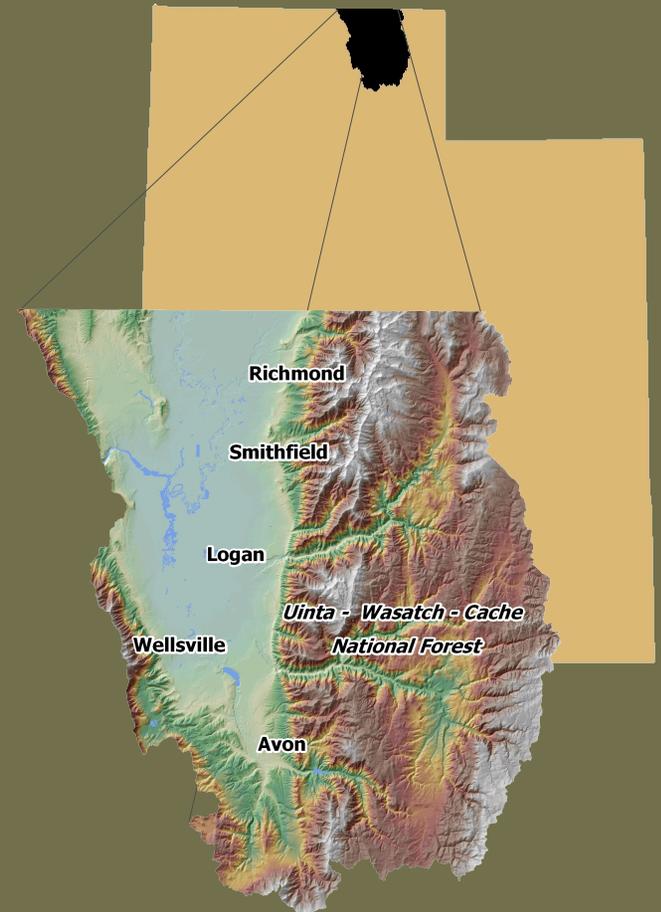


Cache County Resource Assessment

September 2011

Conserving Natural Resources For Our Future

Blacksmith Fork & North Cache Conservation Districts



Acknowledgments

Blacksmith Fork Conservation District

North Cache 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

Utah Partners for Conservation and Development

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
Cache County Commission

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Cache County Resource Assessment: Executive Summary



Why a Resource Assessment?

The Blacksmith Fork and North Cache Conservation Districts have 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 Cache 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:

Blacksmith Fork Conservation District
North Cache Conservation District
1860 N. 100 E., North Logan, UT 84321
Phone: 435-753-6029 ext. 116

Natural Resource Priorities and Concerns

The North Cache and Blacksmith Fork Conservation Districts have identified five natural resource priorities and concerns. These priorities receive special emphasis because of their immediate significance to Cache County:

Ag Land Preservation: Prime farmland is also prime developable land. Growth must be managed to preserve prime farmland.

Water Distribution Systems: Aging infrastructure has created problems with seepage and leaking, compromising efficiency and conservation.

Invasive Weeds: Medusahead rye and other noxious weeds present serious problems in pasture, open lands and the urban interface

Grazing & Range Management: Sixty percent of the county is used for grazing. Range vegetation has significantly changed due to several factors.

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: in Cache Valley is considered good farmland

Water: Projects need to support water development, protection of water rights, and water conservation

Air: Air quality during winter inversions is a significant concern.

Plants: Cache Valley is ideal for producing agricultural crops and pasture.

Animals: Livestock productions has increase while the wildlife community has changed dramatically. Presently there are 21 species of animals in Cache County that are listed as Species of Concern.

Humans: Economic sustainability, especially for agricultural products, and preserving the community and way of life are of paramount importance to residents of the county.

Introduction

The Conservation District Movement

The Dust Bowl of the 1930's brought the beginning of national programs for conserving 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 Soil Conservation Service and today it is 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 38 conservation districts grouped into seven administrative zones.

Cache County has two Conservation Districts: The North Cache Conservation District, founded June 1, 1954, directs activities north of the Logan River while the Blacksmith Fork Conservation District, formed on April 13, 1950, directs activities in the south end of the valley. Locally elected district supervisors guide conservation programs within their respective areas.



Cache Valley

Conservation districts provide local leadership and education to connect private property owners with state and federal assistance to improve, protect and sustain Utah's soil, water and related natural resources.

The Blacksmith Fork District has been actively involved in the Little Bear River 319 TMDL Watershed Improvement Project since its inception in 1990, and most recently the Medusahead Weed Prevention Area. Both districts have completed an inventory of animal feeding operations in the area and are working with landowners to provide cost-share funds for AFOs with water quality concerns. Other activities the districts are involved in include working with local landowners on irrigation improvement projects, with local communities and irrigation companies on storm water runoff issues, and

Public Outreach

In 2005, the districts surveyed local residents, government officials and conservation-oriented agencies to find out how they view the natural resources in Cache County and what conservation issues were most pressing. The survey asked questions about the following categories: air, agriculture, land use, pest management, soil, water, and wildlife. The 2005 assessment identified the most critical concerns as 1) irrigation water management, 2) noxious weed control, 3) pressure of housing development on agricultural land, and 4) effects of pesticides on the human environment.

In fall 2010, Conservation Districts once again requested input on resource concerns. Surveys were distributed at the annual Grill-Your-District Day, local work group meetings and with the fall newsletter. Five percent of the surveys distributed were completed and returned. Respondents indicated that urban encroachment on agriculture land is a major concern. Water issues include water rights, management and quality. Other top concerns included weeds - particularly medusahead rye, air pollution, pollinators and agriculture sustainability.

CACHE COUNTY

Located in northern Utah, Cache County is bordered by the Wasatch Mountains on the east and a spur of the Wasatch, the Wellsville Mountains, on the west. Anciently, much of Cache Valley was covered by Lake Bonneville and, as the lake receded, it left terraces at different levels. Most of Cache Valley is at elevations between 4,400 and 5,200 feet with mountains ranging to nearly 10,000 feet. The Bear River courses through the northwestern corner of the county. Cache County's land area is roughly 1,170 square miles with 239,525 acres of cropland or pasture, 280,802 acres of range and woodland and about 230,000 acres in Cache National Forest.¹

Originally known as Willow Valley, the name was later changed to Cache, from the mountain men who stored their furs in the area. Settlement began in 1856 with Mormon settlers moving into the Wellsville area. While fur trapping was the major business of the past, the economy has evolved into dairy, farming, food processing, education and industry. Cache County consistently ranks as one of the highest contributors of agricultural products in the state.

In 2008 there were 1,195 farms in Cache County with crop and livestock sales equaling \$148,395,000. Cache County ranks number one in the state for barley production. Cache is second in the state for winter wheat production, third for alfalfa production and dairy cattle, and fifth in the state for all cattle.²

In 2009, Cache County's population was 114,276 with 37% living in the city of Logan. Cache County is home to Utah State University which is the state's land-grant university and also the largest employer in the area.³

1 Soil Survey of Cache County

2 2010 Utah Agricultural Statistics

3 Utah Department of Workforce Services

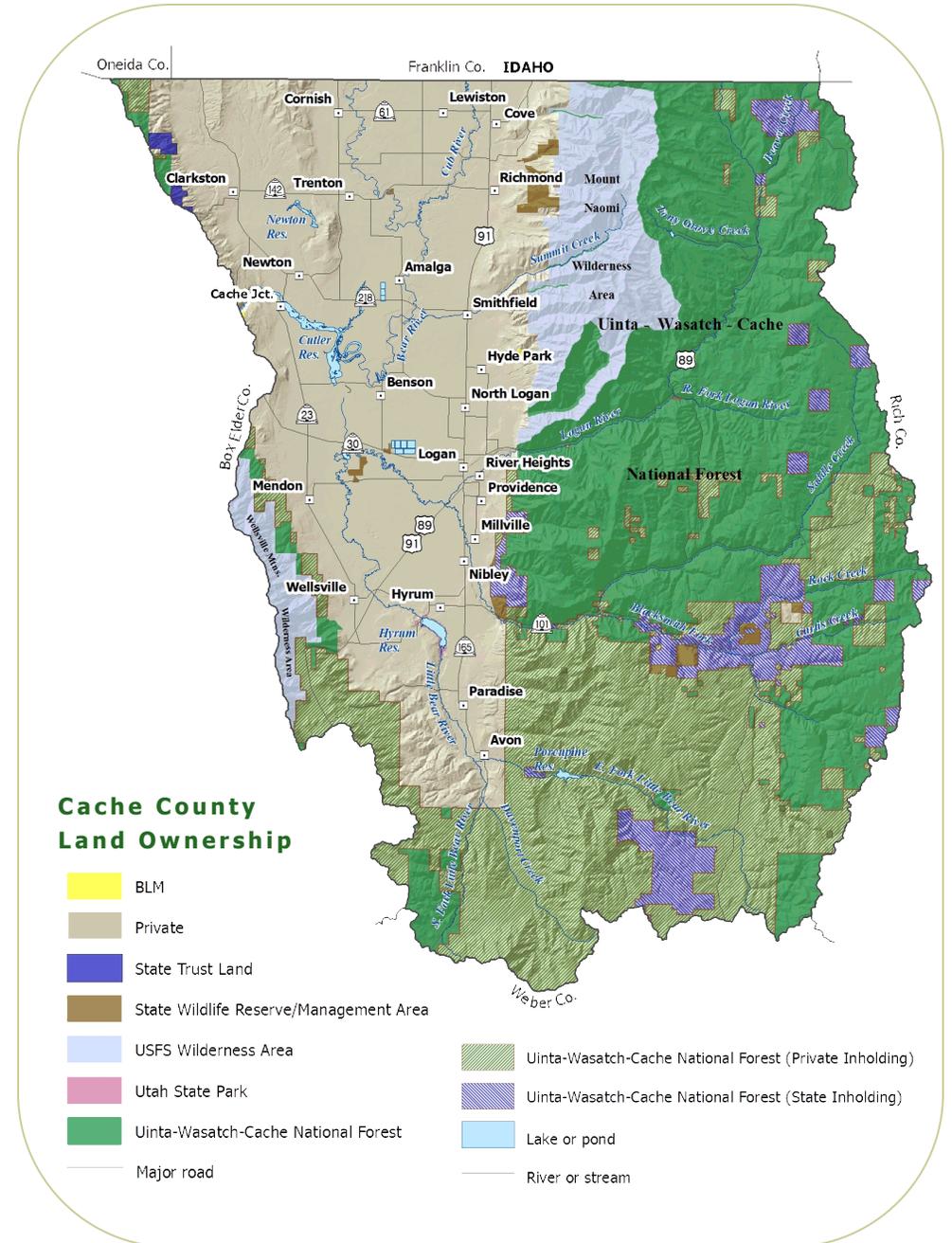




Photo credits (clockwise from top left): www.flickr.com/photos/8430129@N06/; Hyrum Reservoir, by Bruce Karren; Old Main, Utah State University; Mountain Man Rendez Vous, www.flickr.com/photos/rvanbree/; Cache Millville Canyon, USU Extension; Potato planting & Cub River Canyon, by Bruce Karren

