Emery County Resource Needs Assessment

June 2012

Conserving Natural Resources For Our Future

San Rafael and Green River Conservation Districts

UACD Utah Association of Conservation Districts

UDAF Utah Department of Agriculture and Food

USDA NRCS Natural Resources Conservation Service

Acknowledgments

San Rafael & Green River Conservation Districts

with the:

Utah Association of Conservation Districts (UACD)
Utah Department of Agriculture and Food (UDAF)
Natural Resources Conservation Service (NRCS)

in partnership with the:

Utah Conservation Commission

Utah Conservation Districts Zone's 1 through 7
Utah Association of Conservation Districts
Utah Department of Agriculture and Food
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 (UtahPCD)

State Agencies and Organizations:

Utah Association of Conservation Districts
Utah Department of Agriculture and Food
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
- Farm Service Agency
- Agriculture Research Service

Other

Governor's Office of Planning and Budget
Emery County Travel Bureau
Utah Division of Oil, Gas & Mining

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Table of Contents

Emery County Resource Assessment: Executive Summary

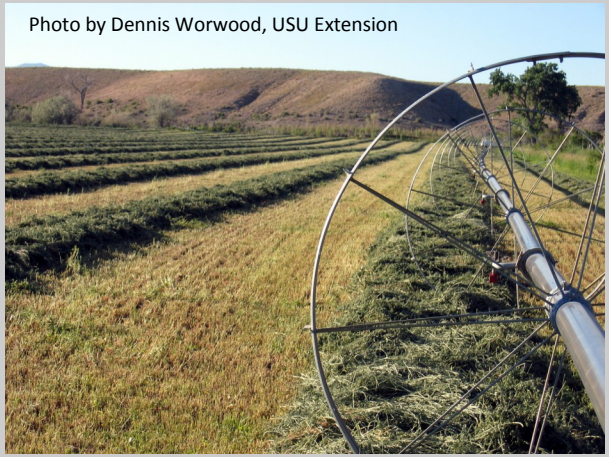
Photo by Dennis Worwood, USU Extension

Why a Resource Assessment?

The San Rafael and Green River 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 Emery 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 for this assessment may not have had the opportunity. This document is dynamic and will be updated as additional information is available.

Your comments are requested:

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Natural Resource Priorities and Concerns

The San Rafael and Green River Conservation Districts have identified five natural resource priorities and concerns. These priorities receive special emphasis because of their immediate significance to Emery County:

1. **Water Quantity and Quality:** Storage capacity, salinity, and mining impacts.
2. **Soil:** Erosion, salinity, and organic matter.
3. **Energy Development and Alternative Energy:** Conventional, renewable, and alternative energy development.
4. **Rangeland:** Watering facilities and grazing permits.
5. **Fish and Wildlife:** Sensitive/endangered species and wild life management.

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:

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.

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 has 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 38 conservation districts divided into seven zones.

Conservation Progress

Since the organization of the San Rafael Conservation District in 1959 and the Green River Conservation District in 1940, great strides have been made toward increasing and sustaining natural resources in Emery County. The 2005 resource assessment listed the most critical resource concerns as 1) water quantity, 2) surface water quality, 3) ground water quality, 4) soil erosion and condition, and 5) fish and wildlife. The 2012 resource assessment provides an opportunity to evaluate the progress made during the last six years and to set new goals to address the highest priority conservation needs in Emery County.

Public Outreach

In May of 2011, the San Rafael and Green River Conservation Districts held public meetings to receive comments and determine which resources were of major concern in Emery County. It was determined that water quantity and quality are still major concerns, as well as soil erosion and condition. Other top concerns presented were energy development and alternative energy; rangeland conditions, specifically limitations on watering facilities, invasive weeds, and grazing permits; and fish and wildlife management.

Top: Wind-devastated farmland during the Dust Bowl
Bottom: Farmland in Ferron, Utah

Emery County Overview

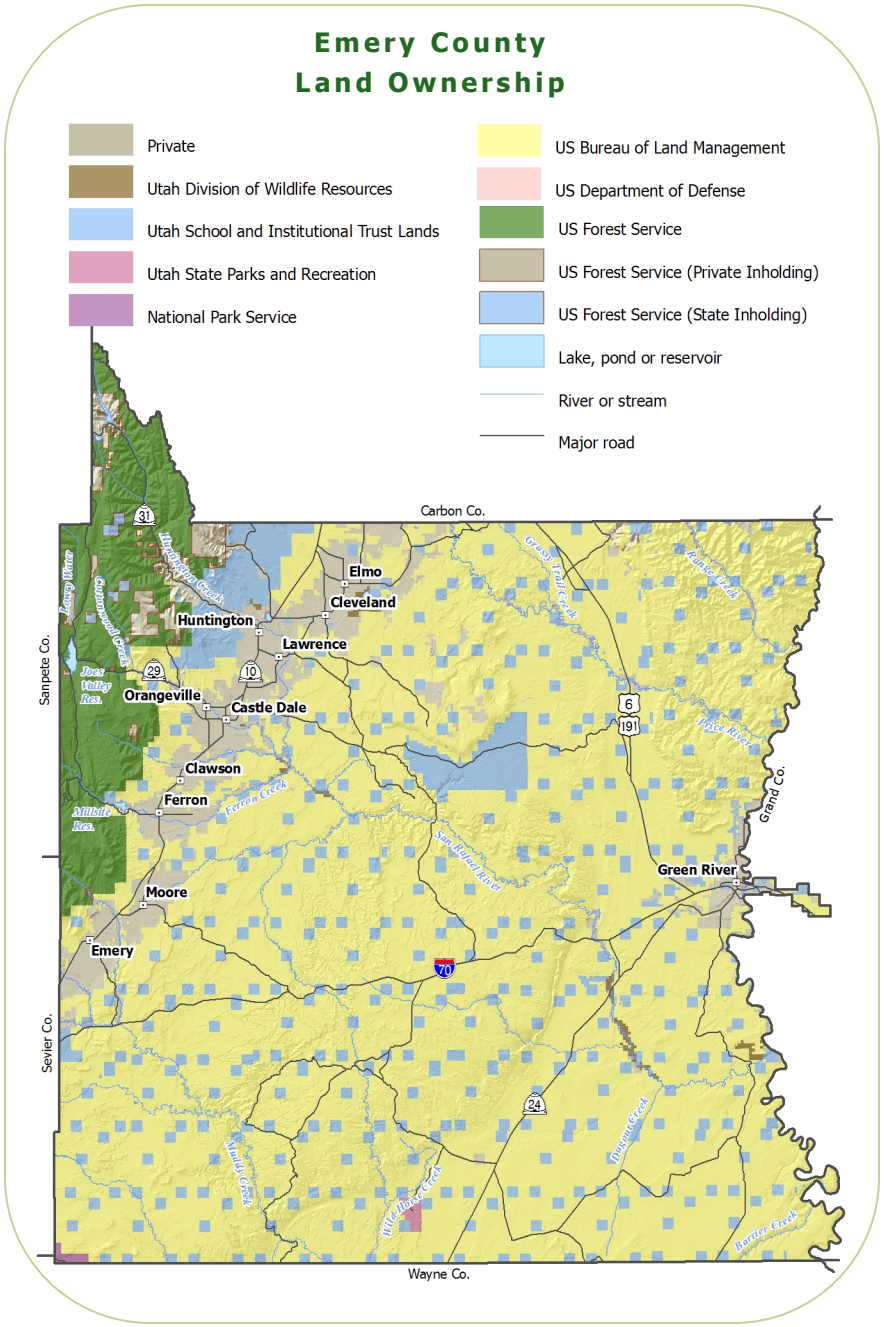
Background

Emery County, named after territorial governor George W. Emery, occupies about 4,439 square miles. The county includes three geographical areas: the mountains of the Wasatch Plateau; Castle Valley, where the major settlements are located; and the desert of the San Rafael Swell, the San Rafael Reef, Cedar Mountain, and the remote stretches of land west of the Green River. The county is bordered on the north by Carbon County, on the west by the Wasatch Plateau, on the south by the remote boundary with Wayne County, and on the east by the Green River, which also serves as the county line of neighboring Grand County.

Evidence of Emery County's ancient inhabitants, the Desert Archaic Culture and later the Fremont Culture, can still be found in many pictograph and petroglyph panels throughout the region. Ute Indians and travelers on the Spanish Trail later occupied sites in Castle Valley. In 1875, livestock producers from Sanpete County brought cattle and sheep over the mountains of the Wasatch Plateau for grazing and realized the potential to settle the area. In 1877, Brigham Young called Mormon settlers to the region from Sanpete County. Settlers took up homesteads in Huntington, Castle Dale, Orangeville, and Ferron. In 1883 the Denver and Rio Grande Railroad was completed through Emery County, bolstering the economy of the city of Green River.[1] Green River is now known for the melons grown in the area.

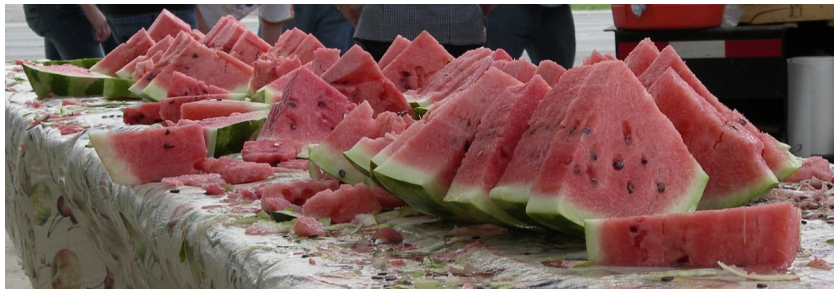
Livestock and farming were the main industries in the county for most of its history. The county's population grew significantly in the 1970s when Utah Power and Light Company constructed two large, coal-fired power plants near Castle Dale and Huntington. Large coal mines were also opened at this time to fuel the new power plants, creating even more jobs.[1]

A dry climate, a shortage of irrigation water late in the summer, and a short growing season often limit crop production. Main crops grown in the area include alfalfa, small grains, and irrigated pasture. The raising of beef cattle and sheep is the main source of agricultural income.[2]



1 Utah Association of Counties
2 Soil Survey of Carbon-Emery Area, Utah





Emery County

Photo credits clockwise from top left: Grain in Ferron, Utah by Roger Barton; Castle Valley Pageant by Emery County Travel Bureau; Zebras in Emery County by Duane Gilbert; Green River Melon Days by Green River City; Southern San Rafael by Emery County Travel Bureau; Emery County hayland by Dennis Worwood, USU Extension; Old Emery County Courthouse by Emery County; PacifiCorp's Hunter Power Plant near Castle Dale at dawn by PacifiCorp.

