent sagebrush and are in need of brush management.

Woodland

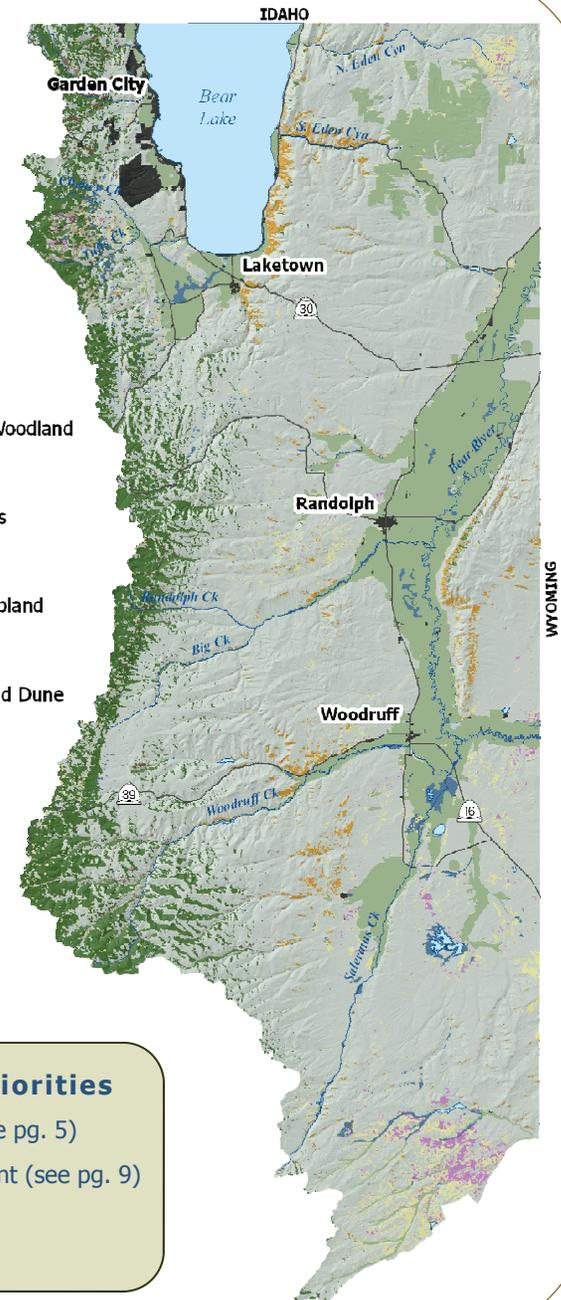
About 15 percent, or approximately 100,000 acres is woodland. Soils in these areas are generally on steep slopes and at higher elevations. Soil properties have a strong influence on the adaptation and growth of trees and management. Soil texture and depth of the soil material limit water holding capacity and thus influence tree growth. Generally, trees grow fastest and tallest on the more productive soils. Understory vegetation consists of grasses, forbs, shrubs, and other plants. Some woodland areas, if well managed, produce enough understory vegetation to support grazing of livestock or wildlife, or both, without damage to the trees.

