MORGAN COUNTY RESOURCE ASSESSMENT 2013

Conserving Natural Resources For Our Future

Morgan Conservation District
Acknowledgements

Morgan Conservation District Board
Fred Thurston, Chair
Barclay Earl, Supervisor
Jason Morgan, Supervisor
Garrett Rees, Supervisor
Todd Wardell, Treasurer
Logan Wilde, Associate Supervisor

Authors
Desiree Van Dyke, Resource Coordinator, UACD
Jake Powell, Upper Weber Watershed Coordinator, Kamas CD

Contributors & Specialists
James Barnhill, USU Extension
Lorien Belton, USU
Trent Bristol, Division of Forestry, Fire and State Lands
Aaron Dalling, NRCS
Buzz Nelson, Conservation Planner, Morgan Conservation District
Hannah Freeze, Conservation Planner, Morgan Conservation District
Ashley Hansen, UDAF-GIP
Thomas Hoskins, NRCS
Anne Johnson, UDAF
Scott Paxman, Weber Basin Water Conservancy District
Kent Sutcliffe, NRCS

Reviewed By:
Todd Black, Deseret Land and Livestock -- AgReserves, Inc.
Sherie Edginton, UDAF
Tony Frates, Utah Native Plant Society
Kevin Labrum, Uinta-Wasatch-Cache National Forest
Alvin Lundgren, Former Morgan County Councilman
Dani Mccaslin, UDAF
Geoff Mcnaughton, Division of Forestry, Fire & State Land
Thayne Mickleson, UDAF
Scott Stoddard, USACOE

Credits

Morgan Conservation District 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
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Utah Association of Conservation Districts
Utah Department of Agriculture and Food
Utah Department of Environmental Quality (DEQ)
Utah Department of Natural Resources
Utah Grazing Board
Utah School and Institutional Trust Lands Administration
Utah State University Cooperative Extension Service (USU Extension)
Utah Weed Supervisor Association
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Executive Summary

Why a Resource Assessment?

The Morgan Conservation District has developed this resource assessment with the goal that conservation efforts in the county address the most important local resource needs. This report identifies natural and social resources present in Morgan 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:

Morgan Conservation District
PO Box 372
Morgan, UT 84050
(801) 583-7118

Natural Resource Priorities and Concerns

The Morgan County Conservation District has identified five natural resource priority concerns.

1. Noxious and Invasive Weeds
2. Water Quantity and Irrigation Infrastructure
3. Agriculture Land Preservation and Sustainability
4. Water Quality
5. Forest, Range, Riparian, and Wildlife

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 within Morgan County. As opportunities become available to address these issues, and as circumstances change, their emphasis should be elevated accordingly.

Soil: Prime Farmland and Farmland of Statewide Importance
Water: Water Bodies, Supply, Irrigation, and Drinking Water
Air and Climate: Air and Climate Overview
Plants: Crops and Pastureland
Animals: Domestic, Wildlife, Game, and Aquatic Life
Humans: Population, Economy, and Recreation
Introduction

The Conservation 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 districts to direct soil conservation practices. Today, Utah has 38 conservation districts (CD).

Morgan Conservation District History
The Morgan CD is a unit of state government created under Utah State Law in 1938 to administer and promote conservation activities in Morgan County. The CD provides guidance to county land managers in identifying and solving specific conservation problems in cooperation with the NRCS, Farm Services Agency (FSA), Utah State University Extension Service (USU Extension), and other federal, state, and local agencies. A five member board of elected supervisors directs and adapts these activities to meet local needs. They meet monthly in accordance with the Utah Open and Public Meetings act.

Agriculture is rapidly being taken over by urbanization in Morgan County. The Morgan CD strives to help local agriculture stay in the county and help those working the land to implement conservation practices. The CD works with farmers and ranchers by helping them develop conservation plans and find funding to implement their plans.

The CD is actively engaged in outreach. Although the CD’s leading focus is the conservation on agricultural lands, it works to conserve all natural resources within Morgan County. The more individuals that understand the value of, and how to protect, our natural resources, the better care our land will receive. Outreach efforts range from presenting at elementary school field trips and awarding college scholarships to sponsoring landowner workshops and meeting with locally elected officials.

Resource Assessment Outreach
The Morgan CD invited stakeholders, including government officials and conservation and natural resource oriented partners, to meetings to learn how they viewed the county’s natural resources and what conservation issues were most pressing. Those who could not attend were invited to provide input via email, attend a Morgan CD meeting, or talk directly with a board supervisor or staff member.

Local resource professionals were consulted on the priority natural resource concerns addressed in this assessment. Furthermore, a review committee was formed to critique each priority resource concern. This committee consisted of resource professionals, elected officials, and stakeholders who volunteered to take part in the assessment.
Morgan County encompasses a rural area without a big city. Its many fields, open land, high mountains, and streams and rivers make a picturesque place to live and to visit.

Morgan County is the third smallest county in Utah. It consists of 610 square miles that are nestled within the northern Wasatch Mountains. Morgan County has the highest percentage (90%) of privately owned land in the state. The remaining land is 5% federally owned and 3% state owned, with 2% underwater.

The landscape is made up of high mountains, steppe valleys, one main river valley (Weber River), and two smaller river valleys (East Canyon and Lost Creek), as well as farming and grazing lands. Elevations range from 4,895 feet at Mountain Green to 9,706 feet at Thurston Peak.

The main entrance to Morgan County is through Weber Canyon which opens on both the east and northwest sides of the county. The Weber River, Interstate 84, and the Union Pacific Railroad line all follow the river corridor.