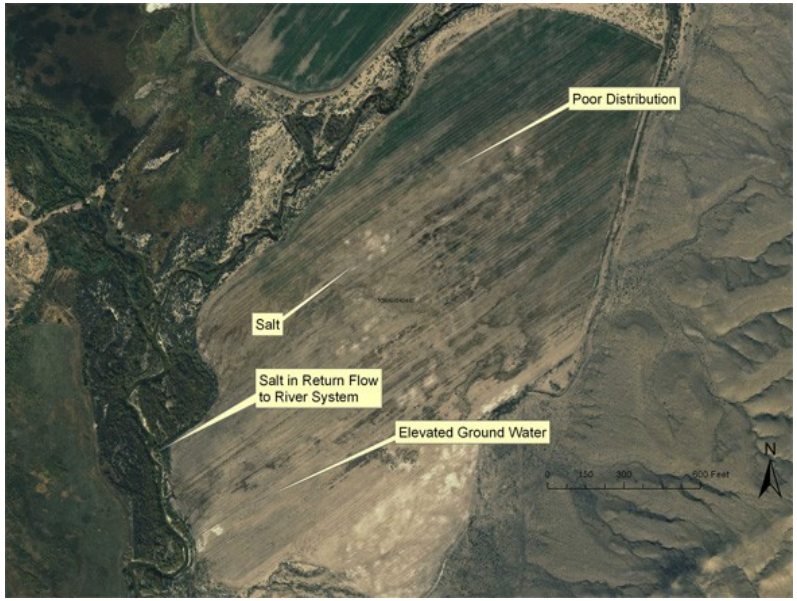
Water Quantity & Quality

Storage Capacity

Because of the area's desert climate, water in Emery County is scarce. The area is highly dependent on mountain snow pack, stream flow and reservoir storage for all water needs. The clay-like nature of Emery County soils makes them highly erodible. Because of this, some reservoirs in Emery County are faced with sedimentation, reducing water storage capacity and decreasing water quality. Millsite Reservoir, located in the hills above the city of Ferron, is currently experiencing large amounts of sediment accumulation. Approximately 3,600 acre-feet of water storage capacity has been lost. It is estimated that approximately half of the sediment comes from Mancos shale in about five square miles upstream from the reservoir. The Millsite Dam and Sedimentation Committee, in cooperation with Ferron Canal and Reservoir Company, is currently working with the Natural Resources Conservation Service and other agencies to prevent and manage the sediment already affecting the reservoir.

Sprinkler Irrigation and Salinity Control

Flood irrigation has been the method of crop and pastureland irrigation in Emery County for over a century. Once saturated by flood irrigation, the salt-bearing soils of ancient shallow seas produce large salt accumulations and damage previously productive agricultural land. Downstream water users of the Colorado River are then affected by the high salt content of water used for residential, commercial, industrial, and agricultural purposes. Currently, many canal and irrigation companies in Emery County are making the transition to pressurized sprinkler irrigation systems in an effort to reduce the salt loading into the Colorado River system, improve irrigation efficiency, and increase crop yields. Through the Colorado River Basin Salinity Control Program, these companies are working with the Bureau of Reclamation, the Natural Resources Conservation Service, and the local conservation districts to help fund the systems. Installed pressurized irrigation systems are now lowering water tables, restoring cropland to productive use, and stopping salt laden water from running off fields and into the Colorado River system.



Top Left: Cropland irrigated by gated pipe prior to sprinkler irrigation
Top Right: Poor water distribution - rising groundwater shown in swale
Bottom: Aerial photo showing poor water distribution using flood irrigation in the Huntington Cleveland project area; salt accumulation indicates rising water table

Mining Impacts

Underground coal mining provides a solid economic base for Emery County and provides needed coal for the energy industry. The Utah Division of Environmental Quality (DEQ), the regulatory agency for quality of mine discharge, indicates that coal mining activities can increase salts and iron through the leaching of spoil materials, groundwater discharge, or the erosion of disturbed surface material. Point source inputs are possible from the discharge of dewatering effluents, and from other controlled sources.[3] There has also been expressed concern of mining impacts on water supply. The interception of groundwater by underground mining activities may alter or diminish natural flows of seeps and springs used by local water user groups. The Utah Division of Oil, Gas and Mining (DOGM) regulates the hydrological effects of mining and administers water replacement rules. Cooperation between DOGM, DEQ, the Utah Division of Water Rights, mining companies, and local water user groups is needed to protect water resources and the mining industry alike.[4]

Additional concerns exist regarding water quantity and quality in Emery County. The following list shows a number of those concerns as well as needs that, if observed, may help address these concerns:

Concerns

- Lack of water storage necessary to fully utilize acquired water rights for irrigation and other uses
- Lack of existing watershed plans
- Health risks from large mosquito populations
- Major flooding events impacting communities, farms, and rangelands

Needs

- Maintenance of water storage capacity of reservoirs by reducing sedimentation loading
- Development of watershed plans
- Support of the reduction of mosquito populations and public education on control methods
- Heightened flood control measures, especially with the abandonment of canals due to the sprinkler irrigation transitions which were previously used as flood control structures

Zebra and quagga mussels are small, clam-like creatures that reproduce rapidly and deplete nutrients in the water. As such, they jeopardize power and water infrastructures, damage ecosystems and destroy recreation. In 2008, the Utah Division of Wildlife Resources detected Zebra mussels in Emery County's Electric Lake. No juvenile or adults mussels were found, but a plankton tow-net sample evidenced a preliminary finding of veligers by microscopy. Subsequent tests and results have been classified as "not detected." In 2008, the Utah State Legislature made it illegal to possess or transport invasive mussels. Boaters who have been in infested waters now must decontaminate boats and equipment before entering or traveling in Utah. Electric Lake, owned and utilized by PacifiCorp, is used for operation of the Huntington Power Plant. An infestation of Zebra Mussel would create major problems for plant operations. Sanitization efforts of all boat users is mandatory in protecting Emery County's water resources, as water from mountain reservoirs is utilized for all water needs.[5]

Top: Zebra Mussel (Dreissena polymorpha)
Bottom: Mussels attached to the bottom of a sail boat after sitting in infested waters

3 Utah Division of Water Quality
4 Utah Division of Water Resources
5 Utah Division of Wildlife Resources

Soil

Erosion

The nature of the soils in Emery County present many land use challenges. Emery County farmlands are unique in that they are nearly exclusively formed from Mancos shale. Mancos shale soils are very erosive and have inconsistent shrink/swell properties. Very few farmed areas in Emery County are not in the highly erosive land (HEL) category. Some areas near Green River experience resource issues presented by the Entrada Sandstone Formation and resulting sand dunes. These dune fields and added wind events result in blowing sand - covering roads and damaging crops and pastureland.

Salinity

Water movement in the Mancos shale bedrock can be unpredictable due to concentrated flows caused by the nature of the substrate. This piping may direct and concentrate water and salts in the soil in such a way that at times it may cause two to three feet of lifting and cracking in a concrete basement, when only a short distance away the houses have little or no problem. Mancos shale soils can and do present significant challenges to structures penetrating the soil where both water and sodium salts are available. Mancos shale parent material also presents another challenge in that it has inconsistent types and amounts of salts deposited within it. Sodium chloride, calcium carbonate, and gypsum salts are the major salt components affecting soils formed from Mancos shale. High salt content driven by sodium salts reduce available water capacity. Sodium left behind by water movement through the soil can form salts that push the pH so high that crops have reduced ability to uptake specific nutrients. Gypsum salts on the other hand promote soil structure, water infiltration, and lower the pH. Fortunately, Mancos shale soils' erosive properties are balanced by its soil forming properties. Well maintained irrigated fields have been found to increase in soil depth with use. Implementation of proper irrigation water management practices can help ensure healthy topsoil by reducing percolation and keeping salts from surfacing.[6] Farmers have also found that the best soils are silty-clay loams which have washed from nearby mountains and overlay the Mancos shale. Depths vary from a few inches to several


Photo by Joseph Dyer, USDA-NRCS


Photo by USDA-NRCS

Top: The erosive nature of the Mancos shale alluvium.
Bottom: Cropland with salts at surface level.

6 J. Dyer, USDA-NRCS

feet

Organic Matter

Because of the low content of organic matter in Emery County soils, the return of organic matter is particularly important in soils that are irrigated. The majority of soils in the area are formed from shale and are rich in illite and kaolinite clays. These clays have a low capacity to retain plant nutrients. Supplemental fertilizers including phosphorous and nitrogen are often used on crop and pastureland to increase plant growth.

The San Rafael Conservation District currently leases two no-till drills to local producers and sees an increase of use of the equipment with each growing season. No-till planting provides producers an opportunity to return organic matter to their soil by planting new crops into crop residue and stubble. Use of no-till equipment also reduces erosion and reduces fuel and equipment costs as compared to conventional tillage practices.