Natural Resource Priorities and Concerns

AG LAND PRESERVATION

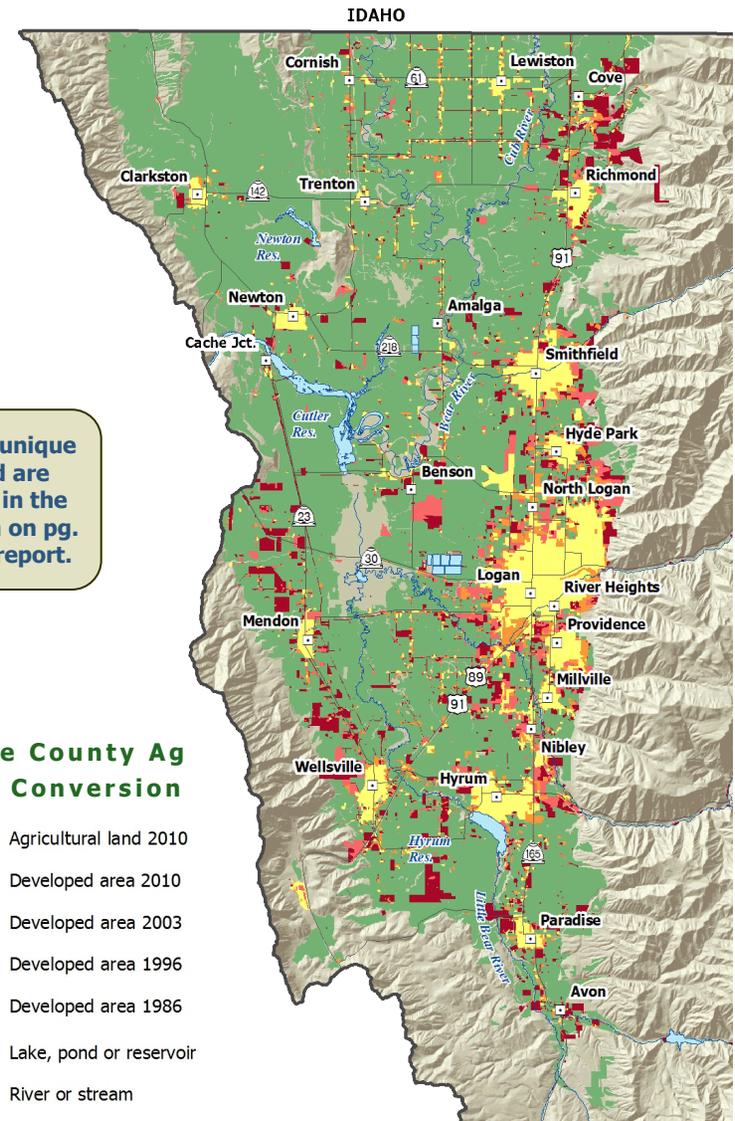
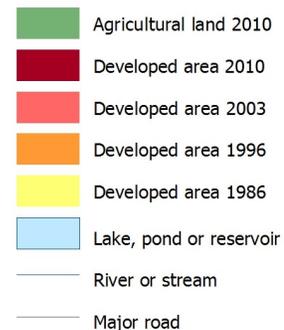
Approximately eighty-three percent of privately owned land in Cache County is agricultural land, with 1,195 farms operating on 251,550 acres. Cache County is one of Utah's leading agricultural counties, consistently ranking in the top five in the state for farm-gate receipts. Most farmers, ranchers, and dairyman want to continue farming, but are concerned about the future of their profession and family operation. Unfortunately, prime farmland is also prime developable land and when in or near urban areas, farm land is used for development. According to the U.S. Department of Agriculture, Utah lost over 636,528 acres of agricultural land between 2002 and 2007. Since 1986, Cache County has lost 8,884 acres of prime and statewide important farmland - nearly 14 square miles- to urban development. The current rate of development is consuming over 600 acres of prime and statewide important farmland each year.⁴

In 2008 the state looked at current land use, projected population growth, and estimated conversion of agriculture land to development. Of 328 square miles in Cache County, 278 were in agricultural use in 2010. Projections into 2030 show 241 square miles in agriculture with a loss of 38 square miles to development.⁵

Public input from the 2009 Envision Cache Valley workshops and meetings indicate that Cache Valley residents put a high priority on conserving land in the valley floor "for its working farms and role in protecting water quality." The most popular growth projection scenarios were those in which the most farmland is preserved for working ranches and farms and population growth stays within the boundaries of existing cities and towns. A majority of residents support restricting development on agricultural land through codes or through incentives to encourage landowners and developers to build in a way that reduces the impact on agriculture.⁶

Prime and unique farmland are discussed in the soil section on pg. 13 of this report.

Cache County Ag Land Conversion



4 Cache Valley SDAT

5 Governor's Office of Planning and Budget

6 Envision Cache Valley Final Report and Toolkit

Economic Incentives

In Cache County only about 1% of the populace, with an average age of 57, farm the land. Yet agriculture and agricultural related business contributes 14% of the revenue in the county. The broader agricultural sector – including agriculture production, services, and processing – generates more in additional output, value added, and employment than any other industry sector in the county. Agriculture produces 26% of all gross economic output in Cache County. Economists estimate that for every \$1 million of agricultural product output, an additional \$830,000 worth of seeds, feed, chemical supplies, equipment, custom work, fuel, etc., will be required to produce those agricultural products. This is the highest “Type 1” multiplier of any industry in Cache County. For every new job created in Cache County's agriculture sector, 2.03 additional jobs are created in the sectors that supply seeds, feed, chemical supplies, equipment, custom work, fuel, as inputs to agricultural production. Likewise, these 2.03 jobs could be lost for each agricultural job lost.⁷

The North Cache and Blacksmith Fork Conservation Districts have been instrumental in leading discussions for preserving agricultural land in Cache County. In fall of 2010 the districts brought together partners from USU Extension, NRCS, and officials from state and local government. The districts worked closely with State Rep. Jack Draxler when he proposed a bill to contribute roll back taxes for conservation easements. Cache County is currently working on a zoning ordinance to cluster development in the county, protecting land for agriculture production.

North Cache CD Chairman Bruce Karren is a member of with the newly formed Ag Sustainability Task Force which holds meetings once a month in conjunction with legislative interim meetings to discuss strategies for promoting ag sustainability. Ag land preservation is essential to to ag sustainability. A report will be written and submitted in November 2011 with ideas, methods, and programs for sustaining agriculture. The public is invited to contact the conservation districts with opinions and suggestions on how best to preserve ag land in the county.

7 Cache County Agricultural LESA Handbook

8 Deseret News



Jon White's 1,600-acre farm in Paradise, Utah was established in 1906. In 2003, the White family established a conservation easement that will ensure the ranch stays agricultural land forever.

“We'd always envisioned it would be a farm, and that's the way we want it to stay,” says White. As part of the easement, the White family sells its right to develop the land to the Utah Dept. of Agriculture. For now, White and his family live on and work the land. The children can sell the land in the future, but it must continue to be used for agricultural purposes, according to the agreement.⁸

Natural Resource Priorities and Concerns

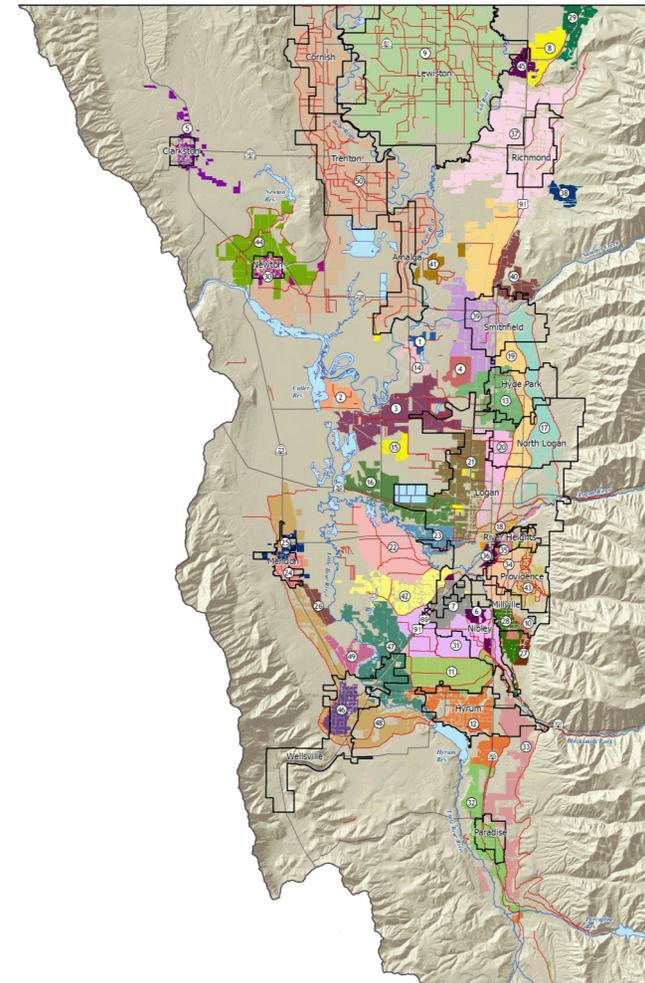
WATER DISTRIBUTION SYSTEMS

Rainfall in Cache County is not adequate to produce maximum crop yields without supplemental water. Consequently, irrigation water is used wherever it is available. Today there are about fifty-eight mutual irrigation companies. Canals are mainly diversions from major streams, however, large reservoirs have been constructed in Cache County to irrigate additional acreage and to furnish a more dependable water supply. One of the earliest efforts to provide late-season irrigation water in the Bear River Basin was to put Bear Lake to work as a storage reservoir.⁹

Agriculture continues to be the major use of water in the Bear River Basin. Many areas of Utah have experienced declining agricultural use corresponding to an increasing municipal and industrial (M&I) use. Significant growth is projected throughout the basin during the next twenty years. While most of the basin's municipalities have sufficient water to meet projected demands, many towns' water distribution systems will reach or exceed the limits of their capacity within the next twenty years. For many communities throughout Cache County, the problem is not water supply but rather some deficiency in their water delivery system. For Logan, Nibley, Paradise and Cornish, the problems exist now.

The Logan and Northern Canal (LN Canal) and the Logan, Hyde Park and Smithfield (LHPS) Canal have provided the citizens of Cache County with irrigation water since the 1890s. During the spring of 2009 a slope failure occurred along a hill side in Logan. As a result of the slope failure, a section of the LN Canal broke away, disabling the water distribution capabilities of the canal. Because the canal is part of an important water delivery system, supplying water to over 7300 acres, shareholders have been adversely affected. The possibility for problems increase with antiquated canal systems, seepage from canals and springs, and urban development. Early canals were designed to deliver water from existing rivers and streams. With development comes increased impervious surface areas and diminished infiltration rates. Replacing agricultural water use with commercial and residential water use increases storm water flows, which results in increased flooding of waterways and canal systems. Increased flooding compromises the stability of stream and canal banks while additional sediment reduces the capacity of the facility.

Cache County Irrigation Companies



Cache County irrigation company water rights are held by 58 companies. See the appendix of this report for a larger map with a list of individual companies in Cache Valley.

Water Conveyance Facilities Safety Act, 2010 H.B. 60

Due to a number of canal failures in the state over the past few years, The Water Conveyance Facilities Safety Act requires water conveyance facilities with a potential risk location to adopt a safety management plan. *Potential risk location* means a segment of a water conveyance facility constitutes a potential risk due to 1) location; 2) elevation; 3) soil conditions; 4) structural instability; 5) water volume or pressure; or 6) other conditions. *Potential risk* means that a failure would create a high probability of causing loss of human life or extensive economic loss. In partnership with Cache County, the Utah Association of Conservation Districts (UACD) is assisting irrigation companies to comply with the new legislation by preparing digitized maps and canal safety plans.