The 9,469 (2011) county inhabitants are concentrated primarily in the areas of Morgan City and Mountain Green. Because of Morgan County’s close proximity to the Wasatch Front, the population is increasing rapidly. The county is expected to continue growing along the Interstate 84 corridor, with the highest concentration of new development in the northern and western portions of the county in areas that once were agricultural or farmland.

Historically, agriculture, mainly livestock, crop, and mink pelt production, has been the primary type of economic activity in Morgan County. Recently, manufacturing, trade, government, and construction have begun to diversify the economy.

Morgan County is known for its spectacular scenery and wildlife and is popular with outdoor enthusiasts.
Morgan County boasts a diversified landscape and thriving agricultural community.

Photo location and credit (L-R): Thurston Property (Hannah Freeze), Diamond D Cattle Ranch (Danny McBride), Dee’s Dairy (Danny McBride), Diamond D Cattle Ranch (Desiree Van Dyke), and Thurston Gully (Danny McBride).
Noxious and invasive weeds are competitive non-native species that are introduced into environments where they readily adapt and reproduce prolifically. They negatively affect agricultural lands, forests, nature preserves, stream banks, private lands and parks. If left unmanaged, weeds can quickly dominate a landscape, crowding out native plants, reducing forage for animals, and increasing the risk of wildfire.

Noxious and invasive weed infestations in Morgan County tend to be concentrated near roads, highway corridors, railroad lines, recreational trails, heavily grazed areas, and canals. The railroad and Interstate 84 run through the county. These two corridors are continual sources of weed introduction. The corridors cover an immense amount of land, which requires ongoing weed management. There are also significant infestations in construction sites, designated open space in developments, and privately owned ranchettes. These areas are not always adequately maintained and are problematic sources of weed infestations.

It is critical to keep potential invaders, such as Russian olive and Myrtle spurge, out of the county. Once a noxious or invasive weed is established, it becomes extremely difficult to manage. Control measures may be unavailable, inadequate, or simply uneconomical, forcing land managers to try and stop the weed from spreading rather than eliminating it. Weeds with extensive distributions in the county include Canada thistle, cheatgrass, dyer's woad, field bindweed, medusahead rye, and quack grass. Land managers should strive to keep potential invaders out and ensure that newly detected weeds be treated before they become prolific.

Small, contained populations of noxious and invasive weeds that are detected early have a high probability of being effectively managed. High priority weeds in this category within Morgan County are dalmatian toadflax, saltcedar, scotch thistle, and viper's bugloss. It is critical to remain vigilant and treat these populations before they become too widespread. Eliminating weeds before they cause damage to the landscape will save the county from losing biological resources and lessen the financial burden it takes to maintain these weeds once they have spread out of control.

**Weeds of Top Concern in Morgan County**

**Medusahead rye** is a rangeland annual that reduces the carrying capacity for domestic livestock. It germinates rapidly in the fall. Its roots grow throughout the winter, and it has prolific seed production. It forms a dense litter that allows it to outcompete most competitors.

**Musk thistle** is a large dry land plant that establishes and spreads along stream banks. It has spines and a dense growth form that crowds out native species, decreasing forage and habitat for domestic animals and wildlife. Cattle have been lost for days in established stands.

**Leafy spurge** greatly reduces the carrying capacity of rangeland and is difficult to control with chemical. Biological controls have been released on some populations, but the species continues to spread.

The state noxious weed list is currently made up of the first twenty seven plants listed on page 5. Counties can add additional invasive weeds to this list as they deem necessary. Morgan County has added common burdock.
Hundreds of thousands of dollars and countless hours of manual labor are necessary to manage and prevent the spread of noxious and invasive weeds each year. If not controlled, these weeds can quickly dominate a landscape and reduce forage for animals, damage soil health, and increase fire risk, resulting in destroyed ecosystems.

Current Weed Control Efforts

Morgan County Weed Department
The Morgan County Weed Department is limited to spraying right-of-ways. When funding and manpower is available, the county can make a tremendous impact on weed populations by enhancing current programs and supporting new weed control efforts.

Morgan Weed Board
The Morgan County Weed Board meets on an as needed basis. They have established a relationship with UDOT and the railroad and continually encourage them to maintain their right-of-ways. With more funding and county support, they will be able to increase their effectiveness.

Morgan County Extension
The Morgan County Extension works closely with everyone from homeowners with weed issues to large rangeland managers, helping them develop an integrated approach to weed management. The agent actively collects, releases, and monitors biological controls, which include insects and fungi, throughout the county and state. Six noxious weeds within the county have been treated with biological controls and are bolded in the noxious weed list to the right.

Weber River Weber River Cooperative Weeds Management Area (WRCWMA)
The WRCWMA is composed of land managers in Box Elder, Davis, Morgan, and Weber who work together to promote an integrated weed management program that includes public relations, education and training, coordination of weed control efforts and methods, sharing of resources, and designing resource protection measures relative to weed management.

Morgan County Noxious Weed List
The following weeds are officially designated and published as noxious for the State of Utah, as per the authority vested in the Commissioner of Agriculture under Section 4-17-3. Utah Noxious Weed Act. Biological controls have been released in Morgan County on the bolded species.