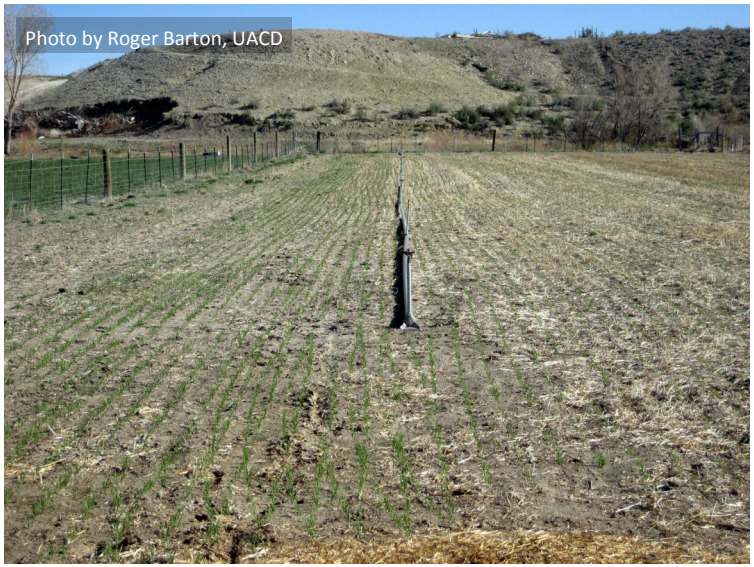
Additional concerns exist regarding soils in Emery County. The following list shows a number of those concerns as well as needs that, if observed, may help address soil concerns:

Concerns

- Salt from Mancos shale entering and polluting water sources
- Soil compaction
- Lack of public knowledge of Emery County soil composition, nutrient needs, and pH

Needs

- Continue participation in the Colorado River Basin Salinity Control Program
- Increase the use of pasture aeration and ripping to decrease soil compaction
- Educate the public on best management practices of nutrient application and soil sampling



No-till planting into crop residue. This method of planting decreases erosion, improves soil tilth, and increases organic matter in the soil.

Locally Important Farmland

Emery 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 agricultural production. Emery County currently does not have any land officially designated as "locally important farmland." However, if such a designation is made in the future, the San Rafael and Green River Conservation Districts suggests that any soils currently under agricultural production and other crop-producing soils that may be utilized when improved irrigation systems are installed be considered "locally important farmland." Rangeland soils are also highly important to livestock and wildlife.

Energy Development & Alternative Energy

Energy development plays an important role in national, state, and local economies, especially that of Emery County. Continued responsible development of these resources is vital in maintaining today's standard of living.

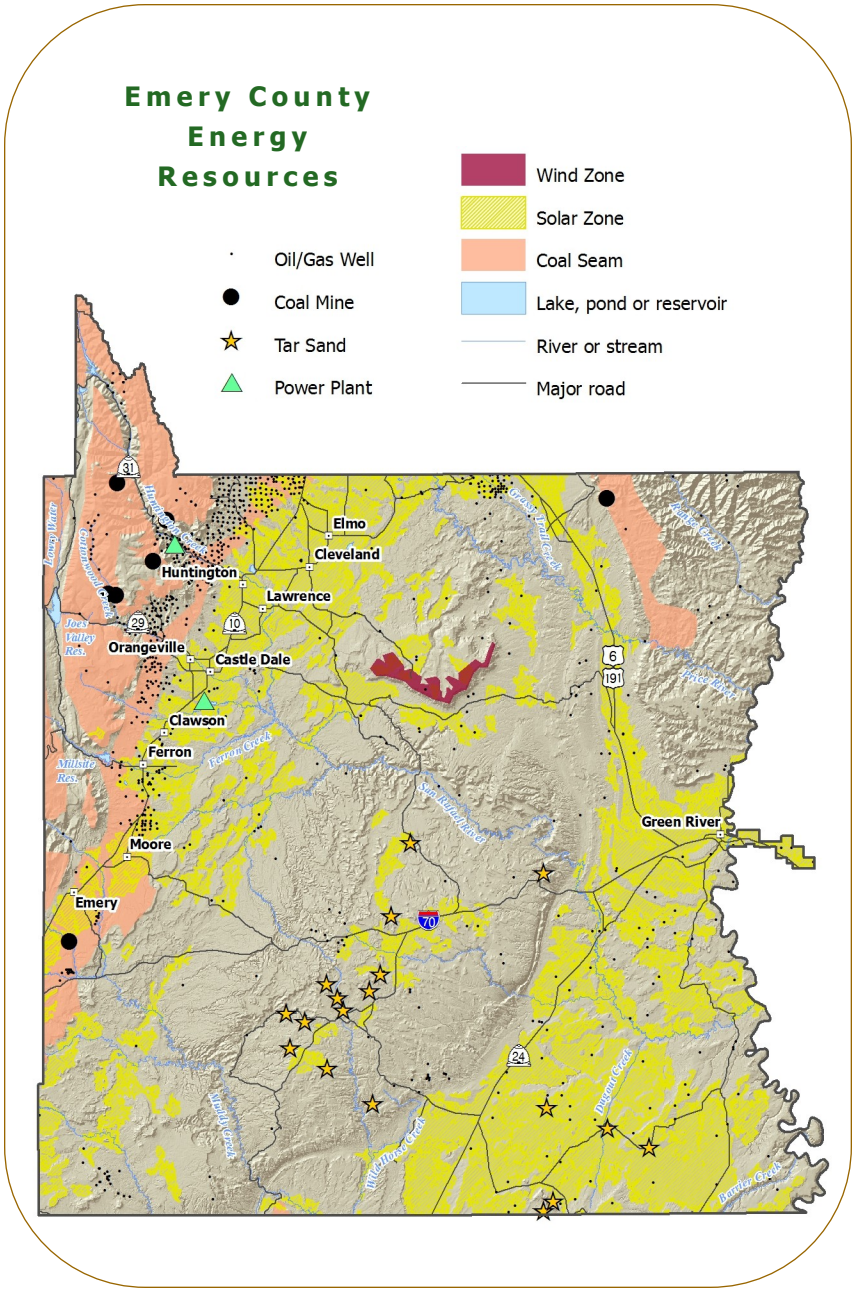
Conventional Energy Development

Coal mining and oil/gas production are the major energy industries found in Emery County. Emery County has one of the state's most economic coal reserves, of which the vast majority is consumed by power generation facilities. Coal production has steadily declined over the past 10 years. The future of coal mining in Utah depends on a number of factors, including economic, geological, technical, and political factors. The Energy Information Administration suggests coal will continue to provide the largest share of electric energy to the U.S., even as alternative energy resources are being developed. Increased demand for coal may be seen if successful carbon capture technology, coal-to-liquids plants, and coal-to-gas plants are implemented, as well as if increased exports to the Pacific Rim are made.[7]

Emery County Oil, Gas, & Coal Production			
	2010	2009	2008
Oil	6,106	11,120	6,602
Natural Gas	14,388,686	16,583,378	16,717,987
Coalbed Methane	10,148,075	11,711,967	13,940,198
Coal	Data unavailable	5,722	5,796

Gas volumes reported in MCF (1 MCF = 1,000 cubic feet).
Coal tonnage reported in thousand short tons.
Source: Utah Dept. of Natural Resources, Utah Geological Survey

7 Economic Development Corporation of Utah



Renewable and Alternative Energy

Emery county has potential for the development of renewable energy resources including wind, solar, and geothermal, as well as alternative energy resources such as tar sands. Bitumen from tar sands can be refined to make synthetic crude oil, asphalt, jet fuel, and gasoline. Factors such as access, technology, and investment constraints currently limit production.[8] Similar restraints also limit the development of renewable energy in Emery County despite the vast resources available.

Additional concerns exist regarding energy development in Emery County. The following list shows a number of those concerns as well as needs that, if observed, may help address energy development concerns in the county:

Concerns

- Regulations slowing energy development
- Water availability
- Expense of system installation verses income potential
- Potential land disturbances, water impacts, and other natural resource-impacting factors
- Lack of educational opportunities for local citizens

Needs

- Reduction of regulation inhibiting energy development
- Cooperation between water user groups, energy development companies, land use agencies, and citizens to both protect water rights and ensure opportunities for needed energy development
- Realistic financial opportunities and incentives for developers and landowners for renewable and alternative energy development
- Proper construction, operation, and maintenance of developments to prevent soil erosion, water contamination, and other possible negative impacts
- Education and coordination with citizens by developers to encourage safe, proper, and efficient energy development

8 DOE Office of Petroleum Reserves

Hunter Power Plant at dusk near Castle Dale, Utah

The Blue Castle Project - Nuclear Power near Green River

In 2009, Blue Castle Holdings announced a proposed nuclear power plant site west of Green River, Utah. Approved in January of 2012, 53,600 acre feet of water required for the plant's cooling process will be diverted from the Green River. Water rights utilized by the proposed plant will be returned to the conservancy districts who own them after the useful life of the plant. Along with the possibility of a nuclear power plant in Emery County would come job opportunities, a boost to the local economy, needed additional power generation, but also many concerns. The impacts of a nuclear power plant would be far reaching. Concerns expressed include impacts on growth, increased demands on infrastructure, and consumer perception of the safety of food grown in the area. Another concern expressed is the gathering of baseline health data prior to plant operation for comparison after implementation. Continual dissemination of accurate information and collaboration with the public as the plant's permitting process continues is needed to address concerns.

Rangeland

Emery County's rangleland has historically been highly utilized for livestock grazing and remains an important resource for the ranching industry today. Cattle and sheep ranchers typically graze during the summer months in upland ranges administered by the U.S. Forest Service and the State Institutional Trust Lands Administration (SITLA). In fall and winter months, cattle and sheep are generally moved to lower rangeland to graze, most of which is administered by the Bureau of Land Management (BLM) in the central area of the county, while others are brought from summer ranges to graze crop aftermath in irrigated, private fields and are fed hay in winter. Still other ranchers utilize private rangelands year long. Ranchers alike are challenged with issues such as limited water and watering facilities and variations in public grazing permit numbers and durations.