Water Rights

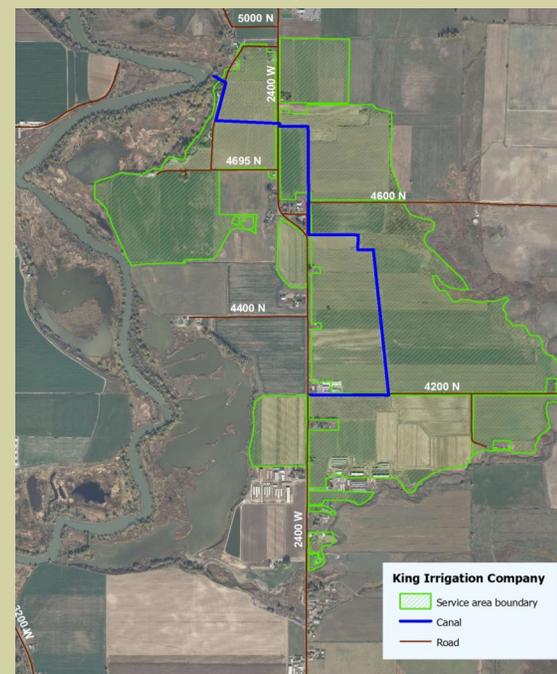
UACD is also assisting canal companies in Cache County in identifying the service area water rights and evaluating in and out production acres. The 1991 Bear River Development Act directs the Division of Water Resources to develop the surface water of the Bear River. Cache County has an abundant supply of both surface and ground water. A USGS study shows that surface and ground water within Cache Valley are interrelated. Withdrawing and consuming ground water reduces surface water flows. Ground water aquifers contribute to surface streams, springs, and reservoirs, and this water constitutes part of the flow to tributaries and the Bear River. The limiting factor regarding ground-water development in Cache Valley is not the amount of water physically available within the aquifers, but rather the amount of ground water which can be withdrawn without impairing prior rights.

The state engineer believes there is un-appropriated water available in Cache Valley during certain times of the year. Much of this water is available during the winter and spring runoff period. During peak demand periods of most years, principle water sources are fully appropriated and there is not sufficient flow in surface sources to meet the demand of all existing surface water rights. In 1992 the Bear River Basin experienced severe drought conditions and many early priority surface rights experienced shortages. Through a groundwater management plan, the State Engineer allowed additional ground water withdrawal as long as the depletions associated with the withdrawal were compensated by the reduction of some other beneficial use in the valley.

Cache County residents have the responsibility of managing water use so that no consumptive beneficial use of water is lost and all water is placed to a legal beneficial use. A healthy watershed will be encouraged by the enhanced multiple use of water resources in the Bear River and its tributaries. Accomplishment of that objective will be the result of citizens working together to facilitate fair and equitable solutions to water issues.

Outreach

In 2010, the Blacksmith Fork and North Cache Conservation Districts sent each canal company a brochure describing the requirements of the 2010 H.B. 60 (*see left*) and H.B. 298, Land Use Authority Notification of Canal Development. The conservation districts are assisting canal companies with the requirements of the new legislation. Canal companies are invited to contact the UACD/Cache County GIS specialist, at the Cache County Development Services Office who can prepare a digitized map (*see below*) of the canal alignment, and provide digital or hard copy maps to the respective cities, county and the irrigation company.



Digitized map showing the location of canals, ditches, and service area, prepared from GIS data.

Natural Resource Priorities and Concerns

INVASIVE WEEDS

Traditionally weed management has been an issue related to agriculture and agricultural production. However, invasive weed species crowd out native vegetation, increase problems with erosion, decrease forage production on land that is used by domestic and wild animals and impact the general public. Weeds have adapted to grow and proliferate in human-disturbed areas such as agricultural fields, lawns, roadsides, poorly managed grazing or logging areas, urban development, construction and high impact recreation areas. Large natural disturbances such as drought, fires, and floods also play a role in the spread of invasive plants.

Cache County has many different noxious weeds infesting rangeland areas. Medusahead rye, dyer's woad, scotch thistle, and leafy spurge are some of the main weeds encroaching on county rangelands.

Each of these weeds have specific areas of growth and require different treatments. Medusahead has seen progress with experimental new chemical treatments, leafy spurge infestations have decreased since the start of a bio-control method using bugs, and dyer's woad had a great community involvement program "Bag-O-Woad" but has been discontinued because of lack of funding. Great strides forward have been made in controlling weeds in Cache County because of help of government agencies and proactive landowners, but resources are scarce which limits weed control efforts. In 1971, the Utah Legislature passed the Utah Noxious Weed Act. Noxious weeds are plants that typically invade from other countries, leaving their natural controls and competitors behind (insects, diseases, grazers, and climate).

Noxious weeds are spreading at an alarming rate across the Western United States and Utah is no exception. Although the exact acreage is unknown, all of Utah's counties are infested by at least one of the 27 state-designated noxious weeds. Left unchecked, noxious weeds can spread at a surprising rate of 14% per year - more than 4,600 acres per day. In Utah, the average value of yield losses in all crops due to weeds is about 13%. Economic losses from weeds in the United States exceeds \$20 billion annually and is not restricted to cropland. Rangeland has experienced a 50 to 90% reduction in pro-

Cache County Noxious Weed List

The following weeds are officially designated and published as noxious for the State of Utah under the Utah Noxious Weed Act.¹⁰ Cache County's highest priority weeds are listed in bold:

- Bermudagrass (*cynodon dactylon*)
- Black henbane (*hyoscyamus niger*)
- **Canada thistle** (*cirsium arvense*)
- Diffuse knapweed (*centaurea diffusa*)
- **Dyers woad** (*isatis tinctoria* L)
- Field bindweed (*convolvulus arvensis*)
- **Hoary cress** (*cardaria drabe*)
- Houndstongue (*cynoglossum officinale*)
- Johnsongrass (*sorghum halepense*)
- **Leafy spurge** (*euphorbia esula*)
- **Medusahead** (*taeniatherum caput-medusae*)
- Musk thistle (*carduus mutans*)
- Oxeye Daisy (*chrysanthemum leucanthemum*)
- **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 (*onopordum acanthium*)
- Scotch thistle (*onopordum acanthium*)
- Spotted knapweed (*centaurea maculosa*)
- Squarrose knapweed (*centaurea squarrosa*)
- St. Johnswort (*hypericum perforatum*)
- **Yellow starthistle** (*centaurea solstitialis*)
- Yellow toadflax (*linaria vulgaris* Mill.)

Additional noxious weeds declared by Cache County :

- **Goatsrue** (*Galega officinalis*)
- **Puncturevine** (*Tribulus terrestris*)

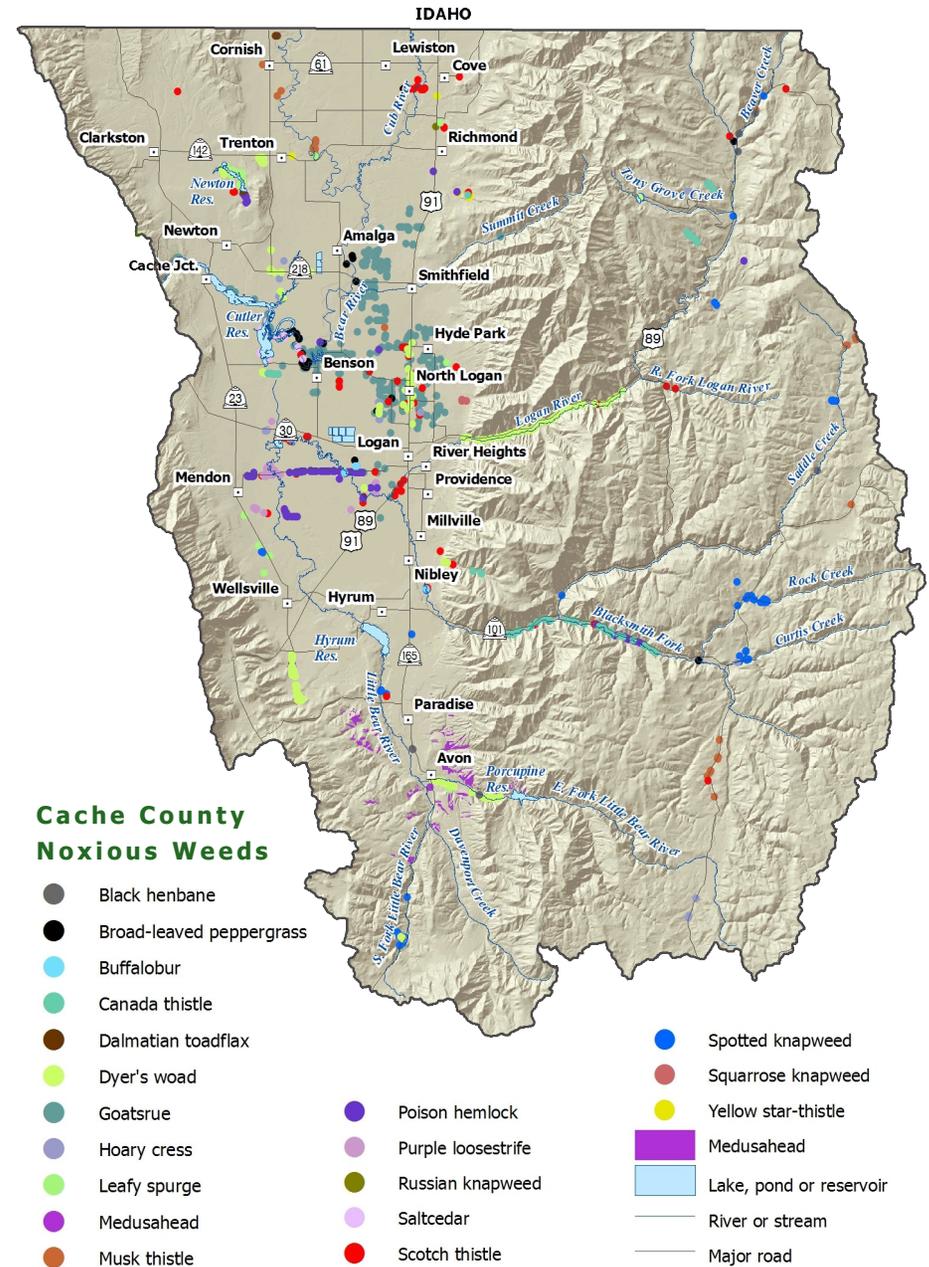
¹⁰ Utah Dept. of Agriculture and Food

Medusahead rye (*taeniatherum caput-medusa*)



One weed of particular concern is medusahead rye (*taeniatherum caput-medusae*), found in five Utah counties: Cache, Box Elder, Weber, Summit and Utah. It may infest as many as 6,000 acres in Cache County. Medusahead is an extremely competitive weed. It grows on dry south facing slopes which are unable to sustain desirable grass stands. Once Medusahead is introduced to an area the thatch from each year's growth begins to build. This weed has a high silica content which inhibits decomposition and as a result the thatch becomes dense and impenetrable to herbicide sprays. Because of the high silica content in Medusahead, it has little to no utility for wildlife and livestock. Unlike cheatgrass, which can be used in early spring for livestock feed, Medusahead is almost never palatable to animals. When Medusahead covers an area, grazing in that area can be cut by up to eighty percent.

Cache County landowners with medusahead problems have started a proactive weed prevention program to help control its spread. The project, which includes mapping, spraying, and reseeding, is governed by a board of landowners and overseen by the Blacksmith Fork Conservation District. Medusahead control efforts have been focused primarily in the south end of the valley but are being extended to include the whole county.



GRAZING MANAGEMENT

Rangeland/Pasture Management

Livestock production plays an important function in the economic development of Cache Valley and the cattle industry has become a dominant sector in county agriculture. About half of the Middle Bear-Logan Watershed is privately owned and half is managed by public agencies including the US Forest Service and the state of Utah. Over half of the land in the watershed is used as rangeland for grazing.