- Black henbane (Hyoscyamus niger)
- Bermudagrass (Cynodon dactylon)
- Canada thistle (Cirsium arvense)
- Dalmation toadflax (Linaria dalmatica)
- Diffuse knapweed (Centaurea diffusa)
- Dyers woad (Iatis tinctoria L)
- Field bindweed (Convolvulus arvensis)
- Hoary cress (Cardaria draba)
- Houndstonque (Cynoglossum officinale)
- Johnsongrass (Sorghum halepense)
- Leafy spurge (Euphorbia esula)
- Medusahead (Taeniatherum caput-medusae)
- Musk thistle (Carduus mutans)
- Ox-eye daisy (Chrysanthemum leucanthemum L)
- Perennial pepperweed (Lepidium latifolium)
- Poison hemlock (Conium maculatum)
- Purple loosestrife (Lythrum salicaria L)
- Quackgrass (Agropyron repens)
- Russian knapweed (Centaurea repens)
- Scotch thistle (Onopordum acanthium)
- Spotted knapweed (Centaurea maculosa)
- Squarrose knapweed (Centaurea squarrosa)
- St. Johnswort (Hypericum perforatum)
- Sulfur cinquefoil (Potentilla recta)
- Yellow starthistle (Centauraea solstitialis)
- Yellow toadflax (Linaria vulgaris)
- Saltcedar (Tamarix spp)

Additional noxious weeds declared by Morgan County:
- Common burdock (Arctium minus)
Like all of Utah, Morgan County requires supplemental water, in addition to rainfall, for both agricultural and municipal and industrial (M&I) use.

Early settlers developed extensive canal systems to provide irrigation water for agricultural use. Many were built in the mid 1800’s and are still in use today. The county’s approximately 30 canals are now also used to supply water to the increasing urban population. Many of these delivery systems are private, non-profit, shareholder owned companies.

Irrigation Infrastructure

As time has passed and technology has improved, many of the irrigation canals within the county have become outdated or are in a state of disrepair. While many have been converted to pressurized pipe, open canals and ditches are a source of many issues. Open systems are subject to erosion and water loss from seepage and evaporation and can be safety hazards. Repairs and improvements are expensive, yet critical, to maximize water availability, water conservation, and public safety.

Agriculture is dependent upon affordable water. When canal companies make improvements or have to pay expensive lawsuits, those costs are passed on to the shareholders. Many canal companies cannot afford to make improvements and are forced to upgrade the systems only after a major problem occurs.

Current funding programs are inadequate for dealing with the magnitude of canal improvements needed. They have strict limitations and are not set up in a way that is practical. It would be extremely beneficial for both agricultural and M&I users if funding mechanisms were in place that could be easily applied for and implemented. It would enable delivery system companies to improve and upgrade their infrastructure before a catastrophe or break occurs.

Urban Encroachment

Urban encroachment and improper development is another issue that greatly affects canals in the county. As subdivisions expand into farmland they are often built over irrigation infrastructure and field drains, as well as directly over and up to critical right-of-ways. When development does not take agricultural infrastructure into account, problems such as flooding and maintenance issues commonly disrupt both homeowners and agricultural users.

Urban development can introduce storm water and pollution into irrigation infrastructure and river systems. Unauthorized storm drain discharge increases the stress on already dilapidating systems and is also a source of pollution. Contaminants, such as oil, fertilizer, chemicals (residential herbicides and pesticides), and other debris from urban areas enter the storm drain and river systems that provide irrigation water. These pollutants are extremely problematic to farmers who are working to comply with food safety and water quality regulations, as well as to wildlife.

Maintenance issues, such as in the above picture, are extensive throughout the county. The water in this canal has undercut the cement lining and is causing severe erosion and water losses through seepage into the ground. In addition, as the water washes the soil away, it cuts a deep channel that becomes very difficult to divert water from for irrigation.
Urban Encroachment (continued)
Canal maintenance is increasingly difficult to perform. Many canal companies do not have the recorded easements that would allow them to access their system at any time. Most have prescriptive easements that only grant access with landowner permission. Many residents deny or block access to the right-of-ways and only allow maintenance after a flood or break occurs and then hold the canal company liable.

Canals are often used for unauthorized recreation. This is both a safety and a liability issue. Canals are not meant for recreation, but it inevitably happens. The canal companies are forced to implement security measures and carry insurance coverage, further adding to the high price of water. Many canal companies do not carry the insurance, which puts them at further risk.

When land is developed, many of the issues above can be minimized if storm water, tailwater, and effluent water are properly managed and comply with Utah State Water Law under Utah Code, Title 73.

Water Quantity
Although Morgan County currently has enough water for continued development, the resource is limited. Much of the water that passes through the county is already allocated to the Wasatch Front. Water that stays in Morgan County stays in the system. Water pumped to the Wasatch Front, or other areas outside the basin, reduce the overall amount of water available for local use.

Although the 2011 Utah Geological Survey’s ground-water study, titled Hydrology of Morgan Valley, Morgan County, Utah, stated that there is adequate water in the valley to continue allocating water rights, there is still concern among water users. New wells built in close proximity to existing wells can reduce the amount of water available, as well as dry up springs, reducing the amount of surface water available for use.

Aquifers in the valley are shallow and recharge quickly. The greatest depth is 600 feet, while the majority are 200-300 feet deep. New wells and diversions will be allowed in the valley floor where the wells are deepest but may not be allowed at higher elevations. Pumping from the Weber River, with the use of Weber Basin’s exchange water, may make it possible to get water to higher elevations. However, this could be very expensive for development.

The results of the proposed ground-water quality classification for Morgan Valley indicate that the valley-fill aquifer contains mostly high-quality ground-water resources that warrant protection. However, there are other quality concerns in Morgan County and they are elaborated on in pages 10 and 11 of this resource assessment.

The complete Morgan Valley County-Water Study can be found at: www.waterrights.utah.gov/meetinfo/m20110720/MorganValleySpecialStudyFinal2011.pdf.
Agricultural Land Preservation & Sustainability

Agricultural land preservation and sustainability go hand in hand. Morgan County has a thriving agricultural community. However, it has become highly urbanized and development is expected to continue. The best soil and agricultural lands are continually being taken out of production. The causes of decline include: urban encroachment, increased land values, aging farmers, high production costs, invasive weeds, short growing seasons, unpredictable frosts, and increased federal and local government regulations. When farmers are not profitable, or are unable to run their businesses, they are often forced to sell their land.