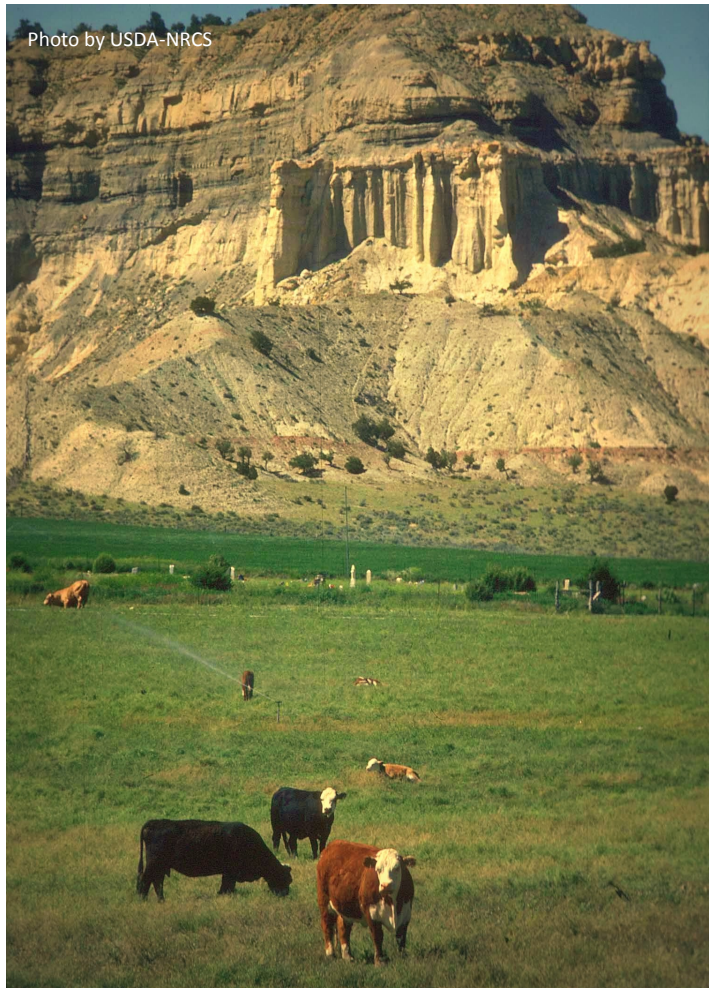


Photo by USDA-NRCS

Water for Livestock & Wildlife

Emery County ranchers are challenged with limited water and watering facilities on rangelands, especially in grazing areas in the lower elevations with little precipitation. The same problem exists for wildlife. Many existing watering facilities are runoff catchment facilities or unlined ponds. Water in these facilities is usually lower in quality and has a higher concentration of dissolved solids, specifically soluble salts. Historically, cattle have also watered out of open canals used for water distribution. However, the ongoing transition from open canals and ditches to sprinkler irrigation has eliminated many open canals, leaving ranchers with few options for watering livestock and reducing watering facilities for wildlife.

In an effort to address this problem, the San Rafael Conservation District is currently implementing the North Emery Rangeland Water Replacement Project through the Basin States Salinity Control Program. This project aims to provide water for livestock and wildlife on public lands surrounding the Huntington Cleveland Salinity Control Project, and includes the installation of over 30 stock watering troughs and more than 25 miles of pipe. The implementation of similar projects may be needed to meet the needs of livestock and wildlife.

Public Grazing Permits

Emery County cattle and sheep ranchers have seen increasing challenges with grazing permit windows and reductions in permit numbers on public grazing allotments. These changes have been made by state and federal agencies in efforts to better manage the rangelands. Yearly changes in grazing permit numbers and windows usually depends on that years' plant growth and precipitation. The frequency and intensity of grazing, as well as the opportunity for growth and re-growth are all important factors in maintaining healthy rangelands. Ranchers and public agencies must work together to protect the range and also to protect the ranching industry in Emery County.

Additional concerns exist regarding rangeland in Emery County. The following list shows a number of those concerns as well as needs that, if observed, may help address rangeland concerns:

Concerns

- Overall rangeland vegetative health
- Beetle-killed timber and resulting fire and watershed hazards to forests and communities
- Noxious and invasive weeds which degrade the range and riparian areas, specifically tamarisk trees
- Flooding from rangelands impacting communities and private property
- Protection of sensitive and endangered species and resulting reduction of multiple use including grazing

Needs

- Implementation of rangeland improvement projects including brush control, seeding projects, pinion and juniper removal, noxious weed control livestock watering developments
- Management of beetle-killed timber to protect local water resources, reduce fire hazards and protect soil and vegetation
- Support of the continued use of the tamarisk beetle as a method of control, along with removal and restorative re-vegetation
- Improve flood control
- Protection of sensitive and endangered species on a multiple use basis with livestock and wildlife


Photo by Melissa Swasey, UACD


Photo by Jodi Christensen, SRCD/GRCD

Top: Private, irrigated mountain pasture in Emery County.
Bottom: Cattle trailing to winter range on the San Rafael desert.
The allotment is administered by the Bureau of Land Management

Fish & Wildlife

Fish

Native Colorado River cutthroat trout are found in several high elevation (> 6,500 ft) streams and lakes in Emery County. Widespread introductions of non-native salmonids over the last century have limited current distributions primarily to isolated headwater streams and lakes. Recognizing the need for state wildlife agencies to coordinate conservation actions, Utah, Colorado, and Wyoming have developed a conservation team with the goal of protecting this native species. Duck Fork Reservoir is currently being used as a wild brood source with eggs being collected and used to reintroduce this species back into its native range.[5] The Ferron Creek drainage is currently being developed into a Colorado River cutthroat fishery.

Low elevation (< 6,500 ft) streams and rivers in the county are home to many native species of desert fish. The flannelmouth sucker, bluehead sucker, and roundtail chub inhabit tributary streams throughout the San Rafael and Muddy Creek drainages. All three species have been placed on the Utah Sensitive Species List due to pronounced declines in range and abundance. Of the many native fish that evolved in the Colorado River drainage, the Colorado pikeminnow, bonytail, humpback chub, and razorback sucker are federally listed as endangered species.[5] Emery County is currently developing a watershed plan which includes protection of endangered fish.

Wildlife Management

All wildlife plays an important role in Emery County. The San Rafael and Green River Conservation Districts and partners recognize the need for improved management of wildlife and habitat to minimize negative impacts and maximize positive impacts to both private and public lands. Elk and deer herds in Emery County have been a concern for many land managers. Several elk herds are now utilizing forage in the populated communities reserved for private livestock. The high numbers are also impacting livestock use of rangeland. Other animals, including bear, present challenges to many farms in the Green River area, especially melon farms. Collaboration of private, federal, state, local, and other groups is needed in order to maintain healthy wildlife numbers as well as protect local agriculture and range resources.

5 Utah Division of Wildlife Resources
9 USDA-NRCS


Photo courtesy of UDWR

"Depredation of private croplands continues to exist in some areas despite careful management of elk populations. Depredation problems need to be addressed in a timely and efficient manner so that landowners will better tolerate migratory populations of elk."

Utah Division of Wildlife Resources, 2010. Statewide Elk Management Plan.

Challenges for Pollinators

Bees and other pollinators are currently facing many challenges in the modern world. Habitat loss, disease, parasites, and environmental contaminants have all contributed to the decline in many species of pollinators. These pollinators serve an important purpose, as many plants cannot reproduce without pollen carried to them by foraging pollinators. It is estimated that one out of every three bites of food we eat exists because of animal pollinators. Protection of pollinators and enhancement of their habitat - especially that of native bees - is needed in order to pollinate the plants that provide the food we eat.[9] Recently, beekeepers in Green River have seen a decline in populations. Possible causes should be evaluated and efforts to increase populations should be made.


Photo: USDA Agricultural Research Service

Predator Control

Predator control is vital to the establishment of sage grouse and other threatened and endangered species. It is observed that the increase in predators, through their protection, may contribute to the decrease of sensitive species that wildlife management agencies are trying to protect. The use of best management practices to maintain healthy populations of predators is needed to protect sensitive species.

Additional concerns exist regarding fish and wildlife in Emery County. The following list shows a number of those concerns as well as needs that, if observed, may help address fish and wildlife concerns:

Concerns

- Predators reducing the numbers of desired wildlife species
- Habitat management instead of predator control reducing acreage once available to grazing
- Introduction of otters can create water use problems
- Wolves and the potential negative impacts on citizens, livestock, and wildlife
- Endangered species and sensitive species regulation impacting water and land use
- Decline in pollinator numbers

Needs

- Improved management of predator numbers to restore historic populations of wildlife, especially where habitat is sufficient
- Use livestock as a tool to improve habitat through proper grazing management practices and livestock weed control programs
- Discouragement of otter introduction
- Discouragement of wolf introduction
- Collaboration and increased opportunities for local input on endangered and sensitive species-related regulation
- Support and increase the number of pollinators through habitat enhancement and other measures

Greater Sage-Grouse

(Centerocerus urophasiarus)

The Greater Sage-Grouse - also known as the Sage-Hen and the Sage-Chicken - is the largest of the North American grouse. These birds inhabit sagebrush plains, foothills, and mountain valleys. Sagebrush is the predominant plant of quality habitat. A good understory of grasses and forbs, and associated meadow areas, are essential for optimum habitat. Male Sage-Grouse gather in traditional "strutting grounds" during March and April and put on spectacular courtship performance—strutting with their tails erect and spread, and air sacs inflated. The principle winter food item is sagebrush leaves.

Sage-Grouse were abundant in pioneer times, but sagebrush eradication and intensive use of lands by domestic livestock and wildlife have reduced their numbers. Sage-Grouse range is declining in Utah in both quantity and quality. Sage-Grouse range has declined 50 percent from historical times. Greater Sage-Grouse are native to Utah and are listed as a sensitive species by the Utah Division of Wildlife Resources.[10]

10 Utah Conservation Data Center

Soil

Emery County soils are similar to most soils found on the Colorado Plateau, in that they are directly tied to the portion of the geology exposed in stratigraphic column and the elevation, aspect, and slope upon which they are found. The varying soils conditions of the area produce varying soil resource conditions.