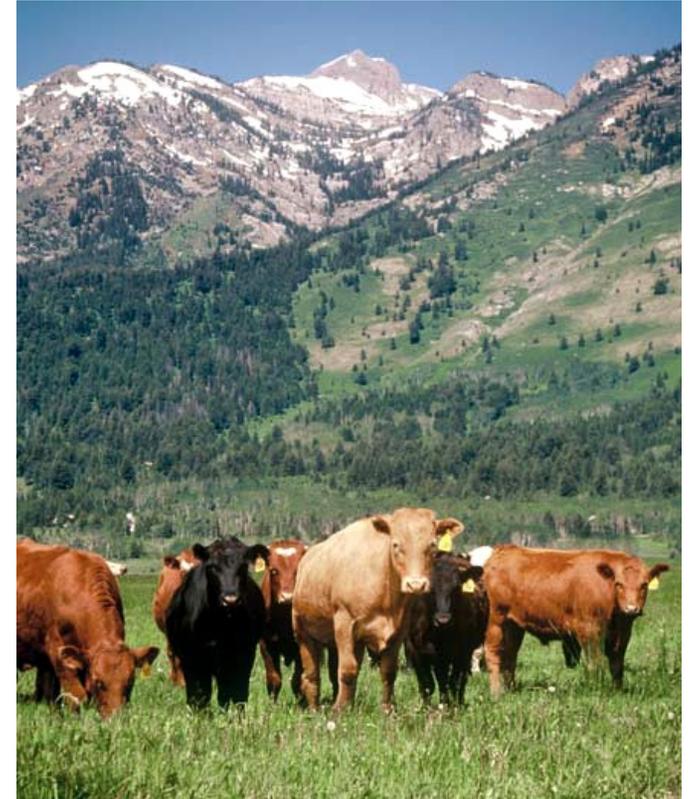
Rangeland degradation reduces the quantity and quality of resources that rangelands provide. Overgrazing, drought, erosion, and other induced stresses have caused severe degradation in the past. Proper grazing techniques can produce greener and more productive pastures and rangeland. On rangelands, proper grazing by domestic livestock can enhance the health and vigor of rangeland plants and improve wildlife habitat. Allowing forages time to recover between grazing intervals and alternating the time forages are grazed largely eliminates overuse of the resource. 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.

Public Rangelands

Public rangelands in Cache County are generally in good condition. These are managed predominantly by the U.S. Forest Service. There are localized areas that become over utilized by livestock, particularly around springs and riparian areas. Changes in management could alleviate most issues. However, making changes to public range management is a difficult and slow process. Multiple interest groups working with public management agencies and each other is the best approach. Due to increasing reliance of big game on state wildlife wintering areas, weeds such as medusahead rye and dyer's woad are becoming more prevalent throughout the county.

Private Rangelands

Private rangeland condition varies greatly in comparison to public rangelands. Much depends on the management of the landowners themselves. Landowner decisions are most often financially based. Sometimes short-sighted decisions can result in range degradation and future economic hardship. Landowners must



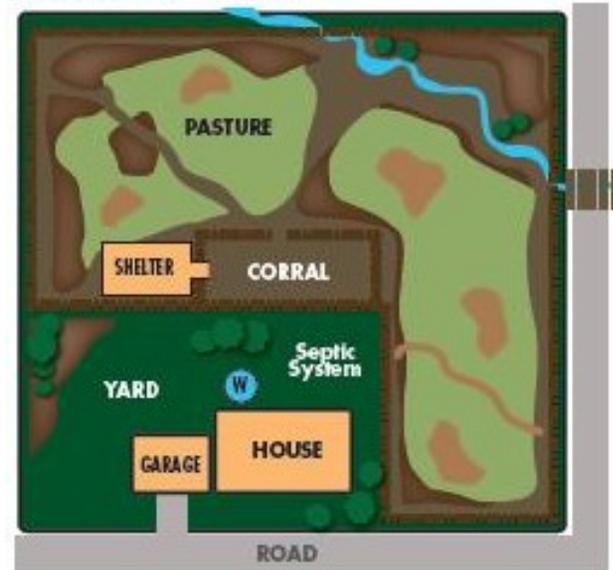
make decisions based on sustainability in the long-term. In Cache County, noxious weeds pose a serious threat to private rangelands, particularly at mid and lower elevations. Medusahead rye and is the focus of the South Cache Weed Prevention Area. Cache County participates in this and other coordinated weed control efforts.

Pasturelands

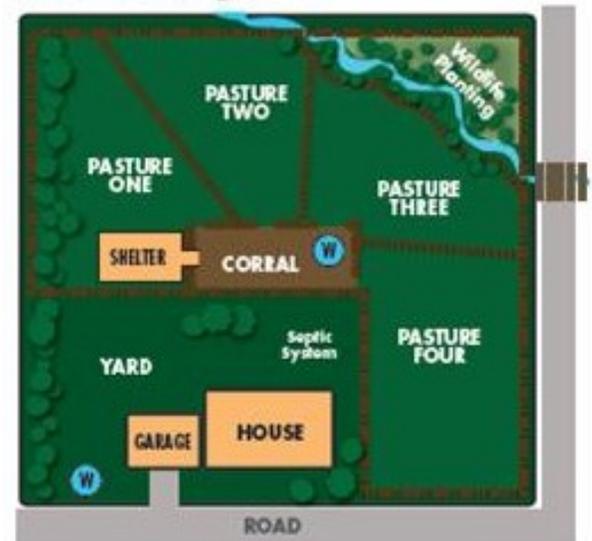
One of the keys factors that favor weeds in pastures is overutilization. This is especially obvious for small acreage pastures. Overutilization weakens perennial plants and decreases desirable plant cover. This sets up an ideal scenario for weeds to invade. Once established, many weeds are unpalatable to grazing animals, which results in a competitive advantage over the over utilized and weakened desirable vegetation. On small acreages, supplemental feeding while restricting grazing will allow desirable perennial plants time to recover and maintain pasture health.

Small pasture management is increasingly an issue in Cache County. Small “ranchettes” of 2-10 acres are being developed at an increasing rate. Landowners of these small properties often have little knowledge of pasture management and consequently don't manage their acreage appropriately for the number of horses or livestock they have on their property. Educational opportunities and resources for small acreage landowners are available, predominantly through USU Extension, but are underutilized. An excellent resource is The Small Pasture Management Handbook from USU Extension: <http://extension.usu.edu/htm/publications/publication=5732>

Before Planning...



After Planning...



General Resource Observations

SOIL

Soils in the Cache Valley evolved over time with climate, topography and biological forces. Over centuries parent material of limestone, sandstone, quartzite and dolomite wore down to create fertile, productive soil. Soils on the valley floors and old flood plains formed from transported materials, deposited by a number of streams located throughout the valley. As the waters from ancient Lake Bonneville receded, the mixed materials were deposited, forming terraces at the base of the mountains. As a result, soils deposited on the valley floor are fine textured, poorly drained soils, while the old lake terraces and the mouths of canyons are more coarse-textured sediment deposited as the lake receded.¹

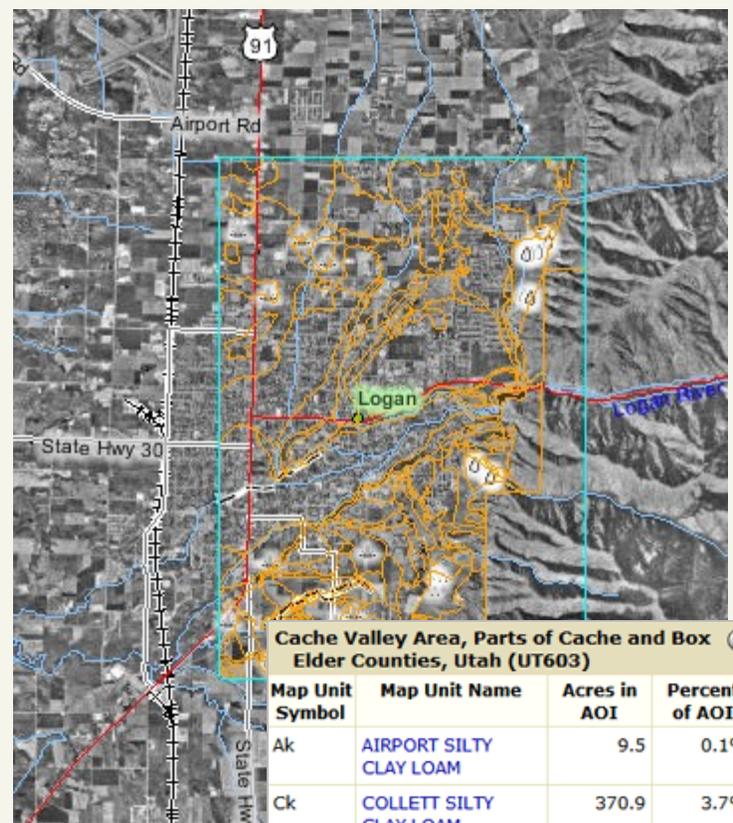
Soil Capability Classes

Soil capability classes show, in a general way, the suitability of soils for most kinds of field crops. Limitations such as permeability, water holding capacity, drainage, erosion, pH, and climatic zones are among the attributes which may determine the suitability of the soil for growing crops.

Land Capability Classes	Irrigated Acres	%	
II	Moderate limitations	63,870	36%
III	Severe limitations	66,202	37%
IV	Very severe limitations	48,585	27%

Specific information on Cache County soils can be obtained from the Web Soil Survey (WSS): websoilsurvey.nrcs.usda.gov. WSS allows users 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. It also delineates and describes large areas of similar soils. Common uses include evaluating soil suitability for dwellings with basements, landscaping, roads, and septic systems, measures for vegetative productivity, chemical and physical properties.

Web Soil Survey



Example of maps and tables available at the Web Soil Survey site. See the appendices for a map of Cache County's general soil associations.

Farmland Designations

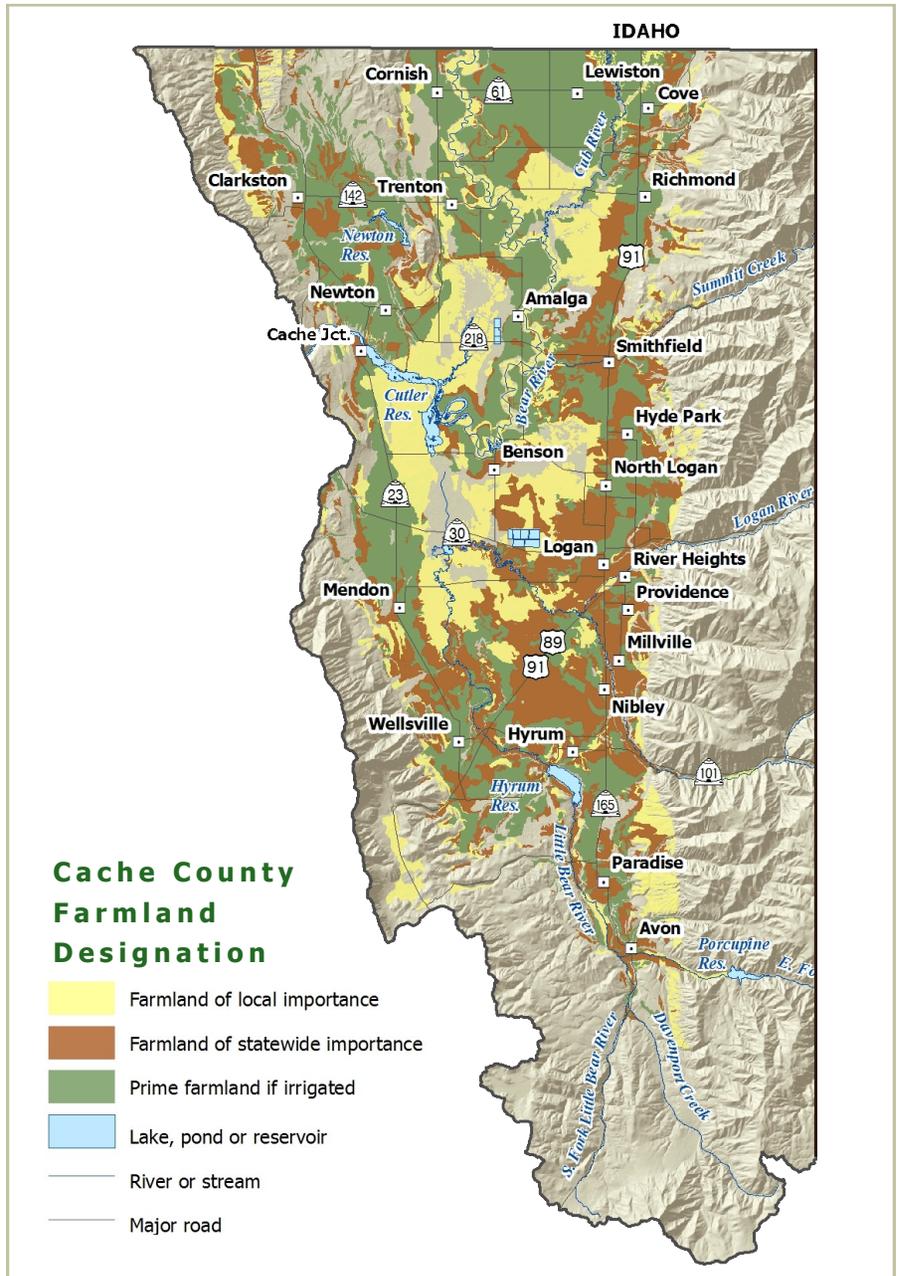
Prime farmland, as designated by U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing crops. It has the soil quality, growing season, and moisture supply needed to produce economically sustained high yields of crops when treated and managed according to acceptable farming methods. Prime farmlands are not excessively erodible or saturated with ground or surface water for a long period of time.