According to the 2002 U.S. Census of Agriculture, Morgan County had 255 agricultural operators. In 2007, Morgan County was reported to have 217 agricultural operators, comprising 301,095 acres and agricultural cash receipts totaling $14.3 million. The reduction of agricultural operation numbers is consistent with the urbanization trend in Utah. Agriculture is not only important to the local food supply; it’s important to the economy. When farms are closed, job loss trickles to related industries. For every agricultural job, 2.03 additional jobs are created in the sectors that supply inputs to agricultural production.

According to the U.S. Department of Agriculture, over 636,528 acres of land were taken out of agriculture between 2002 and 2007. Morgan County is likely following the same trend.

Morgan County agriculture is largely traditional. Morgan County’s mountainous topography is not geographically suited to large farms. Traditional farms have always been considered relatively small, with the average size in 2007 being 953 acres. There are an estimated 6,000 beef cows, 1,100 dairy cows, and 15,100 sheep and lamb in the county. Major crops consist of alfalfa, barley, oats, Christmas trees, woody plants, and pasture.

Mink are a significant agricultural product in Morgan County, yielding 100,000 pelts in 2012. The industry contributes greatly to the economy by providing jobs and generating income. In 2007, Utah ranked eighth in the nation for the production of mink and their pelts, and Morgan County had the third highest production in the state. In 2010, Morgan County was second in both the number of mink pelts produced and females bred to produce kits in the state. The county helped move Utah into second place for mink production in the nation. Morgan County mink pelts are auctioned to international markets. Some of the largest consumers include China, Korea, Russia, and Japan.

Sustainable agriculture has numerous elements, but the ultimate goal is to keep land in production now and into the future. Steps to bring increased profits and provide sound stewardship of the air, water, and soil, as well as improved quality of life for farming communities, are needed. Most agricultural producers want to continue farming but are concerned about the future of their profession and family operations. Sustainable agriculture is a priority concern because of the important role of agriculture in Morgan County’s economy, healthy lands, and way of life.

Benefits of local agriculture include:
- Food and fiber
- Economic contributions
- Open space and wetland habitat for migratory birds and upland game

One trend that is helping agricultural operations is the high tunnel. These high tunnels extend Morgan County’s short growing season and create a climate that enables crops to be raised that wouldn’t normally grow at the county’s high elevations. Producers utilize high tunnels to grow specialty crops, such as tomatoes, and offer locally grown produce through direct market outlets, such as farmer’s markets.
The Utah Agriculture Sustainability Task Force was created to address popular interest in agricultural land preservation and sustainability. The Task Force is offering 29 recommendations that are expected to protect and enhance Utah agriculture. The recommendations generally call for the creation of new laws and policies at the federal, state, and local levels that remove obstacles for safe and modern farming and ranching. The Task Force executive summary is located in Appendix A on page 20.

Loss of Agricultural Lands in Morgan County
Aerial photos taken in Mountain Green in the mid 1990s and again in 2007 illustrate the intensity of urban development in the county.
Natural Resource Priorities and Concerns

**WATER QUALITY**

The Weber River Watershed is the primary water resource providing irrigation and culinary water to the growing northern Wasatch front communities of Ogden, Layton, and Roy. The watershed is characterized by a shifting mosaic of traditional agricultural lands and rangeland into growing suburban cities. This mosaic creates several water quality challenges to local communities and downstream water users. These include changes in stream hydrology, storm water runoff, water usage, and infiltration due to rapid conversion of agricultural and open lands into residential neighborhoods.

East Canyon Reservoir and portions of the Weber River do not currently meet the water quality standards established by their beneficial use designation in the Clean Water Act. East Canyon Reservoir is impaired for dissolved oxygen and phosphorus. A Total Maximum Daily Load (TMDL) for these nutrients was required and is in place. Portions of the Weber River are on the 303d list due to high levels of phosphorus and a poor beneficial water bug community. A more detailed breakdown of the water bodies, their beneficial uses and impairments can be found in Appendix B on page 21.

**Impairments**

**Nutrients**

Streams and reservoirs develop nutrient enrichment problems (i.e. eutrophication), such as algae blooms or excessive macrophyte growth, when elevated levels of phosphorus or nitrogen are present. These create excessive swings in dissolved oxygen levels, which impairs habitat for aquatic organisms. The Weber Rivers from the confluence with Lost Creek to the confluence of the Ogden Rivers has been recognized as having elevated phosphorus levels.

**Sediments**

Although soil erosion and transportation via water is a natural occurrence, excessive sediment can be washed into streams from exposed uplands or stream bank soil erosion. This sediment impairs natural channel hydrology and riparian ecosystems, filling in natural and manmade structures and reducing their storage capacity. Nutrients bound to these sediments also contribute to the excess nutrient enrichment and long term nutrient cycling issue within water bodies, especially in lakes and reservoirs.

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Total Maximum Daily Load (TMDL) is a regulatory term in the U.S. Clean Water Act, describing a value of the maximum amount of a pollutant that a body of water can receive while still meeting water quality standards. A TMDL is required when a body of water is impaired.

303d List: The Clean Water Act requires states to compile a 303d list of water bodies that do not fully support beneficial uses, such as aquatic life, fisheries, drinking water, recreation, industry, or agriculture.