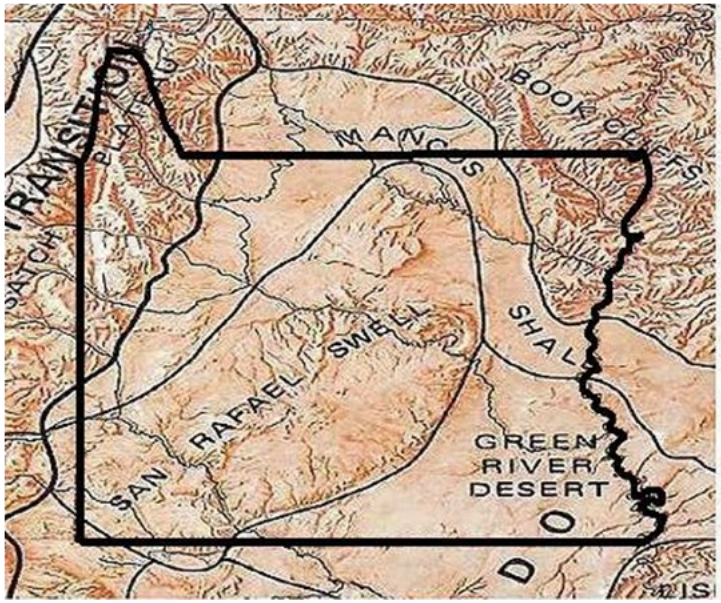
Mancos Shale Area

The majority of Emery County's cities, towns, and farming operations are located in the Mancos shale area. Mancos shale soils are very erosive and have inconsistent shrink/swell properties. Mancos shale parent material also presents other challenges in that it has inconsistent types and amounts of salts deposited within it. Sodium chloride, calcium carbonate, and gypsum salts are the major salt components. This can create problems with irrigated cropland and the resulting transfer of salts into the Colorado River. The non-farmed portions of the Mancos shale area support winter cattle and wildlife grazing.[6]

Wasatch Plateau Area

Located on the west side of Emery County, the Wasatch Plateau is found. In Huntington Canyon is found the Mesaverde Group exposure. This formation contributes a significant portion of the sands found in the mixed alluvium fans and washes, which helps mitigate many of the negative properties of the Mancos shale alluvium deposits. The varied nature of the parent material found as elevation increases, and the erosive energies supplied by thousands of feet of elevation rise create depositional situations. These conditions can create events ranging from landslides to twelve to twenty-foot boulders flowing downstream in a flash flood. Shale layers throughout the stack form aquacludes - concentrating seeps that present challenges in regards to roads. Large sections of road may slide down hill as a result of the shale and combined heavy rainfall events. The nature of and condition in which these soils exist provides excellent quality livestock and wildlife grazing, along with quality recreation such as hunting, fishing, and hiking.[6]

6 J. Dyer, USDA-NRCS



Emery County's land form types

The Morrison Formation found in the San Rafael Swell area is shown in the background. The resulting soil condition supports very little life.

San Rafael Swell Area

Southeast of the major farming area and into the desert - and lower in the stratigraphic column - is found a change in parent material and different resource challenges. Irrigation water is mostly unavailable with the exception of small ranches along the San Rafael River which limits the possible uses of the area to light grazing and recreation. The San Rafeal Swell's riparian area has the benefit of alluvium from Curtis, Entrada, Carmel, Navajo, and Wingate Formations, with the Carmel as a primary source for salts. The Morrison Formation forms what are locally known as black alkali soils. This black alkali condition is easily recognized by the general lack of plant life. The Mussentuchit Flats area present another specific soil resource challenge. Any disturbed soil on the Mussentuchit Flats reveals the highly-concentrated gypsum below and results in the extirpation of 90% of life until winds, rain, and time redistribute the sands and gypsum to allow life to return to normal - hence the name Mussentuchit Flats. The remaining higher elevation areas of the San Rafael Swell form relatively sandy soils that range from shallow to deep and support a pinyon-juniper biome good for grazing and outdoor recreation.[6]

Green River Desert Area

In the extreme southeastern portion of Emery County is found the area known as the Green River desert area. The soils in the northern part of the area are Natraargids and other sodium and salt-affected soil types that are so high in pH that grasses struggle to live, surviving in preferential water collection, geomorphic positions, or in the shade of saltbushes. The resulting Matt saltbush, Gardener saltbush, shadescale and four wing saltbush plant community provides quality winter grazing. The dispersed nature of clays in Natraargids cause serious erosion problems and reduce available water capacity. This soil bakes hard in the summer heat, creating root penetration issues which create problems with water uptake during the high-stress periods of the year. In the southern portion of the Green River desert area is found the Entrada sandstone which creates a small erg (sea of dunes). In this environment water is often stored in the dunes at a depth that remains available to plants adapted to the area, due to the break in capillary action caused by the sand.[6]

6 J. Dyer, USDA-NRCS

The southern portion of the Green River desert area. The parent material is the exposed sandstone in the background with the resulting dunes and dune community in the foreground

Bookcliffs Area

The northeast portion of Emery County presents another major land resource difference. This area is unique because of elevation and landform position. In this area of the Bookcliffs, the North Horn and Price River Formations thin significantly. The Blackhawk Formation is present which is not present on the west side of the basin in Emery County. These and other changes in parent material and higher rainfall totals result in fewer challenges managing sodium salts. Additionally, erosion is reduced, water capacity is improved, and infiltration is improved. Shale layers throughout the stack present challenges in regards to roads. Landslides are common, often forming impoundment lakes in the narrow valleys. High clays often exhibit shrink/swell characteristics and will bake hard in the summer. In these high clay areas, two-needle pinyons are unable to extract enough water to compete with juniper trees and will be missing or exist only in small numbers.[6]

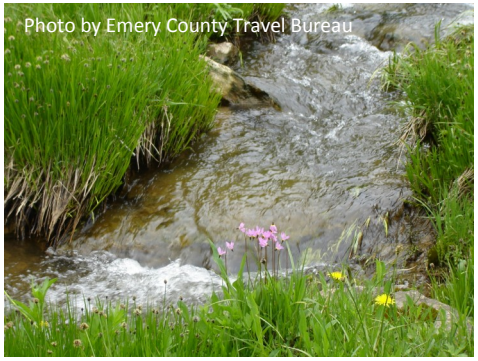
Water

Water Supply and Use

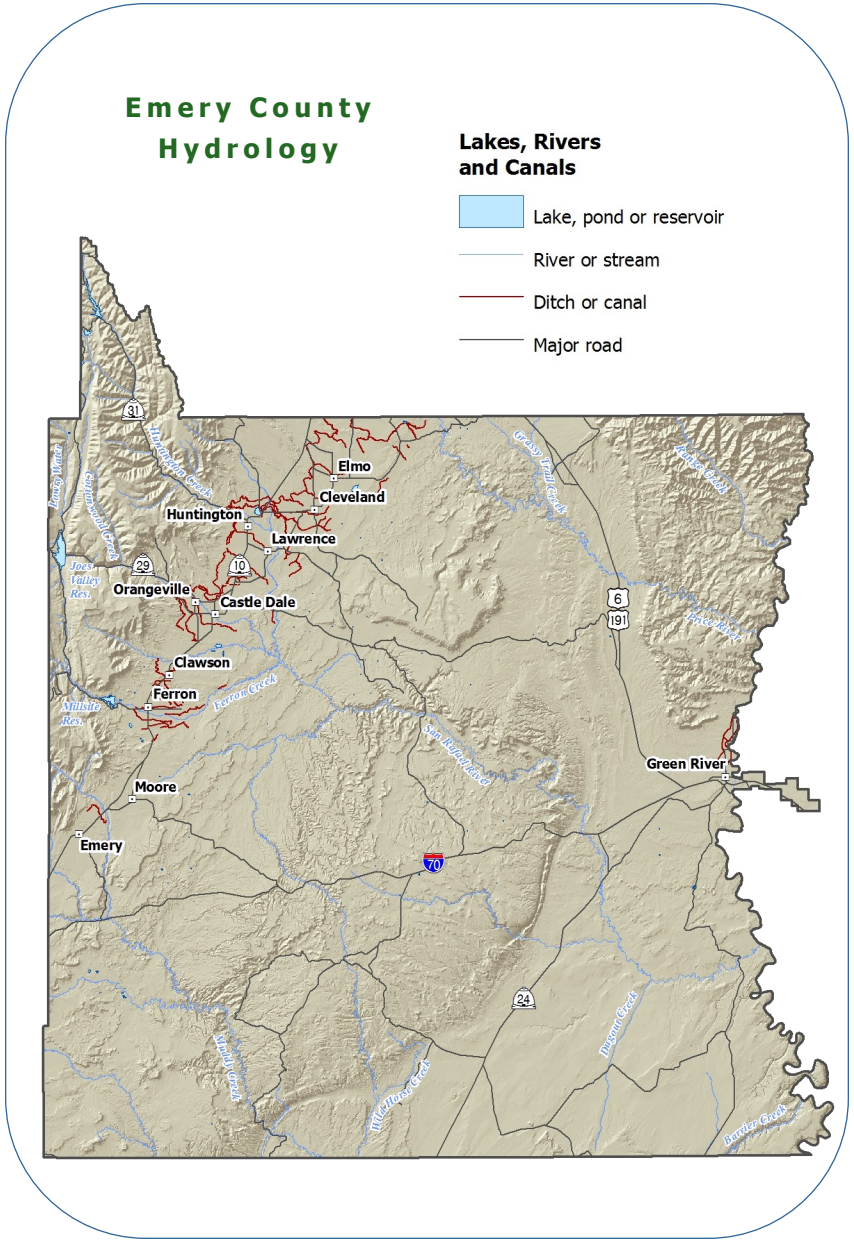
Emery County is highly dependent on mountain snow pack for water needs. The San Rafael River - the main drainage in Emery County - is formed by three main tributaries which originate in Sanpete County high in the Wasatch Plateau at an elevation of around 11,000 feet. The longest tributary is Huntington Creek, with a length of about 54 miles. The three tributaries come together at a location approximately 4.5 miles southeast of Castle Dale and form the San Rafael River. The river then flows approximately 90 miles through the San Rafael Swell terminating in the Green River at an elevation of approximately 4,000 feet.