Unique farmland is land other than prime farmland that is used for the production of specific high value food and fiber crops. It has the special combination of soil quality, location, growing season, and moisture supply needed to produce economically sustained high quality and/or high yields of a specific crop when treated and managed according to acceptable farming methods. There are no soils in Cache County with this designation.

Farmland of statewide importance or of local importance, is land other than prime farmland or unique farmland but that is also highly productive. Criteria for defining and delineating these lands are determined by the appropriate state or local agencies in cooperation with USDA. The significant difference is that although the criteria are not appropriate outside the state or local area, these lands are still highly productive and/or are of special local importance to agriculture in the area.



The USDA prime farmland designation helps to control growth in urban areas by using zoning and/or conservation easements to preserve prime farmland resources, maintain local economic diversity, and establish green belts.

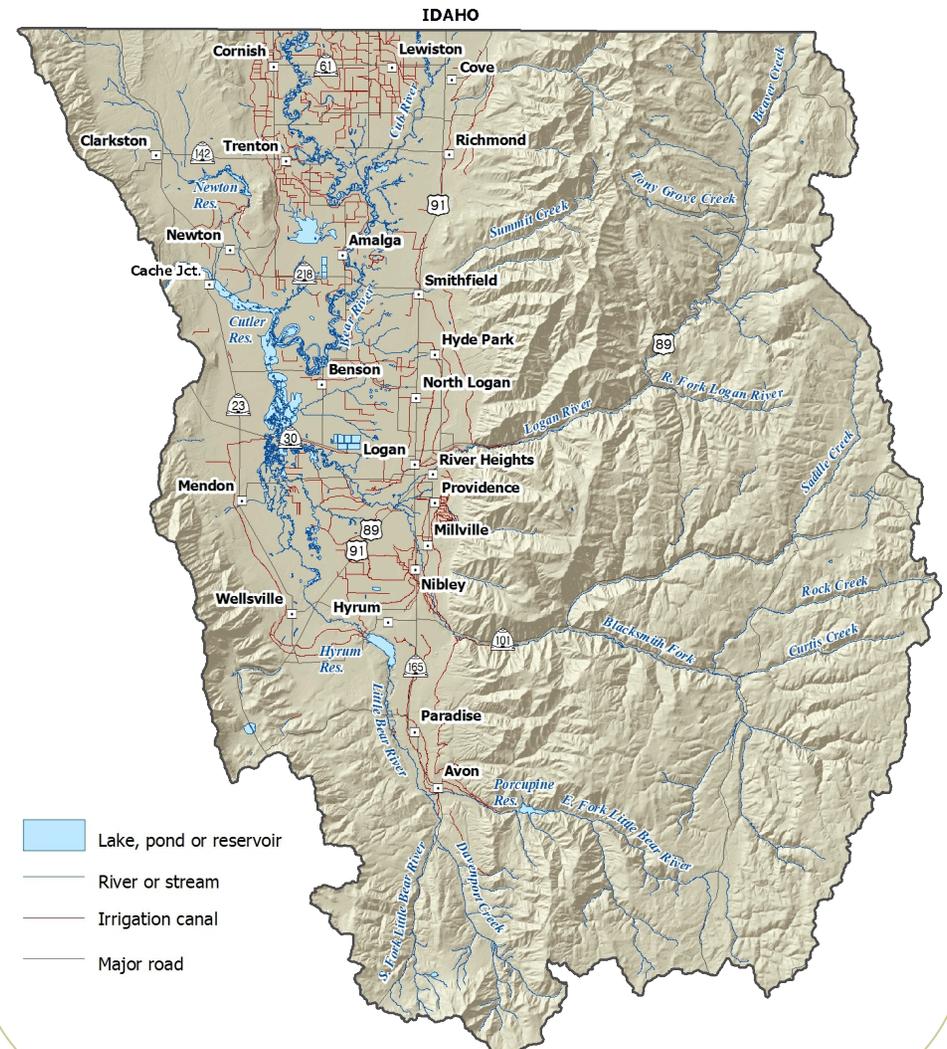


WATER

The Bear River is the largest stream flowing into the Cache Valley. It enters the valley from Idaho, west of Lewiston, Utah, runs south to the vicinity of Benson, then west through Cutler Reservoir into Box Elder County and into Great Salt Lake. Rivers and streams from within Cache Valley contribute 40% towards the natural flow of the Bear River. The source of the Logan River is in the Franklin Basin, entering Cache Valley east of the city of Logan. The source of the Little Bear River is in the extreme southern end of the county. The Blacksmith Fork River and its tributaries drain a large area from the east and southeast. Other smaller streams head in the mountains that border Cache Valley. Logan River is the largest tributary to the Bear River with the Blacksmith Fork and Little Bear River joining the Logan River before it enters Cutler reservoir. The Bear River serves as a drainage for all these streams before it leaves Cache Valley toward Great Salt Lake.

In 1936, Hyrum Dam was completed. The reservoir behind this dam has a capacity of 5,300* acre-feet and serves 2,225* acres. The latest reservoir to be completed is the Porcupine. It has a capacity of about 12,500 acre-feet and serves more than 2,500 acres. Many irrigation companies have lined their canals or piped streams to conserve water and reduce maintenance. Sprinkler irrigation has replaced flood, furrow, or sub-irrigation methods on most farms to conserve water and increase efficiency. Many areas of the Cache Valley are too wet for maximum crop production. Most of these soils are drained to lower the water table and to reduce the concentration of harmful salts in the root zone.

Cache County Lakes, Rivers and Canals



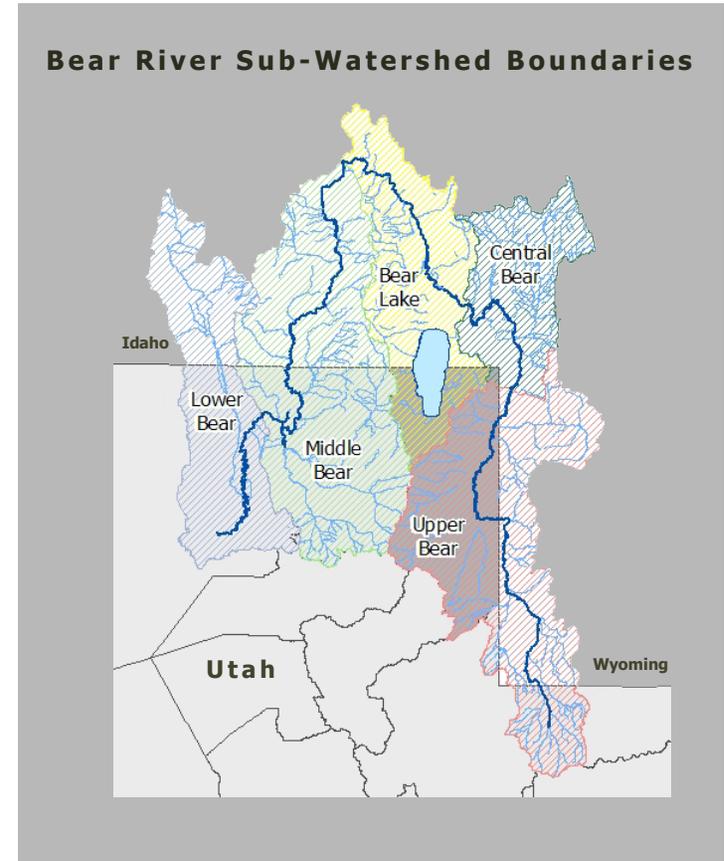
Water Quality

Cache Valley is located in the Middle 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 and phosphorous. Sediment, nitrogen, bacteria, and high water temperatures are also concerns. The EPA defines a Total Maximum Daily Load, or TMDL, as a calculation of the maximum amount of a pollutant that a waterbody can receive and still safely meet water quality standards. There are currently five Total Maximum Daily Loads (TMDLs) established for waterbodies in the Middle Bear River Watershed: the Bear River/Cutler Reservoir, Spring Creek, Newton/Clarkston Creeks, the Little Bear River, and Hyrum Reservoir. All of these TMDLs are in the implementation phase, and work continues in order to achieve load reduction targets.

Improving grazing management on riparian areas is also an important priority. Livestock in direct contact with streams can contribute to streambank erosion, as well as nutrient and bacteria loading. In various locations, high background levels of phosphorous from naturally occurring geologic features can also contribute to the eutrophication of downstream reservoirs. Animal feeding operations are common throughout the county. Some feedlots are close to waterways and there is potential for runoff during spring runoff or storm events. Irrigation return flows can also transport animal waste, suspended sediments, and pesticides to local waterways.

Ground water is the most important source of drinking water in Cache Valley. Septic tanks pose a threat to groundwater throughout the watershed. As sewage percolates down through the soil, pollutants can reach the aquifer, contaminating drinking water. As development continues to increase, so does the threat to ground water.

Storm water has also been identified as a water quality concern in the Middle Bear River watershed. As development increases, parking lots and other impervious surfaces are constructed, increasing urban runoff. This runoff contains sediment from construction, as well as nutrients from fertilizers, pet wastes, and other organic materials. Local municipalities are currently making efforts to reduce storm water runoff from reaching our rivers.