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Stream and River Maintenance

Unstable stream banks often result in erosion that lead to debris and sediment being built up in natural waterways. High waters wash vegetation and soil into the streambed, increasing the risk and occurrence of flooding in Morgan County. Proper vegetation management along streams and rivers increases bank stability and reduces the chances of flooding and loss of land. The photo above illustrates erosion that is a result of excessive removal of riparian vegetation.
Known and Potential Sources of Water Quality Impairments in Morgan County

Growth and Development
The conversion of the county’s agricultural and natural lands to development has both short and long term impacts. In the short term, erosion from construction activities increases sediment contributions through stormwater discharges. Long term impacts are increases in the volume of stormwater and wastewater discharges.

Riparian Corridor Degradation
Riparian corridors and floodplains are vital to a properly functioning stream system. Encroachment into these areas through development or road and infrastructure construction limits streams’ ability to utilize the floodplain for natural migration and flood cycles. Overgrazing of riparian areas can eliminate the woody vegetation (such as willows and cottonwoods) critical for long term stream stability. Efforts to constrict streams’ access to the floodplain (hardened channels, riprap, dikes, etc.) typically result in more severe erosion downstream, large flooding events, and overall stream instability.

Stormwater Runoff
Increased impervious surfaces (roads, pavement, roofs, etc.) inhibit the natural percolation of water into groundwater storage. This increases flows and damage during storm events and decreases overall water storage in groundwater. It also provides a direct route, via drainage pipes, for pollutants to go from these surfaces into waterbodies.

Agricultural Runoff
Excess water from precipitation or irrigation runoff from farm fields and feed lots can carry nutrients and pesticides into nearby waterbodies. High nutrient levels throw off the water’s natural balance and cause many issues. Pesticides can also damage sensitive aquatic and riparian ecosystems. Agricultural runoff is reduced when Morgan County agricultural producers manage their operations with water quality as a priority.

Wastewater Disposal
Municipal wastewater treatment plants are considered point sources and are regulated by the Utah Division of Water Quality to meet specified water quality standards. Currently there are three facilities discharging wastewater in the county (discharge in millions of gallons per day): Henefer Wastewater Lagoon (.21), Morgan Wastewater Lagoon (.15), and Mountain Green Wastewater Lagoon (.10). Although not originating in Morgan County, the East Canyon Wastewater Treatment Plants’ (4.0) discharge into East Canyon is large and contributes to the water quality problems in Morgan. Also of concern are individual wastewater systems, typically septic systems that are not properly maintained or located in unsuitable soils. These systems can contribute nutrients to shallow groundwater, which flows into adjacent waterbodies.

Upland Soil Erosion and Sedimentation
Soil erosion from upland areas contributes to sedimentation of waterbodies, as well as nutrient concentrations that exceed water quality standards. Management of grazing, agricultural fields, and disturbance from construction activities must be managed so that valuable soil does not become a pollutant.

Toxic and Hazardous Spills
Several of the subwatershed streams and the main stem of the Weber River have major transportation corridors running adjacent to them — specifically, I-84 and the railroad parallel the main stem of the Weber River. Spills of toxic or hazardous materials along these transportation corridors could quickly contaminate adjacent water bodies.
Natural Resource Priorities and Concerns

**Forest, Riparian, Range & Wildlife**

**Forest**
Forested land covers 15,590 acres, or approximately four 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 the potentially irreversible changes in forest health that could result from poor management, such as overgrazing, excessive timber harvest, residential or recreation related development, and surface mineral development.

Overall, Morgan County’s forests are in good condition. Fir engraver beetles are a constant threat that generally have minimal impact and rarely reach epidemic levels. Douglas-fir beetle is more of a concern, though they are not at epidemic levels. Many aspen stands are slowly being displaced by shade tolerant conifers, while other stands are inadequately regenerating due to various environmental influences. Proper forest management is encouraged to reduce risks from threats such as beetles, wildfire, and aspen declines. Proper management may include timber harvest, thinnings, regeneration, and fuels reductions.

Generally, the risk of wildfire is moderate in the county. However, the accumulation of fallen timber, understory trees, and brush are contributing to the likelihood of high intensity fires. Morgan City has a low risk within most of its boundaries, with the exception of small area in the northern part of the city. Unincorporated areas that have locations with extreme risk include Enterprise, Milton, Mountain Green, Peterson, Snow Basin Resort, and Stoddard. These areas tend to have an increased amount of wildland-urban interface. Homes in these areas are at an increased risk for wildfire damaging their property. For more information, see the fire hazard map in Appendix E page 24. New owners who are responsible for large lots often do not understand the need to control noxious weeds or the management needed to maintain and/or enhance desirable vegetation that reduces fire risk.

**Riparian Areas**
Riparian plants and their ecosystems are, in general, threatened. Many have been subject to poor grazing and improper land management practices, which leads to loss of habitat, poor water quality, and erosion.

**Range**
Range and shrubland covers approximately 354,300 acres in Morgan County, ranging from grassy meadow valleys to sagebrush and oak covered mountain slopes to subalpine peaks in the Wasatch Mountains. The rangeland in the county serves as critical summer range for sheep and cattle across northern Utah, as well as habitat for sage-grouse, elk, mule deer, and moose.

The biggest threat to the rangeland in Morgan County is non-native annual grasses. According to rangeland health inventories conducted from 2011 to 2013, species including bulbous bluegrass, annual ryegrass, Medusahead rye, and cheatgrass decrease total forage production by 20-50%. The annual grasses are of particular interest in the lower elevation areas around Henefer and Echo Canyon. Higher elevation aspen and oak thickets are much healthier, remain in good condition, and are valuable sources of livestock feed in late summer.