Rich County Land Cover



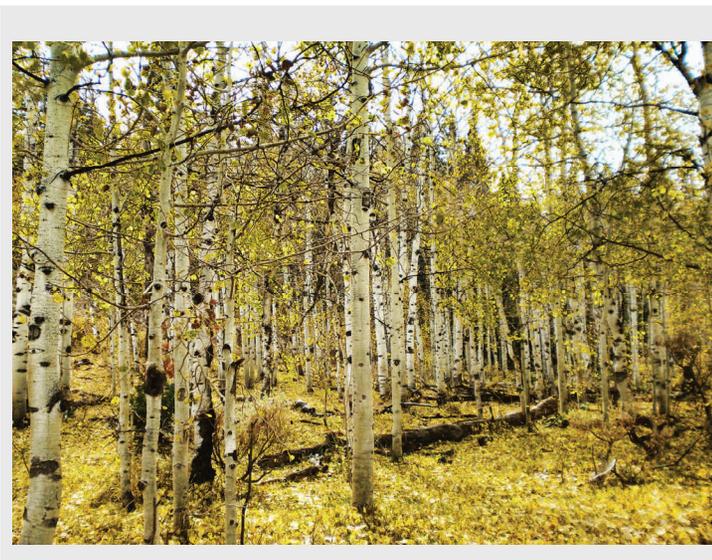
Local Plant Priorities

- Noxious Weeds (see pg. 5)
- Grazing Management (see pg. 9)
- Brush management



Forest Land

Forested land covers 70,000 acres or approximately 10 percent the county. These forests overlay some of the state's most valuable watershed, wildlife, and recreation areas. They are capable of providing multiple benefits as well as posing risks for nearby homes and communities if not properly managed. Threats and challenges include the degradation of watersheds and potentially irreversible changes in forest health that could result from poor management such as overgrazing, excessive timber harvest, and residential or recreation related development and surface mineral development.



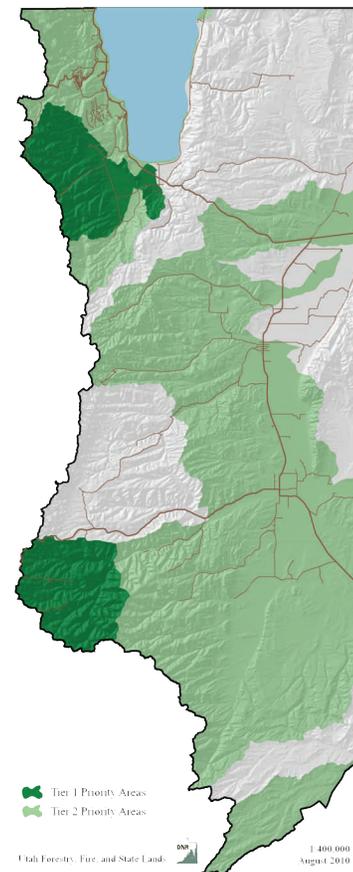
The expansion of residential or recreational homes on east facing slopes west of Garden City and Laketown increases the risk of fire at the urban forest interface and to homes and property improvements. Further new home owners responsible for large lots in residential subdivisions may not understand the need to control noxious weeds or the management needed to maintain and/or enhance desirable vegetation cover.

Rich County forests are in good condition. Mountain pine beetle and spruce beetle are present and becoming an increasing threat. Aspen forest are slowly being displaced by shade tolerant conifers. Generally the risk for catastrophic wildfire is low, yet accumulation of fallen timber, understory trees and brush would contribute to the intensity of a fire. Continued forest harvesting, thinning of understory trees, and/or fuels reduction are encouraged and will reduce the risks of epidemic populations of beetles.

A recent assessment by the Utah Division of Forestry, Fire and State Lands shows the location of areas that the most benefit can come from doing forest (tree) related projects. This includes urban and community forestry, tree planting, wind breaks, and projects in riparian areas. Rural forest landowners, ranchers and farmers have many opportunities to improve forest lands through the wise use of this resource, conservation plantings, and following best management practices.

State Forestry Assessment

The Utah Division of Forestry Fire and State Lands Statewide Forest Resource Assessment, completed in June 2010, provides analysis of forest conditions and trends, addresses current state and national resource management priorities, and identifies priority rural and urban forest landscape areas. The assessment is online at ffsl.utah.gov/stateassessment.php



General Resource Observations

ANIMALS

Agriculture: Cattle and Sheep

Livestock grazing is the most abundant agricultural enterprise in Rich County with approximately ninety percent of the total land area used for cattle and sheep. The economy of Rich County has been largely dependent on livestock since settlement of the county. Large ungulate grazing (wild and domestic) can be either beneficial or detrimental to watershed health, especially riparian areas, depending on management. Contrary to popular opinion, 'stocking rate' is less important than managing the timing of grazing. Harvesting forage with domestic livestock on a rotational basis creates nutritional opportunity for wildlife.¹³ Managed grazing encourages new plant growth and improves forage health over time.