General Resource Observations

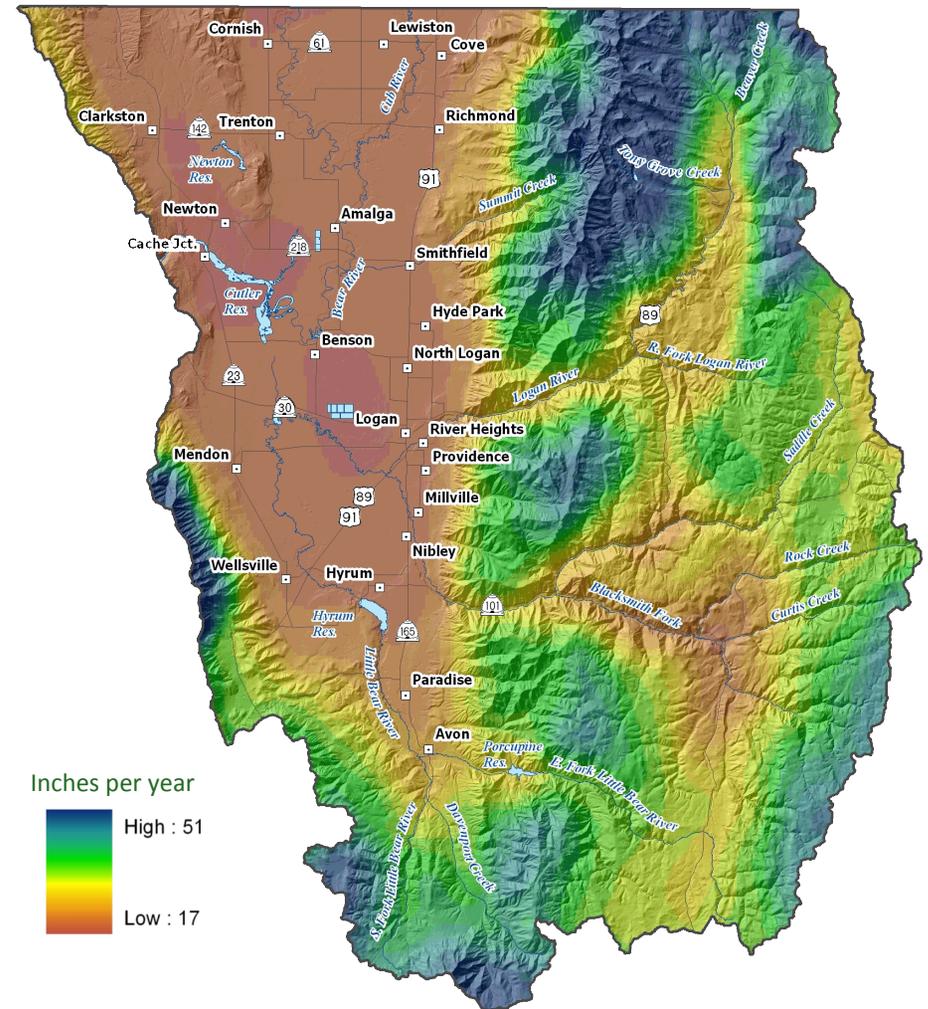
AIR AND CLIMATE

The climate in Cache County is typical of a high mountain desert, demonstrated by relatively low humidity, minimal precipitation, and a wide range of seasonal temperatures. Precipitation increases with elevation, and seasonal variations are significant. Rainfall is light in summer and is heaviest in spring. In the farming areas of Cache Valley, elevations range from 4,400 to 5,200 feet. The average annual precipitation at this elevation ranges from sixteen to twenty inches, with extremes of six and thirty-two inches. The average annual snowfall is about thirty-two inches per season, with extremes of 71 and 6.4 inches. The mountains surrounding the valley rise to heights of more than 9,000 feet above sea level. Here, the average annual precipitation ranges from 20 to 35 inches. As snow accumulation in the mountains melt, it provides water for valley residents during the growing season. About 75 percent of irrigation water comes directly from river water and runoff. Reservoirs contribute another fifteen percent while deep wells provide the remaining ten percent of needed irrigation water.

Producers plan for a relatively short growing season in Cache Valley. The frost-free period can be only 7 days in the vicinity of Hardware Ranch and about 164 days at Utah State University in Logan. The growing season for most farming areas in Cache Valley ranges from 114 to 150 days. The growing season is slightly longer where higher lake terraces meet the mountain slopes.

Temperatures range from an average summertime high of 89°F to an average low of 15°F in the winter. The daily temperature in summer ranges from a minimum in the 50's to a maximum in the 80's. Maximum temperatures of 90° or higher occur on an average of less than 25 days a year. The record low temperature in Cache Valley is -30°F. The coldest temperature ever recorded in Utah was -69° F at Peter Sinks, located in the high elevations of Logan Canyon. Winter months in Cache Valley are often characterized by extreme cold and poor air quality due to temperature inversions.

Cache County Annual Precipitation

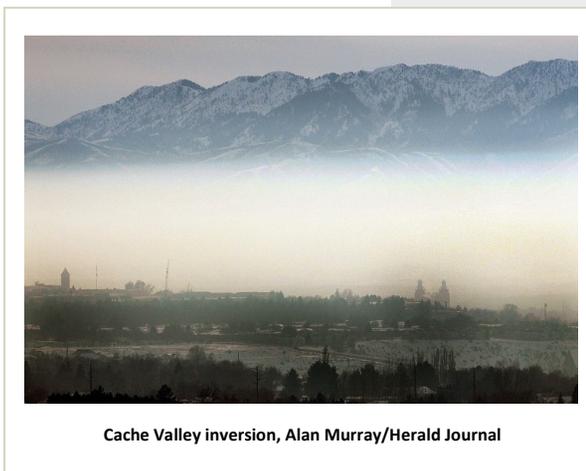


Air Quality

While Cache Valley has good air quality most of the time, it experiences poor air quality during stagnant, wintertime conditions of calm winds, clear skies, and long nights. Inversions form through the cooling of air near the ground at night. Once the sun goes down, the ground loses heat quickly, cooling the air in contact with the ground. Calm winds prevent warmer air above the surface from mixing down to the ground, and clear skies increase the rate of cooling at the Earth's surface. These conditions are exacerbated by the local topography (enclosed valley) and regional, stagnant high pressure systems.

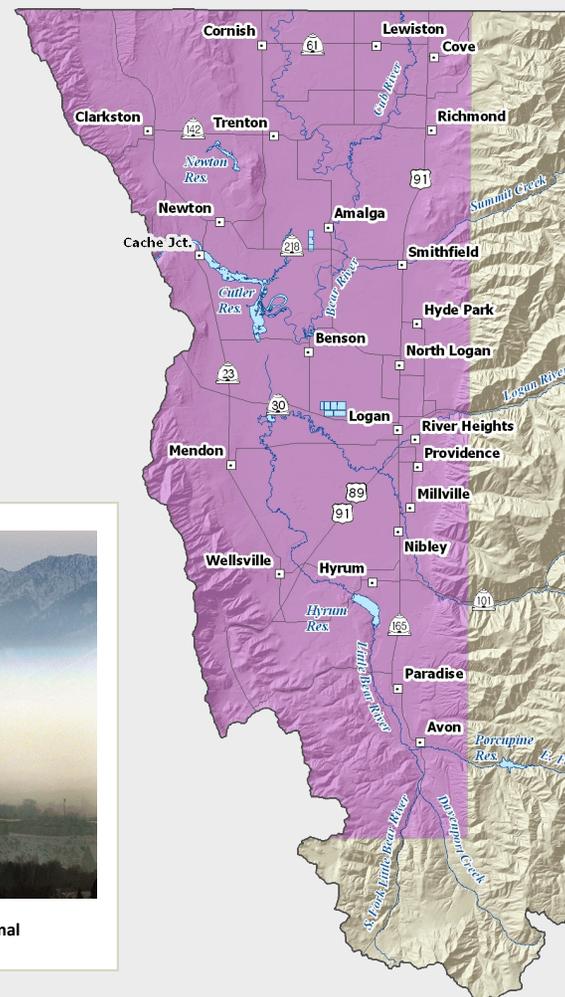
When an inversion occurs, photochemical reactions accelerate the creation of minute particles in the air, which in the Cache Valley are primarily composed of a chemical species known as ammonium nitrate. Fine particles that constitute this type of pollution are referred to as PM_{2.5}. These particles are about 1/35th the diameter of a human hair and can penetrate into the deep lung where they potentially cause serious health problems. Gas-phase emissions of oxides of nitrogen (NO_x), and hydrocarbons (VOCs) from vehicles, industry, commercial activities and households provide the material necessary for particulate formation. Ammonia gas (NH₃), the second half of the dominate particulate species, is locally attributable primarily to the livestock industry (cattle, poultry, swine, sheep, etc.). Studies have suggested that the wintertime ambient air is NH₃-rich, meaning any potential remediation scenarios should first target the NO_x and VOC source to observe the most immediate PM_{2.5} reductions. In addition, soot and dust particles contribute to the problem, but are not a large local contributors.

Air quality in Cache Valley consistently met national standards until recently when the Environmental Protection Agency lowered the 24-hr PM_{2.5} standard from 65 micrograms per cubic meter to 35. This change became effective on December 14, 2009, and resulted in the “nonattainment” designation of certain areas within the County. The State will have to develop a plan to bring the air in these regions back into attainment with this new standard. The State Implementation Plan (SIP) must be completed three years from the effective date, and must show attainment of the standard five years from the effective date. Cache County air quality therefore needs priority emphasis.



Cache Valley inversion, Alan Murray/Herald Journal

Cache Valley Non-Attainment Area



PM_{2.5} nonattainment area designated by EPA

General Resource Observations

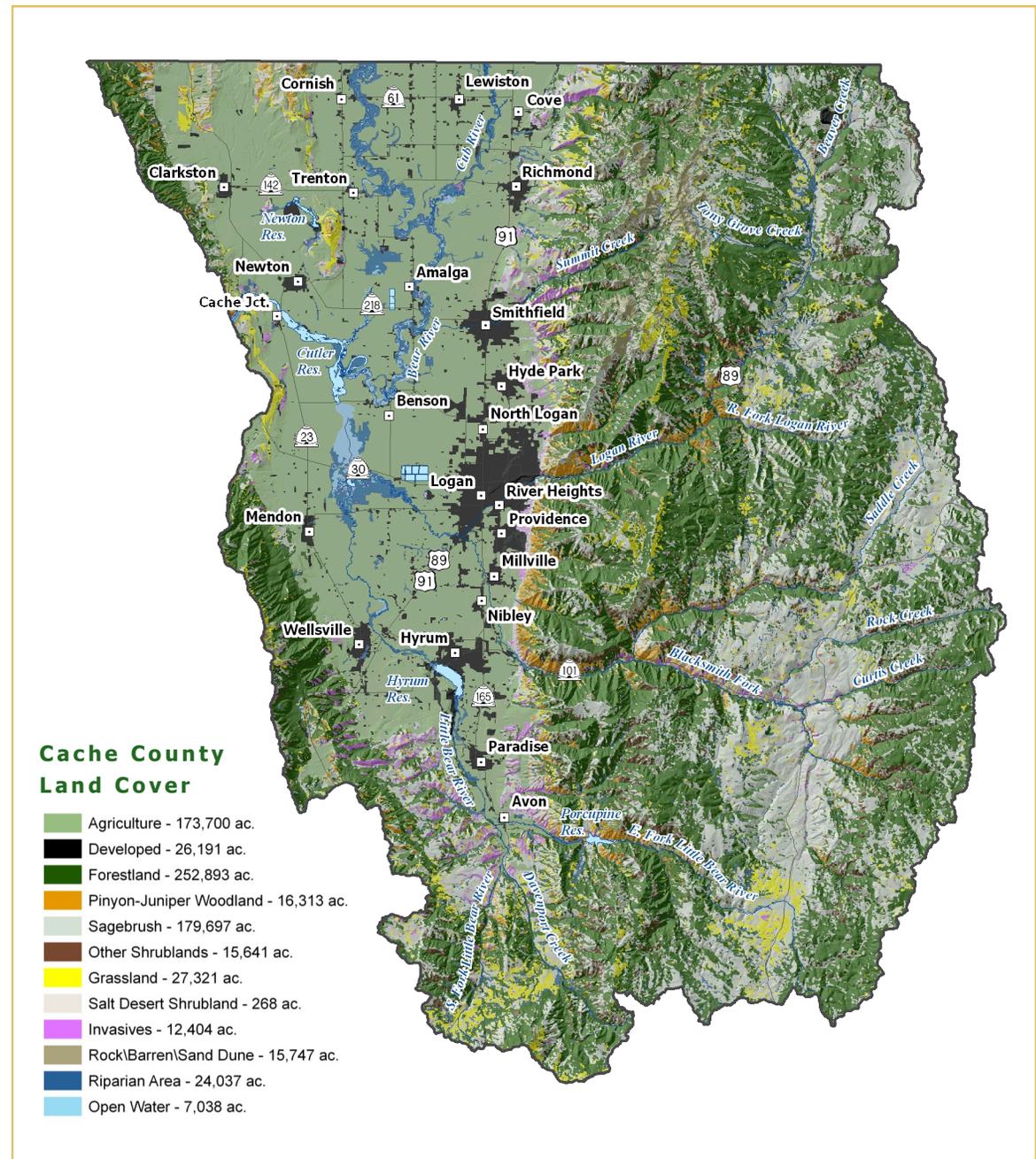
PLANTS

Crops and Pasture

Of the 745,600 acres comprising Cache County, 251,550 acres are in farms or ranches. The fertile valley is home to the majority of farms in the county where 145,751 acres are planted to crops. The principle crops grown in the Cache Valley are alfalfa, small grain, corn for silage, safflower and improved pasture. Alfalfa is the most important crop grown on irrigated soils. Farmers in the county raise dairy and beef cattle so that pasture, hay, and grain are used as feed. On non-irrigated farms wheat, barley and safflower are grown as cash crops. Some apples, pears, sour cherries and other fruits are grown in the county, primarily in the southern portion of the county on bench locations where the hazard of frost is reduced by good air drainage.