Other concerns on the rangelands of Morgan County include cedar encroachment, overgrazing, and riparian stream bank erosion.

Rangeland concerns can be remedied utilizing rangeland management techniques such as rotational grazing systems, brush management to reduce canopy cover of cedar, integrated pest management, and range planting in areas of heavy infestation of noxious plants.
Wildlife
According to the Utah Division of Wildlife Resources there are seventeen sensitive species in Morgan County (Appendix C, page 22) — notably, the Bonneville cutthroat trout and greater sage-grouse. On the polar extreme, there is a problematic overabundance of deer and elk in the county.

Cutthroat Trout
The Bonneville cutthroat trout is a subspecies of cutthroat that is native to the Bonneville Basin of Utah, Wyoming, Idaho, and Nevada. They can be found in habitat types ranging from high-elevation mountain streams and lakes to low-elevation grassland streams. They require a stream riparian zone, which provides structure, cover, shade, and bank stability.

By the late twentieth century, Bonneville cutthroat trout had declined to the point that they were believed to be extinct. Remnant populations were discovered in a few headwater streams that had not been invaded by nonnative trout. These discoveries enabled conservation efforts for this subspecies to begin in the 1990s.

Major threats to the Bonneville cutthroat trout include habitat loss and alteration, predation by and competition with nonnative fishes, hybridization with nonnative fishes, such as the rainbow trout, and susceptibility to various diseases. To effectively manage Bonneville cutthroat trout in Utah, biologists must continue to conserve and restore remaining habitat, remove nonnative trout that compete with native cutthroats, and discontinue the stocking of fertile nonnative fishes where Bonneville cutthroat occur.

Sage-Grouse
Greater sage-grouse live in several places in Morgan County, including near East Canyon Reservoir and north of I-84 between Henefer and Morgan. Sage-grouse need a variety of sagebrush habitat types throughout the year. Threats to sage-grouse in the Morgan area include potential housing developments, fire, invasive weeds, drought, and disturbance from recreationists that degrade habitat and disturb the birds.

Although sage-grouse in the Morgan area continue to be visible to residents and visitors alike, biologists have little information about the local sage-grouse populations. The Morgan-Summit Adaptive Resource Management group (MSARM) is a local group of biologists, landowners, and others that works to identify and address concerns for sage-grouse populations in the area.

Elk and Deer Populations
Morgan County has a large amount of rangeland that has historically supported elk and deer populations. As this ground is encroached upon and developed, the carrying capacity of the land is reduced, forcing both deer and elk into lower elevations to find food. The elk populations are growing, and, as a result, the deer population is being diminished. Elk are an agricultural nuisance in the lower elevations because they move onto farms and ranches and eat growing crops and the feed provided to livestock. Not only do they cost agricultural producers large amounts of money in damages and extra feed but they also spread noxious weeds, exacerbating the weed problem discussed on page 4.
General Resource Summary

SOIL · WATER · AIR & CLIMATE · PLANTS · ANIMALS · HUMANS

The NRCS conducts resource inventories to help resource managers make land use decisions. These inventories evaluate the soil, water, air, plants, and animals and are discussed below. The Morgan Conservation District used these inventories to determine its priority concerns for this assessment in the previous pages and its long range planning process.

Soil

Most of the parent material in Morgan County is derived from quartzite, sandstone, limestone, argillite, phyllite and schist rocks that were deposited in mountain valleys during the high water level periods of ancient Lake Bonneville. As the water receded, coarse textured and gravelly type soils began to deposit near the mouth of the canyons at either end of Morgan Valley and along the stream bank that is now the Weber River. Medium and fine textured soils formed and deposited in valley bottoms, making these areas well suited for agricultural use.

There are approximately 145 different soil types within Morgan County, 35 of which are designated prime, unique, and farmland of statewide importance.

- **Prime farmland** is a national designation for land that has the best combination of physical and chemical soil characteristics for producing food, feed, fiber, forage, oilseed, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor without intolerable soil erosion.
- **Unique farmland** is land, other than prime farmland, that is used for production of specific high-value food and fiber crops.
- **Farmland of statewide importance** is identified as important for agricultural use in the state but is not of national significance. It has the special combination of soil quality, location, growing season, and moisture supply needed to economically produce sustained high quality or high yields of specific crops.

Soil Designation

<table>
<thead>
<tr>
<th>Soil Designation</th>
<th>Acres in Morgan County</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prime farmland if irrigated</td>
<td>11,650</td>
</tr>
<tr>
<td>Prime farmland if irrigated and drained</td>
<td>2,740</td>
</tr>
<tr>
<td>Farmland of statewide importance</td>
<td>6,130</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>20,520</strong></td>
</tr>
</tbody>
</table>

Farmland Classification in Morgan County
**Air & Climate**

**Air:** Residents in Morgan County were ranked as having the best health in Utah in 2012, according to the County Health Ranking and Roadmaps website. A factor in the county’s high score was air quality. The air quality in Morgan County received 98 on a scale to 100 (higher is better). This is based on ozone alert days and the number of pollutants in the air, as reported by the EPA. As development pressure continues and population increases, the resulting escalation of automobile travel will inevitably pollute the air citizens breathe.

**Climate:** Morgan County’s mountain elevation makes for cold winters and mild summers. The coldest temperatures occur in January, with an average low of 11°F. The hottest temperatures are in July, with an average high of 89°F.

As expected, the surrounding mountainous area receives a greater amount of precipitation compared to the valley. Annual precipitation averages nineteen inches, and snow is frequent during the winter, with an average of 72 inches (1948-1992).

The growing season is relatively short in the county, with an average of 98 frost free days.