Muddy Creek is the next major drainage south of the San Rafael River. The headwaters of Muddy Creek originate in Sanpete and Sevier counties high in the Wasatch Plateau at an elevation of around 10,500 feet. Muddy Creek is approximately 120 miles long and flows through the southwestern edge of the San Rafael Swell before it meets the Fremont River and forms the Dirty Devil River at an elevation of approximately 4,250 feet.[3]

Reservoirs and lakes in the county contain approximately 117,000 acre-feet of water. Joe's Valley Reservoir and Electric Lake make up the majority of this total. Nearly all reservoirs and lakes within the county are used for irrigation, with other uses being flood control, power generation, municipal and recreation.[11]



Huntington Creek in Huntington Canyon



3 Utah Division of Water Quality
11 Emery Water Conservancy District

Water Quality

Stream and river flows in the area are generally of good quality in the upper reaches, but deteriorate as they flow downstream. In 1997, the Utah Division of Water Quality (DWQ) conducted a water quality assessment that included the San Rafael and Muddy Creek drainages. This assessment, along with water quality data collected by the Emery County Water Conservancy District (EWCD), revealed that agricultural use classifications were not being supported in several stream segments and they were subsequently listed on the Utah's 303 (d) list of impaired waters. As a result of this listing, a Total Maximum Daily Load (TMDL) to address Total Dissolved Solids (TDS) pollution in the San Rafael River and Muddy Creek watersheds was prepared. The primary sources for TDS in receiving waters are agricultural and residential runoff, and erosion of soluble salt soils.[3] In an effort to address this, local landowners are participating in salinity programs to prevent deep percolation and runoff.

Irrigation

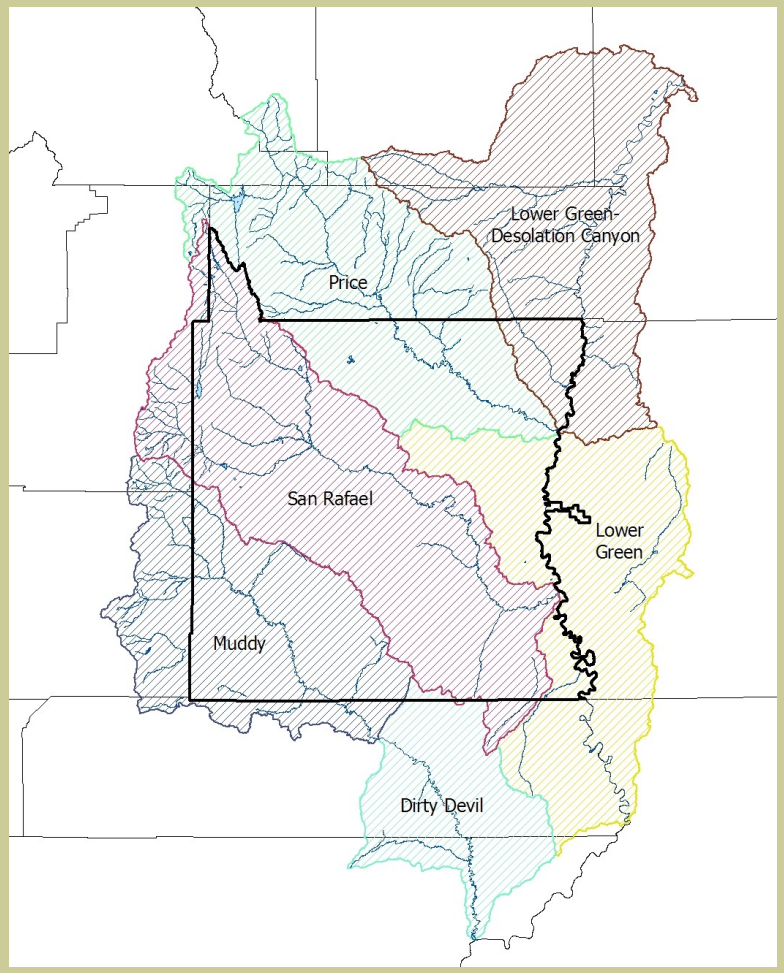
Crop and pastureland in the county require irrigation for plant needs. Emery County has approximately six irrigation and canal companies which serve the majority of the irrigated land in the county and manage water that irrigates approximately 77,116 acres of land. The Emery County area has a problem with overall supply and uses with regards to water rights. Much of the basin is over-appropriated and, as a result, late season shortages exist in many agricultural areas. The San Rafael River is the most over-appropriated drainage in the West Colorado River Basin. As a result, river commissioners have been appointed in Cottonwood and Huntington creeks to administer the rights properly, especially in dry years.[4]

Emery County Irrigation Companies

Company	Water Right Irrigated Area (acres)
Cottonwood Creek Consolidated Irrigation Company	15,091
Ferron Canal and Reservoir Company	14,435
Green River Canal Company	1,450
Huntington Cleveland Irrigation Company	32,957
Muddy Creek Irrigation Company	7,657
Gunnison Butte Mutual Irrigation Company	5,526

Source: Utah Division of Water Resources[4]

Emery County Watersheds



Emery County consists of six major watersheds: Lower Green-Desolation Canyon, Price, San Rafael, Lower Green, Muddy, and the Dirty Devil.

3 Utah Division of Water Quality
4 Utah Division of Water Resources

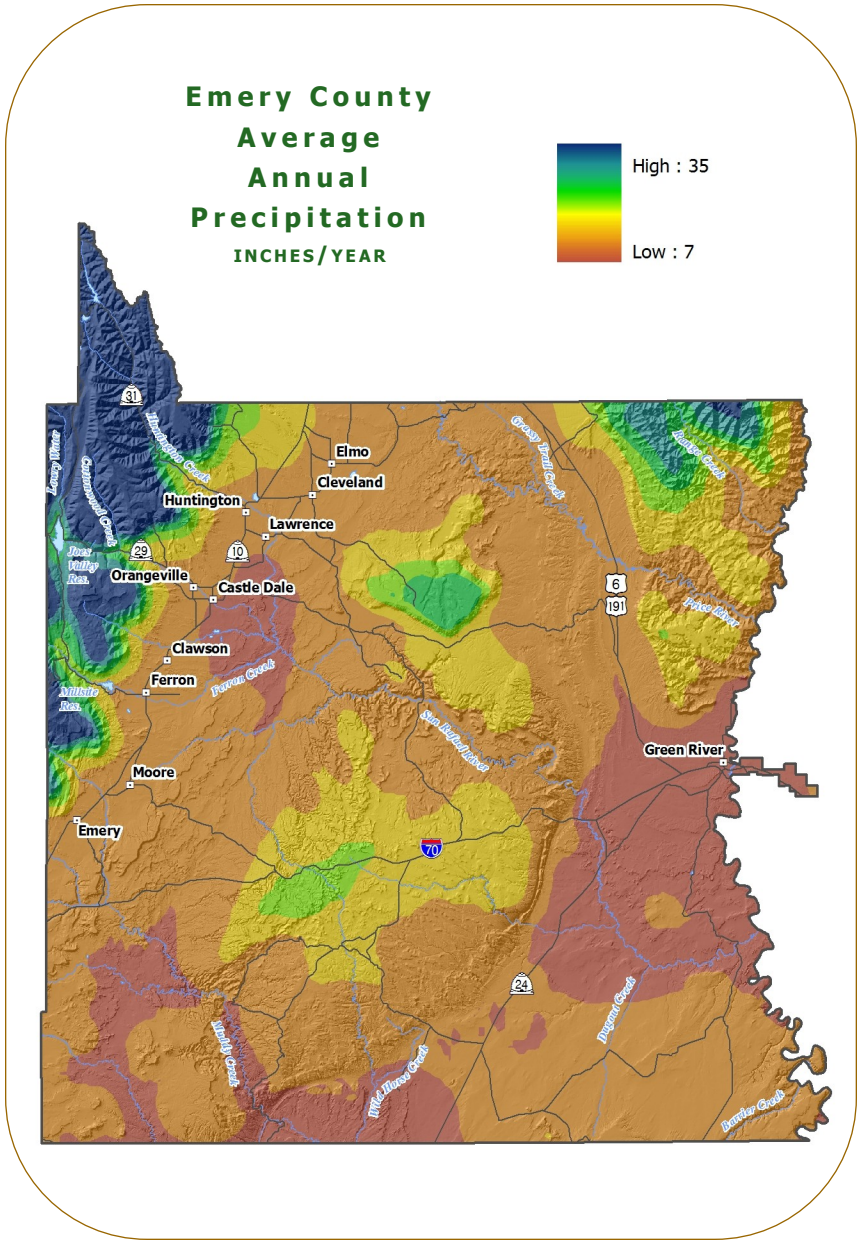
Air and Climate

Air Quality

Identified by the Clean Air Act, six common air pollutants are found across the United States which can create health hazards, harm the environment, or cause damage to property. These six common air pollutants include carbon monoxide, lead, nitrogen dioxide, particulate matter (PM10 and PM2.5), ozone, and sulfur oxides. Emery County is classified by the United States Environmental Protection Agency (EPA) as an attainment area for air quality. This means that the county's air meets the National Ambient Air Quality Standards (NAAQS) set forth by the EPA. Areas that do not meet the NAAQS are classified as nonattainment areas and are then required to develop and implement comprehensive state plans to reduce pollutant levels. The State of Utah currently has 24 air monitoring stations located across the Wasatch Front and in southwestern Utah.[12]

Climate

The Sierra Nevada, Cascade, and Rocky Mountain ranges have a large influence on the climate of Emery County. The Wasatch Plateau to the west and the Tavaputs Plateau located north of the county aid in the development of showers and thunderstorms from the masses of moisture-laden air that occasionally move into the southeastern part of Utah from the Gulf of Mexico. The Rocky Mountains serve as a barrier to cold, continental air masses that move southward from Canada during the winter months. Emery County has a semiarid, continental type of climate. Humidity is low. Daily and seasonal temperatures vary over a wide range. There is a large amount of sunshine year round. The growing season is 110 to 130 days and approximately 140 to 160 days in areas near Green River.[2] Average annual precipitation ranges from 35 inches in the high elevations on the west side of the county to approximately 8 inches in the valleys where the majority of cities and towns are located. Green River and the surrounding area has an average annual precipitation of approximately 7 inches.