Rangeland

About 60 percent of the Cache County area is used for grazing by sheep and cattle. Much of the range vegetation has deteriorated since the area was settled. In recent years better methods of range management and increase use of herbicides have greatly improved grass production on ranches in the area.



Forest Land

Forested land covers 80,000 acres, approximately fifteen percent of the county. These forests provide some of the county'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. Currently the most threatening such as overgrazing, excessive timber harvest, and residential or recreation related development and surface mineral development.

Many of the communities along the east side of Cache Valley as well as Logan Canyon and the southeast corner of the county are increasing the amount of wildland-urban interface. In addition to the increased fire risk of these homes, new 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.

Cache County forests are in good condition. The presence of mountain pine beetle, spruce beetle and fir engraver are becoming an increasing threat. Many of aspen stands are slowly being displaced by shade tolerant conifers. Continued forest harvesting, thinnings, tree planting and regeneration, and/or fuels reduction are encouraged and will reduce the risks of epidemic populations of beetles. Generally the risk for catastrophic wild-fire is low, yet accumulation of fallen timber, understory trees and brush are contributing to the likelihood of a high intensity fire.

A recent assessment by the Utah Division of Forestry, Fire and State Lands (<http://www.ffsl.utah.gov/stateassessment.php>) 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.

Threatened and Endangered Species



The Maguire primrose (*Primula maguirei*) was listed as Federally Endangered in 1985. This species is extremely rare and found only in Logan Canyon, restricted to cool, moss-covered dolomite cliffs and boulders in the lower elevations of the canyon, and may be dependent on the calcium and magnesium carbonates of its soil substrate. The estimated population is

3,000 individuals in six known locations. Threats to this plant are recreational rock climbers, road work and amateur horticultural collecting.¹¹

Ute ladies'-tresses (*Spiranthes diluvialis*) was listed as a Threatened Species in 1992. During a wetland delineation in Mendon, Utah, a botanist discovered an undocumented population of Ute ladies' tresses – about 30 plants. The orchid also occurs in Colorado, Idaho, Montana, Nebraska, Utah, Washington, and Wyoming in high water table sites. The Cache Valley population is a geographic link between known populations in the Snake River Valley, Idaho and Utah County.¹²



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General Resource Observations

ANIMALS

Agriculture: Cattle and Sheep

Cache Valley has large acreages of range and pasture. This acreage and the irrigated acreage of hay and other feed make efficient and extensive production of livestock possible. Hereford and angus are the principal breed of beef cattle, but small herds of other breeds also are raised. Most of the calves from beef herds and the Holstein steers from the dairy herds are retained and fed in farm feedlots in the valley. Others are sold and fed elsewhere. Most of the dairy herds are of the Holstein-Friesian breed. There also are a few herds of Jersey and Guernsey cattle. The milk is manufactured into cheese or condensed and canned milk or is marketed as whole milk.

Sheep are raised mainly for meat and wool. Most of the lambs are sold to feeders or packers outside the valley. Most herds are wintered on desert ranges in western Utah and eastern Nevada.

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. 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. The brown (grizzly) bear, previously classified as endangered, is no longer listed.

Pollinators

Cache County agriculture statistics indicate it is second in the state for colonies of bees. The Utah Department of Agriculture and Food (UDAF) monitors for bee health every year. Bee inspectors not only survey for the number of active hives within the state, but also assess the health of each colony by sampling for pathogens and parasites.



Sensitive Species

Animals in Cache County that are federally listed or candidate species under the Endangered Species Act:

- Canada Lynx (*Lynx canadensis*)
- Greater Sage Grouse (*Centrocercus urophasianus*)
- Yellow Billed Cockoo (*Coccyzus americanus*)

Species that are receiving special management under a Conservation Agreement to preclude listing:

- Bluehead Sucker (*Catostomus discobolus*)
- Bonneville Cutthroat Trout (*Oncorhynchus clarkia Utah*)
- Northern goshawk (*Accipiter gentilis*)

Other sensitive species in Cache County:

- American white pelican (*Pelecanus erythrorhynchos*)
- Bald eagle (*Haliaeetus leucocephalus*)
- Black swift (*Cypseloides niger*)
- Bobolink (*Dolichonyx oryzivorus*)
- Burrowing owl (*Athene cunicularia*)
- California floater (*Anodonta californiensis*)
- Deseret mountainsnail (*Oreohelix peripheralis*)
- Ferruginous hawk (*Buteo regalis*)
- Fringed myotis (*Myotis thysanodes*)
- Grasshopper sparrow (*Ammodramus savannarum*)
- Great Plains toad (*Bufo cognatus*)
- Lewis's woodpecker (*Melanerpes lewis*)
- Long-billed curlew (*Numenius americanus*)
- Lyrate mountainsnail (*Oreohelix haydeni*)
- Pygmy rabbit (*Brachylagus idahoensis*)
- Sharp-tailed grouse (*Tympanuchus phasianellus*)
- Short-eared owl (*Asio flammeus*)
- Three-toed woodpecker (*Picoides tridactylus*)
- Townsend-s Big-eared Bat (*Corynorhinus townsendii*)
- Western Red Bat (*Lasiurus blossevillii*)
- Western Toad (*Bufo boreas*)

Aquatic Life

Large wetland areas, especially those near Cutler Reservoir, provide important habitat for waterfowl and shorebirds: White-faced Ibis, Franklin Gulls, Sandhill Cranes, and nesting Great Blue Herons. The wetland and juniper habitats support many songbirds, birds of prey, upland birds, and waterfowl.

The Logan and Blacksmith Fork Rivers and their tributaries are cold-water fisheries that provide excellent habitat for a variety of fish, including the Bonneville Cutthroat, Brown, and Rainbow Trout. The east fork of the Little Bear River has also been recently restored below Porcupine Dam and is stocked with several varieties of trout species including brown trout. Reservoirs provide additional habitat for fish. Despite its turbidity, Cutler's shallow, warm water environment is very productive and supports a diverse and abundant fish assemblage including Wall-eyes, Black Crappies, Channel Catfish, Common Carp, and Black Bullheads are common. Green Sunfish, Bluegill Sunfish, Largemouth Bass, Smallmouth Bass, Rainbow Trout, and Brown Trout are also found, but not in high numbers. The Utah Sucker is the only native fish found in Cutler.

Upland Game

Large scale transplant efforts are a major reason for the reestablishment of elk in Utah with the current statewide population estimated at approximately 68,000 animals. Hardware Ranch Wildlife Management Area, home to more than 600 elk, provides protected habitat for elk and other game. Hardware Ranch was established primarily to feed elk during winter months to keep them from causing damage to agricultural resources in Cache Valley.

The Wasatch-Cache National Forest is part of the critical wildlife corridor for species migration (lynx and elk) linking the Greater Yellowstone Ecosystem and the lower Rocky Mountains. Deer, elk, and moose are common in canyons of the area. The Division of Wildlife Resources established more than fifty Wildlife Management Areas statewide to protect areas used by mule deer during the winter when they move to lower elevation ranges. Utah statewide management plans for mule deer, elk, rocky mountain goat, moose, bighorn sheep and pronghorn are at the Utah Division of Wildlife Resources website: www.wildlife.utah.gov/hunting/biggame.



Sharp-tailed grouse, utabwildlifephotos.com; Mule deer buck, utabwildlifephotos.com; Bonneville cutthroat trout, bouldermountainguide.com

General Resource Observations

HUMANS: Social and Economic Considerations

Cache County's population passed the 100,000 mark in 2004 and has grown at a minimum of 2.0 percent per year through 2009. Logan is the largest community in the county. In 2009 communities throughout the county reported the following populations:⁵

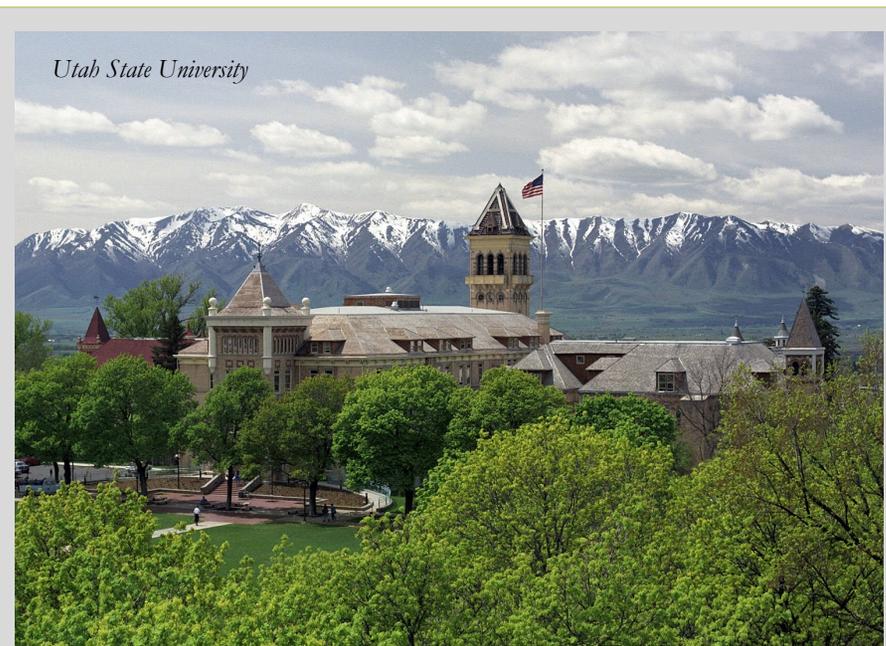
Logan	49,534	Hyde Park	4,039
Smithfield	9,757	Wellsville	3,272
North Logan	8,500	Lewiston	2,374
Hyrum	7,670	Richmond	2,038
Providence	5,612	Millville	1,833
Nibley	4,605	River Heights	1,713

Demographics

The 2010 Census indicates that Cache County's population increased by 23.3 percent from 2000 to 2010. In terms of age, Cache County's population can be broken down as follows: 10.3 percent under 5 years old; 30.8 percent under 18 years old; and 7.7 percent 65 years old and over. In 2009, the county's racial makeup was 89.1 percent white; 10 percent of the population was Hispanic or Latino of any race; 0.6 percent Black or African American; 0.6 percent Native American; 1.9 percent Asian; 0.4 percent Pacific Islander, and 1.9 percent from two or more races.¹³

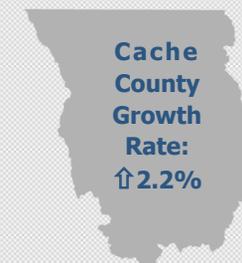
In 2009, the median household income was \$47,064 and the median income for a family was \$54,345. About 17 percent of the population were below the poverty line, including 9.8 percent of those under age 18 and 6.2 percent of those ages 65 or over. Over 92 percent of the county's residents over the age of 25 were high school graduates and 35 percent had obtained a bachelor's degree compared to the state average of 28.7 percent.¹³

⁵ Governor's Office of Budget and Planning
¹³ US Census Bureau



Cache County Population Data

Period Year	2009
Population	114,276
Births	2,503
Deaths	434
Natural Increase	2,069
Net Migration	366
Annual Change	2,435



Source: Utah Population Estimates Committee

Economy

Cache County's economy is historically rooted in agriculture and employment generated by Utah State University. At the turn of the 20th century, a growing financial industry signaled a break from the original isolated subsistence based economy of early settlers. With improved transportation from spurs off the transcontinental railroad in Ogden, industry was allowed to expand and farmers were able to deliver their produce regionally. Efforts and experimentation at Utah State's Agricultural College were critical in allowing Cache County to become one of the most productive agricultural areas in Utah as early as World War I. Within the last thirty years the county's economy has been further diversified mostly through "homegrown" entrepreneurial endeavors.