Sensitive Species

The Utah Division of Wildlife Resources maintains information on Utah plants and animals classified as at-risk. The state's objective is to prevent at-risk species from being listed by the federal U.S. Fish and Wildlife Service as Threatened, Endangered, or Candidate Species under Endangered Species Act. In March 2010, the greater sage grouse was listed as a candidate species (see Sage-Grouse Habitat section of this report). A candidate species does not receive statutory protection, though it increases the urgency for state and federal agencies to give priority to and manage to improve habitat and mitigate impacts. Further, the yellow-billed cuckoo is listed as a Candidate Species. The black-footed ferret, previously classified as endangered, is no longer listed.

Aquatic Life

Bear Lake's water properties have led to the evolution of several unique species of fish that live naturally only within the lake. Remaining known endemic species include the Bonneville Cisco, Bonneville Whitefish, Bear Lake Whitefish, and Bear Lake Sculpin. Bear Lake provides habitat for other important fish species such as mackinaw, rainbow, brook, and brown trout. Although other species have been introduced into the lake, few can reproduce successfully in the lake's waters, so it has not been affected as greatly as other lakes by invasive species. Small reservoirs and privately owned ponds in the area support trout fisheries. Natural streams provide habitat for beaver, muskrat, and mink.

Sensitive Species

Included on Utah's State Listed Conservation Species Agreement with the U.S. Fish and Wildlife Service and Species of Concern in Rich County:

- Greater Sage-Grouse
- Bald eagle
- Black-footed Ferret
- Bear Lake sculpin
- Bear Lake springsnail
- Bear Lake whitefish
- Bobolink
- Bonneville cisco
- Bonneville cutthroat trout
- Burrowing owl
- California floater
- Ferruginous hawk
- Lewis's woodpecker
- Northern Goshawk
- Pygmy rabbit
- Western toad
- White-tailed prairie-dog
- Yellow-billed Cuckoo

This list was compiled using known species occurrences and species observations from the Utah Natural Heritage Program's Biodiversity Tracking and Conservation System (BIOTICS). This list includes both current and historic records. (Last updated on March 29, 2011). Utah Division of Wildlife Resources: dwr.dcr.utah.gov/ucdc/



Pygmy Rabbit

The pygmy rabbit, *Brachylagus idahoensis*, occurs in western (primarily northwestern) United States. It can be found in northern and western Utah, where it prefers areas with tall dense sagebrush and loose soils. Inactive periods are spent in underground burrows. As its name implies, the pygmy is the smallest of all rabbits in Utah and all of North America.¹⁰



Bonneville Cisco

The Bonneville Cisco, *Prosopium gemmifer*, is one of three whitefish species found only in Bear Lake. They generally inhabit cool, deep water. In January, the small sardine size fish move to shallow water, where they form large schools and spawn over the lakes' limited rocky areas. Bear Lake's eastern shoreline is a popular location for sport fishing, where great numbers are captured using dip nets.¹⁰

Upland Game

Utah statewide management plans for mule deer, elk, rocky mountain goat, moose, bighorn sheep and pronghorn are at wildlife.utah.gov/hunting/biggame/. Various other upland game species including rabbits (cottontail, jack, pygmy, etc.) and grouse (sage, ruffed, blue, etc.) occur throughout the county. The county is renowned as a bird viewing are. Birding opportunities and sightings are updated at: www.utahbirds.org/counties/rich/

Human/Wildlife Interactions

Wildlife can conflict with private land and or livestock. Private lands in some locations see increasing use from antelope, deer, and elk. Predation from coyote and mountain lions can become localized concerns. Wolves have also predated livestock in the county. Efforts should be made to keep these conflicts to a minimum.