2 Soil Survey of Carbon-Emery Area, Utah
12 Utah Department of Environmental Quality, Division of Air Quality

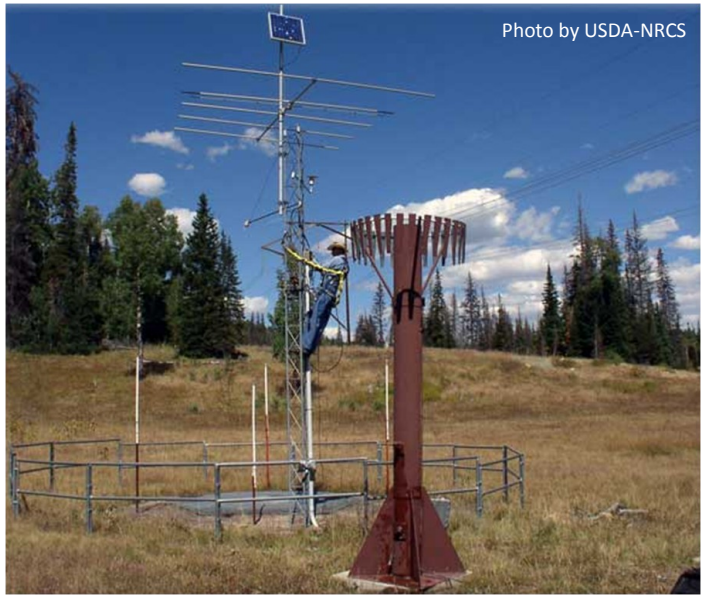
NRCS Snow Survey and SCAN Programs

The Natural Resources Conservation Service (NRCS) Snow Survey Program generates water supply forecasts and provides near real-time climatic data from high elevation, snow-fall driven environments in the western United States. Timing and amount of snowpack, along with temperature fluctuations throughout the spring and summer months, impact the amount of water available for irrigation during the growing season. The NRCS Snow Survey provides valuable data that is used to help manage water resources in order to maximize available water.

In Emery County, NRCS operates two SNOTEL (SNOwpack TE-Lemetry) site that monitors conditions at Red Pine Ridge (9,009 ft) and Mammoth-Cottonwood (8,727 ft). SNOTEL sites located in Sanpete County but highly important to watersheds in Emery County include Buck Flat, Seeley Creek, and Dill's Camp. Additional climatic data is available at http://www.ut.nrcs.usda.gov/snow/.

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 in agriculturally important areas that best represent current irrigated and non-irrigated practices. Emery County has one SCAN location at Green River (4,107 ft). For access to data from other nearby sites, visit http://www.wcc.nrcs.usda.gov/scan/Utah/utah.html.

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



Pine Ridge SNOTEL site in Emery County

Cloud Seeding in Emery County

In an effort to increase winter precipitation, the Emery Water Conservancy District is currently operating a small scale project using liquid propane to seed the Wasatch Plateau above Joe's Valley Reservoir. It is estimated that seeding projects of this nature increase winter precipitation by 14 to 20 percent. Economically, the benefits of additional precipitation outweigh the costs associated with operating a cloud seeding project. The project is expected to be enlarged to include portions of the San Pitch River Drainage in Sanpete County.[4]

4 Utah Division of Water Resources

Plants

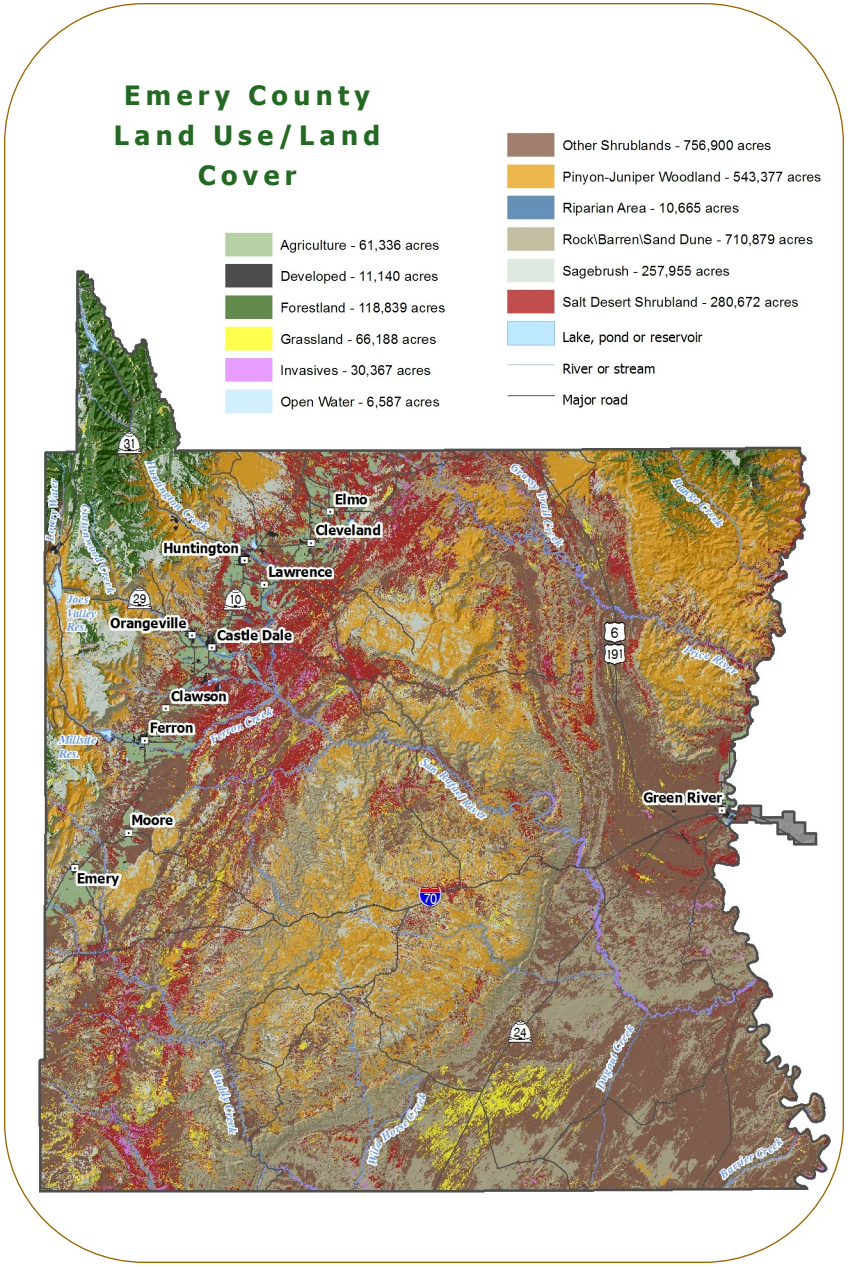
Crops and Pasture

There are approximately 60,000 acres of irrigated land in Emery County. The primary irrigated crops are alfalfa and small grains. Emery County had 16,200 acres in alfalfa production in 2009 and 17,900 acres in 2010. Five hundred acres of barley were also in production in 2009. The remaining irrigated land is used as pasture consisting mainly of native, introduced, and improved grasses.[13] With the vast majority of the irrigated land in Emery County residing in an area with little rainfall, farmers rely heavily on the mountain snowpack for irrigation water. Shorter growing periods coupled with the arid climate can often limit production.

Rangeland

Rangelands are very important to the agricultural economies in Emery County. There are approximately 2.4 million acres of rangeland in the county.[14] Rangelands provide grazing for domestic livestock and valuable habitat for a variety of wildlife species such as pronghorn antelope, mule deer and elk. The low amounts of precipitation make it extremely important to institute proper grazing management practices. Rangelands in the lower elevations consist of grass species such as galleta, blue grama, Indian ricegrass, bottlebrush squirreltail, needle and thread and Sandberg bluegrass, and forbs such as scarlet globemallow, phlox and western yarrow. Shrubs in the lower elevations include species such as shadscale, fourwing saltbush, Gardner saltbush, winterfat, bud sagebrush, black sagebrush and low rabbitbrush.

In the far west end of the county where some of the high elevation rangeland is found, the precipitation pattern differs than that in the valley floors or the Bookcliffs to the east. Grasses include species such as Indian ricegrass, western wheatgrass, bluebunch wheatgrass, Salina wildrye, needlegrasses and fescues. Forbs such as western yarrow, Indian paintbrush, Oregon grape and lupine are present. Shrubs include species such as big sagebrush, woods rose, antelope bitterbrush, rabbitbrush, mountain mahogany, gambel oak, chokecherry, serviceberry and snowberry.



13 Utah Agricultural Statistics
14 SWGap

Forestland and Woodland

The primary woodland type in Emery County is pinyon pine and juniper. There are approximately 543,000 acres of this ecotype in the county.[15] Many of the soils associated with this ecotype are on steep slopes and are relatively shallow. This depth and texture of the soil limit water holding capacity and thus influence tree growth. Understory vegetation consists of grasses, forbs, shrubs and other plants. Pinyon pine and juniper tress are considered invasive and require management for grass and forb growth as well as erosion control. Some woodland areas, if well managed, produce enough understory vegetation to support grazing of livestock or wildlife, or both, without damage to the trees.

Forested land covers approximately 118,000 acres in Emery County.[15] Forestlands include species such as quaking aspen, Douglas fir, Engelmann spruce, subalpine fir and ponderosa pine. These forests overlay some of the county's most valuable watershed, wildlife and recreation areas. The vast majority of these forests fall in the far northwest corner of the county and reside in a zeric moisture regime. Threats and challenges for these ecotypes include the degradation of watersheds and potential irreversible changes in forest health that can result from poor management such as overgrazing, excessive timber harvest, bark beetle infestation, residential or recreational related development, and surface mineral development.

In general the forests in Emery County are in good condition, although spruce beetles (Dendroctonus rufipennis) are present and have affected approximately 90 percent of spruce trees. Aspen forests are being displaced by shade tolerant conifers. In general, the risk for catastrophic wildfire is low but as fallen timber, dead standing beetle killed timber and understory growth increase, the intensity of a fire increases exponentially. Continued forest harvesting, thinning of understory trees, and/or fuel reduction are encouraged to help reduce the risk of epidemic populations of beetles and catastrophic wildfire.