Utah State University, accounts for 24 percent of all jobs in the county. USU's research activity has spawned many companies that have added jobs. Manufacturing is second with about 20 percent and the trade, transportation, and utilities sector has a 15 percent share of all jobs. Construction lost 500 jobs between 2008 and 2009. Manufacturing shed 760 positions, which amounted to a 7.0 percent decline. Only four industry sectors grew between 2009 and 2010. Leisure and hospitality gained 100 new slots while government added 160. Healthcare, which had been a top growing industry, added only a meager 30 new positions in 2009. Cache County's net immigration is much lower than in previous years, yet it is still positive, which suggests that Utah's economic opportunities are still better than in other states.³

Despite historic economic growth, Cache County's workforce suffers from low wages and underemployment. In 2009 the average salary for Cache County employees was \$2,403 per month. The state average wage was \$3,171 per month. The recent recession further complicated the situation with increased unemployment. The current 5.1 percent rate of unemployment equates to 3,152 people out of work. The county lost 1,700 jobs in 2009, or a loss of -3.3 percent. However, in the first quarter of 2010, Cache County year-over job counts turned positive, that means that between March of 2009 and March of 2010 employers added just a handful of new jobs. Consumers spent less in 2009, down about 2.7 percent and both building valuation and the number of new building permits declined between 2008 and 2009. Relative to many other counties across the state, however, Cache County continues to maintain a stable economic position and the outlook is favorable.³

Cache County Labor Force			
	2006	2008	2009p
Labor Force	60,598	61,146	61,791
<i>Employed</i>	59,295	59,508	58,785
<i>Unemployed</i>	1,303	1,638	3,006
<i>Rate</i>	2.2%	2.7%	4.9%
Nonfarm Jobs	49,942	50,711	49,032
<i>% Change Prior Year</i>	3.8%	1.5%	-3.3%
<i>Mining</i>	9	7	6
<i>Construction</i>	3,027	2,797	2,289
<i>Manufacturing</i>	10,730	10,866	10,105
<i>Trade/Trans/Utilities</i>	7,528	7,624	7,363
<i>Information</i>	1,103	577	599
<i>Financial Activities</i>	1,478	1,652	1,561
<i>Profess/Business Svcs</i>	5,045	5,498	5,142
<i>Ed/Health/Social Svcs</i>	4,957	5,298	5,328
<i>Leisure/Hospitality</i>	3,566	3,594	3,701
<i>Other Services</i>	1,111	1,078	1,059
<i>Government</i>	11,381	11,719	11,880
Total Establishments	3,211	3,259	3,220
Total Wages (\$Millions)	1348.4	1449.5	1414.4
Source Utah Dept. of Workforce Services http://jobs.utah.gov/jsp/wi/utalmis/gotoLaborforce.do http://jobs.utah.gov/jsp/wi/utalmis/gotoIndustry.do			

³ Utah Department of Workforce Services

References

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2. 2010 Utah Agricultural Statistics and Utah Department of Agriculture and Food Annual Report. Prepared by *Utah Agriculture Statistics*. A copy of the report is available at <http://ag.utah.gov/news/publications/documents/10annualreport.pdf>
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4. Cache Valley SDAT, 2005. A Report by the Sustainable Design Assessment Team, available at www.aia.org/aiaucmp/groups/aia/documents/pdf/aia078149.pdf
5. Governor's Office of Planning and Budget <http://planning.utah.gov/super/SUPER/State%20Resources/LandUse2008.pdf>
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7. Cache County Agricultural Land Evaluation and Site Assessment (LESA) Handbook, available at www.brag.utah.gov/pdf/Ag/Cache%20LESA%20handbook10-28-04.pdf
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12. Bio West News. *Threatened Orchid found in Cache Valley*, retrieved from www.bio-west.com/news
13. US Census Bureau. Cache County Quick Facts retrieved on July 19, 2011 from quickfacts.census.gov/qfd/states/49/49005.html

Map Data Sources

Cache County Land Ownership: Land ownership status and areas of responsibility for the State of Utah. The Utah School and Institutional Trust Lands Administration (SITLA) and the Bureau of Land Management revise this data regularly to reflect changes in ownership. 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=LandOwnership>

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: <http://www.waterrights.utah.gov/gisinfo/wrcover.asp>

Watersheds: 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: <http://gis.utah.gov/sgid-vector-download/utah-sgid-vector-gis-data-layer-download-index?fc=StreamsNHDHighRes> and at <http://gis.utah.gov/sgid-vector-download/utah-sgid-vector-gis-data-layer-download-index?fc=LakesNHDHighRes>

Important Farmland: Prime, Statewide and Locally Important Farmland derived from the following SSURGO soil survey: UT603 – Cache Valley Area, Utah – Parts of Cache and Box Elder Counties 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: <http://soildatamart.nrcs.usda.gov/>

Noxious Weeds: Dataset compiled by Utah Department of Agriculture and Food from data collected by Cache County Weed Department for the time period 2003 – 2005. Not all areas containing noxious weeds have been surveyed; only surveyed areas are shown. 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=NoxiousWeeds_Point

Medusahead: Dataset represents areas of Medusahead sprayed in Cache County, fall 2009. Data was collected by David Mabey (NRCS) using a GPS unit and ARC Map. The map shows only areas sprayed and not all areas where medusahead has been identified.

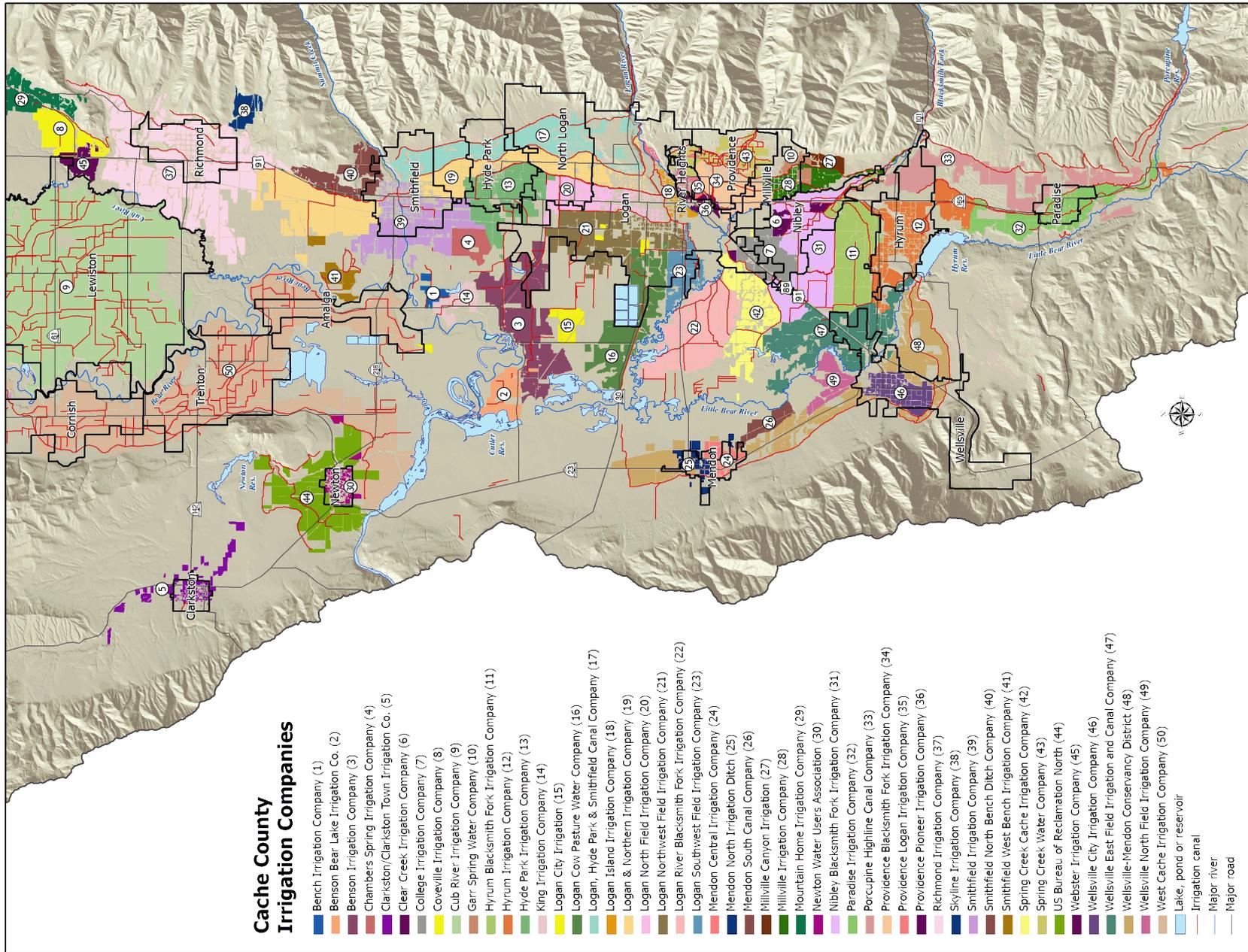
General Soils Data: General soil properties derived from the following SSURGO soil survey: UT603 – Cache Valley Area, Utah – Parts of Cache and Box Elder Counties using Soil Data Viewer, a tool created by USDA Natural Resources Conservation Service as an extension to ArcMap that allows users to create soil-based thematic maps. SSURGO Soil Surveys are available for download from the NRCS Soil Data Mart: <http://soildatamart.nrcs.usda.gov/>

Land Cover: USGS National Gap Analysis Program. 2004. Provisional Digital Land Cover Map for the Southwestern United States. Version 1.0. Produced by 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.

Annual Precipitation: Produced by U.S. Department of Agriculture Natural Resources Conservation Service – National Cartography and Geospatial Center. This vector data set provides derived average annual precipitation according to a model using point precipitation and elevation data for the 30-year period of 1971 – 2000.

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>



Cache County Soil Associations

Moderately well-drained to poorly drained soils of the low lake terraces

- s5484 Parant-Equis-Duffer
- s7803 Salt Lake-Logan-Cardon-Airport
- s7804 Trenton-Jordan-Cache
- s7805 Roshe Springs-Nibley-Milleville-Greenson-Collett

Well-drained to somewhat poorly drained soils of the medium lake terraces

- s1791 Windernot-Preston-Kidman
- s1811 Manila-Lonigan-Copenhagen-Broadhead
- s1826 Ridgecrest-Hondoho
- s7806 Quinney-Lewiston-Layton-Kidman

Well-drained soils of the medium and high lake terraces

- s2168 Nielsen-Dranyon-Dra
- s7807 Wheelon-Mendon-Curtis Creek
- s7808 Wheelon-Parleys-Collinston
- s7809 Timpanogos-Sterling-Ricks-Parleys-Nibley-McMurdie
- s7834 Sessions-Poleline-Patio
- s7839 Timpanogos-Parleys-Kearns-Fielding

Well-drained soils of the uplands

- s7785 Sterling-SheepCreek-Richmond-Foxol-Elzings
- s7810 Sterling-Nebeker-Hendricks-Croshaw

Well-drained and somewhat excessively drained soils of the mountains

- s7813 Dateman-Bradshaw-Bickmore-Agassiz
- s7814 Poleline-Lucky Star-Cluff-Bickmore
- s7823 Yeljack-Lucky Star-Charcol-Baird Hollow
- s7824 Sambrito-Lucky Star-Condie
- s7834 Sessions-Poleline-Patio
- s7835 Lucky Star-Charcol
- s7836 Rock Outcrop-Geertson-Cristo-Broad Canyon
- s7837 Yence-Richens-Lucky Star-Herd-Ercan