Data Sources

Primary and secondary habitat information is in the Utah Comprehensive Wildlife Conservation Strategy at http://wildlife.utah.gov/cwcs/10-01-21_utah_cwcs_strategy.pdf

For general questions or comments regarding wildlife in Utah, contact the UDWR at: 801-538-4700 or DWRcomment@utah.gov or the Northern Region Office Habitat Manager – Scott Walker (801) 476-2776; scottwalker@utah.gov.

Local Animal Priorities

- Sage Grouse Habitat (see pg. 11)
- Grazing Management (see pg. 9)
- Other sensitive species
- Wildlife depredations

General Resource Observations

HUMANS: Social and Economic Considerations

Since 1990 Rich County's population has grown by about twenty-five percent. At 2,329 in 2009, this makes Rich County one of the least populated in the state. Economic activity in the area is geographically split. Agriculture/ranching dominates the southern two-thirds of the county, while tourism-related business dominates in the north—the Bear Lake area.²

Labor Force

Rich County bases its livelihood on agriculture (ranching), tourism, and government which, together, account for over half of nonfarm jobs. While the ranching activity is fairly stable year round, the tourism business is not. Off-season employment averages between 480 and 580 workers. During the summer peak season, employment counts run between 650 and 800.

One in five jobs in the county is in the hospitality industry. Government is a strong employer contributing one-third of total jobs. Although Rich County represents a relatively small part of the Utah economy, this corner of the state provides an important place for food production and recreation.²

Oil and gas development occurs and has potential to increase. This could have both positive and negative impacts on Rich County resources.

Local Human Priorities

- Bear Lake Development
- Oil & Gas Development
- Recreational Use of County Resources



Visitors and locals enjoy Bear Lake's famous raspberry shakes.

Rich County Population Data



Area name	Rich
Period Year	2009
Population	2,329
Births	38
Deaths	16
Natural Increase	22
Net Migration	29
Annual Change	51
Annual Rate of Change	↑ 2.2%

Source: Utah Population Estimates Committee
<http://www.governor.state.ut.us/dea/UPEC.html>

Recreation

Rich County provides a wide variety of recreational activities. Natural streams and lakes provide fishing and recreation for local residents and tourists; some streams and lakes provide year-round fishing. The greatest number of visitors are attracted to Bear Lake for water-related recreation and to enjoy its aesthetic value. In January, fishing for the Bonneville Cisco is a major event for fishermen. No other lake in the continental United States offers such an opportunity.

Rich County is noted for its hunting opportunities. Hunters return to the county year after year because of the abundance of sage grouse, ruffed grouse, blue grouse, and big game animals such as mule deer, elk, and moose. Opportunities for waterfowl hunting are also available.

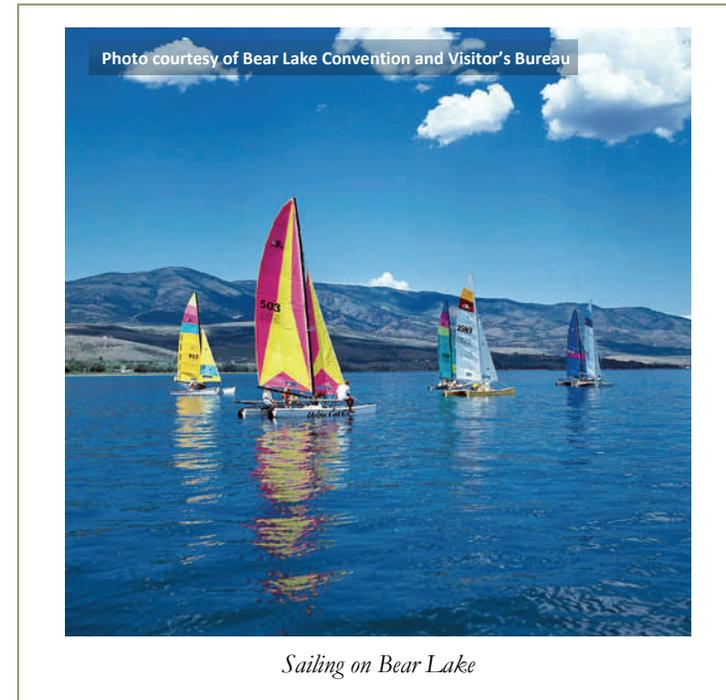
There are several private and state recreational facilities on the shores of Bear Lake. The state parks provide beaches, overnight camping, and swimming. The private facilities provide lodging, water-oriented recreation, golfing, horseback riding, and other activities.