A recent assessment by the Utah Division of Forestry, Fire & State Lands (www.ffsl.utah.gov/stateassessment.php) shows the location of areas that would benefit from forestry-related projects. 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 Plant Species


http://dwrcdc.nr.utah.gov

The **San Rafael cactus** (*Pediocacus despainii*) is a federally listed endangered plant that occurs in Emery County, Utah. The crown of the stem is at or very near ground level. Its flowers are born near the tip of the stem and bloom during April and May. San Rafael cactus is found in fine textured soils rich in calcium derived from the Carmel formation and the Sinbad member of the Moenkopi formation. It occurs on benches, hill tops, and gentle slopes in pinyon-juniper and mixed desert shrub-grassland communities.[10]


Photo by C.R. Delmatier

Barneby reed-mustard *(Schoenocrambe barnebyi)* is a federally listed endangered plant that is found only on the Colorado Plateau in Emery County and Wayne County, Utah. Specimens have a branched woody base that gives rise to purple veined, white, or lilac flowers from late April to early June. Barneby reed-mustard grows in xeric, fine textured soils on steep eroding slopes of the Moenkopi and Chinle formations. It grows in sparsely vegetated sites in mixed desert shrub and pinyon-juniper communities.[10]

10 Utah Conservation Data Center
15 USGS National Gap Analysis Program

Animals

Livestock

Livestock production is the main focus of agriculture in Emery County. The average annual market value of livestock sales of $9,126,000 in 2007 made up 81 percent of total agricultural products sold in the county.[16] Most cattle operations found in the county are cow-calf operations where calves are marketed and sold in the fall. The sheep industry is also found in the county. The mountains surrounding the county and the desert of the lower elevations provide significant summer and winter range for the beef cattle and sheep industries.

Endangered and At-Risk 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 the 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.

Emery County's Federally Listed Threatened (T), Endangered (E), and Candidate (C) Species

Common Name	Status
Humpback Chub	E
Bonytail	E
Colorado Pikeminnow	E
Razorback Sucker	E
Greater Sage-grouse	C
Yellow-billed Cuckoo	C
Mexican Spotted Owl	T
Black-footed Ferret	E Extirpated
Canada Lynx	T
Gray Wolf	E

Utah Division of Wildlife Resources
http://dwrcdc.nr.utah.gov/ucdc/ViewReports/te_cnty.pdf

Bald eagle
(Haliaeetus leucocephalus)
The bald eagle was removed from the endangered species list in June of 2007, but still remains an at-risk species in Emery County.

16 USDA-NASS, 2007 Census of Agriculture

At-Risk Species

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

- Bald Eagle
- Bluehead Sucker
- Burrowing owl
- Colorado River Cutthroat Trout
- Cornsnake
- Ferruginous hawk
- Flannelmouth Sucker
- Great Plains Toad
- Kit Fox
- Northern Goshawk
- Roundtail Chub
- Three-Toed Woodpecker
- Townsend's Big-Eared Bat
- Western toad
- White-tailed prairie-dog

This list was compiled using known species observations from the Utah Natural Heritage Program within the last 20 years. A comprehensive species list, which is updated quarterly, can be obtained from the Utah Division of Wildlife Resources website: dwrcdc.nr.utah.gov/ucdc/

Coyote, *utahwildlifephotos.com*; Mountain bluebird, *utahwildlifephotos.com*; Cougar, *utahwildlifephotos.com*

Aquatic Life

Watersheds in Emery County hold abundant populations of cold water sport fish. Lakes and reservoirs at moderate to high elevations contain numerous trout species including: rainbow trout, tiger trout, brook trout, brown trout, cutthroat trout, and splake. Lower elevation reservoirs, such as Huntington North, provide habitat for warm water species such as: largemouth bass, bluegill, and green sunfish. Emery County also offers anglers opportunity to seek tiger muskellunge at Joes Valley Reservoir.[5]

Game

Emery County is home to numerous wildlife species. The county contains crucial habitat for many big game species including elk, mule deer, pronghorn, and desert bighorn sheep. Elk and mule deer rely on shrubs and forbs in the lower elevations of the county during the winter. Studies on desert bighorn sheep are currently being conducted to determine the cause of population decline. Pronghorn antelope in the county are known to be among the largest harvested in the state. The county holds a large population of golden eagles which can often be seen during the winter and spring nesting seasons. White-tailed prairie dogs are important in the county as they provide habitat for many other wildlife species. Desert Lake Wildlife Management Area is listed as one of the best birding locations in the state containing habitat for migrating waterfowl, passerine birds, and upland game species such as the ring-necked pheasant.

Other species that can be seen in the county include blue grouse, quail, chukar, wild turkey, rabbits, doves, bear, mountain lion, bobcat, coyote, and fox.[5]

5 Utah Division of Wildlife Resources

Humans: Social and Economic Considerations

Population

Over the last 70 years, Emery County's population has experienced a cycle of expansion and contraction. In the early 1980s, the population reached a high of 12,700, but has been closer to approximately 10,000 in recent years. The county has shown positive growth over the last three years, exhibiting a healthy 2.2 percent growth rate in 2009. Because the county's rate of natural increase was well below the state average, most of the population growth in 2009 was a result of net in-migration. As of 2010, populations of Emery County cities and towns were:[17]

Castle Dale	1,630
Clawson	163
Cleveland	464
Elmo	418
Ferron	1,626
Green River	952
Huntington	2,129
Orangeville	1,470

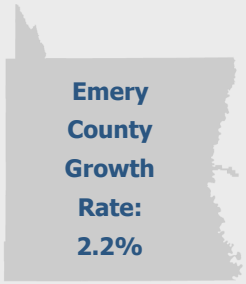
Demographics

In 2010, the county's racial makeup was 92.1 percent white; 6 percent of Hispanic or Latino origin, 0.6 percent American Indian; 0.3 percent Asian; 0.2 percent black, and 0.7 percent of persons reported "other." In 2009, persons under age 18 represented 31.9 percent, and persons 65 years and older represented 12.2 percent of the population. 12.4 percent of the county's population were below the poverty level, which is 0.9 percent higher than the state average for 2009. In the same year, 89.6 percent of the population reported being high school graduates, and 12.7 percent reported being college graduates.[17]

17 Utah Department of Workforce Services

Melon Days in Green River

Emery County Population Data



Area name	Emery
Period Year	2009
Population	10,848
Births	178
Deaths	85
Natural Increase	93
Net Migration	145
Annual Change	238
Annual Rate of Change	⇧ 2.2%

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

Economy & Labor Market

The mainstays of Emery County's economy are mining, transportation, communications, utilities, and government. In agriculture, livestock ranching remains important and hay sales are increasing. An emerging part of Emery County's economy is recreation and tourism.

In 2009, total employment in the county fell by 2.4 percent, which amounted to 93 total jobs. With the State of Utah having experienced a 5.1 percent job loss in 2009, Emery County's moderate downturn can be viewed as a relatively favorable outcome. Most of the job losses occurred in the mining industry. The second-largest numerical loss of jobs occurred in the accommodation and food services industry with 24 jobs lost. Construction increased by approximately 47 jobs into the county, with several other industries contributing a few jobs. Emery County was one of the only two counties in Utah in which construction employment increased in 2009. Emery County's top employer in 2010 was PacifiCorp.[17]

Recreation

Emery County has recreational opportunities for all interests. The diverse terrain of the county includes the high mountain ranges of the Wasatch Plateau to deep rugged canyons on the San Rafael Swell. Tourists enjoy visiting the San Rafael Swell, the Wedge Overlook and Buckhorn Draw, Goblin Valley, Huntington/Eccles Canyon Byway, Skyline Drive, river running on the Green River, museums, and more. Recreational activities at these destinations include golfing, hiking, kayaking, biking, bouldering, fishing, rafting, geocaching, hunting, OHVing, snowmobiling and much more.

A major attraction in Emery County, the Huntington/Eccles Canyon Byway is a section of the Energy Loop Byway and travels across Skyline Drive at the top of the Wasatch Plateau at approximately 10,000 feet in elevation. Along the byway can be seen high mountain lakes, beautiful vegetation, and high-rising mountain cliffs. The Wedge Overlook and the Buckhorn Draw are also major attractions on the San Rafael Swell, with the Buckhorn Wash pictograph panel and the Wedge Overlook, also known as "Utah's Little Grand Canyon."[18]

17 Utah Department of Workforce Services
18 Utah.com

Top: Goblin Valley
Bottom: View from Cedar Mountain

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Map & GIS Data Sources

Emery 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

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 2/9/2011. 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

Emery County Energy Resources

Coal Seams - This data set represents coal seams in the state of Utah. The data set was created by Utah Geological Survey (UGS), a division of the Utah Department of Natural Resources. 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=Coal_4FootSeams

Coal Mines - This data set represents coal deposit areas in the state of Utah. The data set was created by Utah Geological Survey (UGS), a division of the Utah Department of Natural Resources. 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=Coalmine_UGS

Oil and Gas Wells – This data set represents oil and gas well surface points in the state of Utah as of 9/21/2010. The data set was created by the Utah Department of Natural Resources, Oil Gas and Mining Division. 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=DNROilGasWells

Power Plants - This data set represents power plant locations in the state of Utah. The data set was created by Utah Geological Survey (UGS), a division of the Utah Department of Natural Resources. Last updated July 2008. 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=PowerPlants_CO2

Tar Sands – This data set represents the current tar sand resources of Utah. It was derived from the Utah Mineral Occurrence System by Utah Geological Survey (UGS), a division of the Utah Department of Natural Resources. 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=TarSands

Solar Zones – Data set produced by the National Renewable Energy Laboratory (NREL) for the Utah Renewable Energy Zones Task Force Phase I Report: Renewable Energy Zone Identification. 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=UREZPhase1_SolarZones

Wind Zones – Data set produced by the National Renewable Energy Laboratory (NREL) for the Utah Renewable Energy Zones Task Force Phase I Report: Renewable Energy Zone Identification. 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=UREZPhase1_WindZones

Emery County 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 http://gis.utah.gov/sgid-vector-download/utah-sgid-vector-gis-data-layer-download-index?fc=LakesNHDHighRes

Emery County 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

Emery County Average 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.

Emery County Land Use/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.