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**Water**

Morgan County is located in the Lower Weber River Watershed where the Weber River flows from east to west. Major waterways include Cottonwood Creek, East Canyon Creek, Hardscrabble, and Lost Creek. In addition, Morgan provides thirteen tributary creeks that add to the flow of the Weber River as it makes its way to the Great Salt Lake. Lost Creek Reservoir and East Canyon Reservoir reside in the county. See water maps in Appendix D on page 23.

Low average rainfall leaves crop production dependent almost entirely on irrigation from fresh water sources. There are numerous canals and ditches that run throughout the county, which form an intricate supply network for agricultural, secondary, and municipal and industrial water distribution. Weber Basin Water Conservancy District’s canal originates in Morgan and ends in Weber County. There are several other large canals, with the predominant one belonging to Weber Basin. The Weber River, Echo, and Rockport reservoirs provide 65% of the irrigation water for the county; the remaining 35% comes from East Canyon Creek.

In terms of development issues and annual supply, groundwater resources, which are locally used for domestic and public supplies, livestock watering, and irrigation, are of secondary importance compared to surface water in Morgan Valley. Groundwater use in 2003 consisted of 78% domestic and municipal supply, 7% commercial and industrial use, 3% irrigation and stock water, and 12% for other uses.

The Weber River Watershed is the primary water resource providing irrigation and culinary water to the growing northern Wasatch front communities of Ogden, Layton, and Roy. Competition between the county, the Wasatch Front, and Summit County is increasing and is discussed in the water quantity and irrigation infrastructure section on page 6. Water quality is detailed on page 10.
General Resource Summary

Soil · Water · Air and Climate · Plants · Animals · Humans

Plants
Pastureland includes both irrigated and dry land pasture and makes up the majority of the farmland in the county. The majority of the irrigated pastureland is located on the valley floor.

Major forage crops in the county include alfalfa hay and grass hay. The grain crops include barley, oats, and wheat. Much of the wheat is fall planted; the others are planted in the spring. The most prevalent large-acre crop rotation is seven years in alfalfa, followed by two years in small grain, and then re-planted in alfalfa. Producers typically get three cuttings of alfalfa per year. According to the Utah Agricultural statistics, Morgan County produced 90,000 bushels of barley and 35,000 tons of alfalfa hay in 2012.

Vegetable growers tend to utilize greenhouses and high tunnels, which extend the growing season. Major fruit crops are apples and pears. The production of woody plants and Christmas trees is also noteworthy.

Noxious weeds continue to be a major resource concern that affect plants in Morgan County. There are two endangered plant species: Logan buckwheat and Burke’s draba. Noxious weeds are elaborated upon on page 4.

Animals
Domestic: The county is home to four dairy farms, with approximately 1,100 dairy cattle, and three livestock operations, with 6,000 beef cattle. Morgan ranks second highest in northern Utah for sheep and lamb production, with 15,100 animals. There are eight mink operations, and they are an important agricultural product in the county. Mink is elaborated upon on page 7. There is also a large number of domestic horses in the county.

There is a growing trend of urban farming in the county, with chickens, goats, horses, and other livestock, as well as specialty fruit and vegetable crops.

Despite the reduction in production agriculture, Morgan County has fifteen Century Farms. These farms, or ranches, have been in continuous ownership by a family for at least 100 years. A complete list of these farms is in Appendix F on page 25.
Humans

Population: Morgan County’s population grew 2.1% in 2011, making it one of three 6th-ranked counties in the state for highest population growth. The 2012 census recorded a population estimate of 9,821, which is 2,692 more people than the 7,129 recorded in the 2000 census. The population is projected to increase to 24,595 by 2030.

Economy: Dominant industries include manufacturing and agriculture. Eighty-three percent of the people employed in Morgan County work outside the county. Browning Arms, Holcim Gavel Pits and the Union Pacific Railroad are among the major employers in the area. The median household income (2007-2011) was $76,472, nearly 24.6% higher than the national income of $57,783. Similarly, only 3% of residents lived below the poverty line, while 11% of the national population falls below the poverty line.

Recreation: Most of the county is open land and wilderness, with many opportunities for campers, hikers, bikers, and fishermen. It also has an eighteen-hole public golf course, Round Valley, which is situated along the Weber River.

Main water attractions in the county include East Canyon Reservoir, Lost Creek Reservoir, and the Weber River. East Canyon, a beautiful mountain lake, attracts motorized water sport enthusiasts and fisherman. Lost Creek is another high-mountain reservoir that is popular with fishermen who enjoy summer and winter fishing. Kayaking and canoeing are among the fastest growing activities in the country, and the Weber River is a very popular destination for these recreationists.

The Widowmaker Hillclimb and Adventure Expo is a three-day event that brings in riders from the U.S. and Canada to try to climb a 1,000 foot hill in Croydon. The event started in 2002 and continues to increase in popularity.

Animals (continued)

Wildlife: According to the Utah Division of Wildlife Resources, Morgan County has three federal listed threatened or endangered species and sixteen species listed as having statewide importance. See list in Appendix C on page 22.

The forest, riparian, rural, and wildlife section on page 12 elaborates on some top species of concern, including sage-grouse, Bonneville cutthroat trout, mule deer, and the increasing elk population.

Game species include mule deer, Rocky Mountain elk, pheasants, chukars, pronghorn, and moose. Morgan County is home to nineteen CWMUs (Cooperative Wildlife Management Units). These units open private land up to the public for limited entry hunts.