The last several years have shown an increase in the number of visitors to Rich County, especially in the Bear Lake area. Roads can become congested with summer recreators. As recreational use of county resources continues to increase, the impacts to permanent residents and infrastructure should be considered. Development of summer homes around Bear Lake changes the dynamics of historic land use in the area. Noxious weeds tend to become more common. Many of the areas being developed are big-game winter habitat. The need to control wildfires in these areas become increasingly critical.

Bear Lake Water Level Management

With the fluctuating water level at Bear Lake, more public land is exposed for multiple purposes including recreation. These public lands are referred to as sovereign lands. Sovereign lands are considered to be the land lying below the elevation of 5,923.65 feet above sea level (based on Rocky Mountain Power datum). The Utah portion of Bear Lake in Rich County is represented as owned by the State of Utah.

The Division of Forestry, Fire and State Lands manages the approximately 25.25 miles of land for the public trust in accordance with the Public Trust Doctrine, state law and administrative rule. The Division strives to assure public access to navigable waters for commerce, navigation, fishing, swimming, recreational boating and preservation of lands in their natural state. Although sovereign lands are generally open for public enjoyment at Bear Lake there are no permanent facilities present with limited/seasonal sanitation services provided.



Sailing on Bear Lake

Virtual Utah

www.earth.gis.usu.edu/utah/

Virtual Utah offers aerial imagery (photography) for most of the state from 1993/97, 2003, 2004 and 2006. Using aerial images from multiple dates allows you to see how land use has changed over the years! Other geographic datasets include land cover, hillshade (shaded relief), elevation data, and other satellite images.

References & Credits

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5. U.S. Fish and Wildlife Service News Release, March 5, 2010, *Interior Expands Common-Sense Efforts to Conserve Sage Grouse Habitat in the West*. www.doi.gov/news/pressreleases/2010_03_05_release.cfm
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7. Upper Bear TMDL Water Quality Study: www.waterquality.utah.gov/TMDL/Upper_Bear_TMDL.pdf
8. Bear River Management Unit: www.waterquality.utah.gov/documents/2008_IR_BearRiver_63009.pdf
9. Utah Conservation Data Center, State of Utah Natural Resources, Division of Wildlife Resources. Species information retrieved from <http://dwrcdc.nr.utah.gov/ucdc/> and <http://dwrcdc.nr.utah.gov/ucdc/ViewReports/SSLAppendices20110329.pdf>

Map Data Sources

Rich County Land Ownership: Utah School and Institutional Trust Lands Administration and the U.S. Bureau of Land Management, April 2010 Rich County Important Farmland Designation

Important Farmland: Prime and Statewide Important Farmland derived from the following SSURGO soil survey: UT604 – Rich County, Utah using Soil Data Viewer, a tool created by USDA Natural Resources Conservation Service as an extension to ArcMap that allows users to create soil-based thematic maps. SSURGO Soil Surveys are available for download from the NRCS Soil Data Mart: www.soildatamart.nrcs.usda.gov/

Rich County Irrigation Companies: The irrigation company boundaries were taken from a dataset showing irrigated acreage for the entire state, created by Utah Division of Water Rights. Available for download from the Utah Division of Water Rights website at: www.waterrights.utah.gov/gisinfo/wrcover.asp

Rich County Pastures: Pasture boundaries of the proposed Three Creeks consolidated grazing plan derived from existing BLM and Forest Service grazing allotment boundaries by Utah Department of Agriculture and Food Grazing Improvement Program, July 2010

Rich County Sage-Grouse Habitat: Winter, brooding and nesting use areas in Rich County as determined by Utah Division of Wildlife Resources field biologists in 1999. Winter and brooding use areas updated in 2007 by the Rich County Coordinated Resource Management Sage-grouse subcommittee, available for download from the Utah Automated Geographic Reference Center at: gis.utah.gov/sgid-vector-download/utah-sgid-vector-gis-data-layer-download-index?fc=Habitat_SageGrouseBrood and gis.utah.gov/sgid-vector-download/utah-sgid-vector-gis-data-layer-download-index?fc=Habitat_SageGrouseWinter

Rich County Impaired Waters: Data set produced by the Utah Department of Environmental Quality Division of Water Quality and certified by the U.S. Environmental Protection Agency in 2006. The dataset shows Assessment Units in Rich County for which existing pollution controls are not stringent enough to implement state water quality standards

Bear River Sub-Watershed Boundaries: A subset of the National Hydrography Dataset (NHD). The National Hydrography Dataset (NHD) is a comprehensive set of digital spatial data that contains information about naturally occurring and constructed bodies of water, paths through which

water flows, and related entities. The NHD was developed by U.S. Geological Survey (USGS) in cooperation with U.S. Environmental Protection Agency, USDA Forest Service, and other Federal, State, and local partners. Available for download from the USGS National Map website at: <http://nationalmap.gov/index.html>

Hydrology: A subset of the National Hydrography Dataset (NHD). The National Hydrography Dataset (NHD) is a comprehensive set of digital spatial data that contains information about naturally occurring and constructed bodies of water, paths through which water flows, and related entities. The NHD was developed by U.S. Geological Survey (USGS) in cooperation with U.S. Environmental Protection Agency, USDA Forest Service, and other Federal, State, and local partners. Available for download from the Utah Automated Geographic Reference Center at: gis.utah.gov/sgid-vector-download/utah-sgid-vector-gis-data-layer-download-index?fc=StreamsNHDHighRes and gis.utah.gov/sgid-vector-download/utah-sgid-vector-gis-data-layer-download-index?fc=LakesNHDHighRes

Soil Survey Maps: Soil Survey Staff, NRCS, United States Department of Agriculture. Web Soil Survey, accessed August 6, 2010. Available online at websoilsurvey.nrcs.usda.gov/

Rich County Average Annual Precipitation: U.S. Department of Agriculture, Natural Resources Conservation Service – National Cartography & Geospatial Center. Vector dataset provides derived average annual precipitation according to a model using point precipitation and elevation data for the 30-year period of 1971 – 2000

Rich County Land Cover: USGS National Gap Analysis Program. 2004. National Digital Land Cover Map for the Southwestern United States. Version 1.0. RS/GIS Laboratory, College of Natural Resources, Utah State University. Published 9/15/2004. Multi-season satellite imagery from 1999-2001 were used in conjunction with digital elevation model derived datasets to model natural and semi-natural vegetation

Roads: This data set represents street centerline data for the State of Utah as compiled by the Utah Automated Geographic Reference Center from data contributed by local, county, state, federal and tribal governments. Available for download from the Utah Automated Geographic Reference Center at: <http://gis.utah.gov/sgid-vector-download/utah-sgid-vector-gis-data-layer-download-index?fc=Roads>

County Boundaries: This data set represents county boundaries in Utah at 1:24,000 scale. Last updated 8/18/2009. Available for download from the Utah Automated Geographic Reference Center at: <http://gis.utah.gov/sgid-vector-download/utah-sgid-vector-gis-data-layer-download-index?fc=Counties>