Aquatic life is abundant due to many fresh water streams and ponds and local reservoirs. Fish species in the county include brown and tiger trout, Booneville, Bear Lake, rainbow, and strawberry cutthroat trout, black crappie, kokanee salmon, smallmouth bass, crawdads, and Utah chub.
REFERENCES

COUNTY OVERVIEW

PRIORITY CONCERNS
Noxious and Invasive Weeds
1. Morgan CD Board (Multiple 2010-2013). Board meetings, personal interviews, telephone interviews.

Water Quantity and Irrigation Infrastructure

Agricultural Land Preservation and Sustainability

Water Quality

Forest and Wildlife
1. Morgan CD Board (Multiple 2010-2013). Board meetings, personal interviews, telephone interviews.

GENERAL RESOURCE SUMMARY
Soil

Water
REFERENCES (continued)

Air and Climate

Plants

Animals
2. Morgan CD Board (Multiple 2010-2013). Board meetings, personal interviews, telephone interviews.

Humans

Map Data Sources

Land Ownership/Overview. 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: www.gis.utah.gov/sgid-vector-download/utah-sgid-vector-gis-data-layer-download-index?fc=LandOwnership

Morgan County Ag Land Conversion/Farmland Loss. This map shows loss of farmland in Weber County between the early 1990s and 2007. Retrieved from Virtual Utah at earth.gis.usu.edu/utah/advanced.html.

Precipitation. Produced by U.S. Department of Agriculture Natural Resources Conservation Service – National Cartographic 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.


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: www.nationalmap.gov/index.html

Morgan County Fire Hazard Map. Morgan County Natural Hazard Pre-Disaster Mitigation plan 2009 draft, page 17. Available at publicsafety.utah.gov/emergencymanagement/documents/13-PartX.MorganCounty.pdf
As agriculture in Utah continues to face increased pressure from urban development, changing demographics, economic pressures, and a myriad of other issues, it is increasingly important that policy makers and citizens understand the critical role that agriculture plays in Utah’s security, economy, society, culture, and well-being. To better understand and address these concerns, Lieutenant Governor Greg Bell and Commissioner of Agriculture Leonard Blackham convened the Utah Agriculture Sustainability Task Force, comprised of state legislators, local government officials, conservation districts, agricultural producers, and other interested parties. During the discussion of key agricultural sectors, eight overarching issues emerged.

**Food Security**
Local farming gives us the ability to feed people in their community, independent of outside influences, and keeps dollars spent on agricultural products in the local economy. Once prime or important agricultural lands are converted to urban development, the ability to produce food is lost and our ability to be self-sufficient is decreased.

**Invasive Species**
More effective coordination is needed to inventory and control weeds on public and private lands and to educate the public.

**Grazing Management**
Livestock grazing is the dominant sector in Utah agriculture. While the number of permitted livestock on public lands has decreased, rangeland can support additional livestock grazing that is beneficial to wildlife, healthy lands, and quality recreational opportunities, if it is properly managed. Landscape-scale grazing management can be a tool to effectively manage the resource for wildlife and livestock.

**Immigration**
Utah farms and ranchers require an ample, sustainable, and legal workforce.

**Urban Agriculture**
Urban agriculture is a growing segment in which “every acre counts”. Creating agriculture friendly zoning ordinances will help expand food-producing opportunities throughout our cities and counties.

**Agriculture Promotion and Profitability**
To be sustainable, agriculture must be profitable. This will require increased local marketing opportunities (Utah’s Own), processing capacity, and distribution capacity.

**Next Generation Farms**
As the average age of farm operators in Utah continues to increase, it will be important to provide Utah farmers and ranchers with reasonable options for generational farm transfer.

**Irrigation Infrastructure**
The availability of water is critical to agriculture. Improving water distribution systems to deliver water to farm lands in a cost-effective manner will be critical for both sustainable agriculture and projected population growth.

In order to address these issues, the Task Force developed a list of proposed actions that state, local, and federal governments and the private sector can implement.

All proposed action items were unanimously supported by all members of the task force, with the exception of conservation easements. A few members of the task force had concerns with the structure and appropriateness of conservation easements.

## Morgan County Water Quality Impairments

<table>
<thead>
<tr>
<th>Waterbody</th>
<th>Beneficial Use</th>
<th>Impairment and Status</th>
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<tbody>
<tr>
<td>East Canyon Reservoir</td>
<td>1C - (Domestic Drinking Water)</td>
<td>Dissolved Oxygen, Phosphorus Approved TMDL</td>
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<tr>
<td></td>
<td>2A - (Frequent Contact e.g. Swimming)</td>
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</tr>
<tr>
<td></td>
<td>2B - (Infrequent contact e.g. Fishing, wading)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3A - (Cold Water Fishery)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 - (Agricultural Use: e.g. Irrigation, stock water)</td>
<td></td>
</tr>
<tr>
<td>Weber River</td>
<td>1C - (Domestic Drinking Water)</td>
<td>Total Phosphorus 303d List</td>
</tr>
<tr>
<td>Below Echo Dam to Lost Creek Confluence</td>
<td>2B - (Infrequent contact e.g. Fishing, wading)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3A - (Cold Water Fishery)</td>
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<td></td>
<td>4 - (Agricultural Use: e.g. Irrigation, stock water)</td>
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</tr>
<tr>
<td>Weber River</td>
<td>1C - (Domestic Drinking Water)</td>
<td>Poor Benthic Macroinvertebrate Community 303d List</td>
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<tr>
<td>Lost Creek Confluence to East Canyon Cr Confluence</td>
<td>2B - (Infrequent contact e.g. Fishing, wading)</td>
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<tr>
<td></td>
<td>3A - (Cold Water Fishery)</td>
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<tr>
<td></td>
<td>4 - (Agricultural Use: e.g. Irrigation, stock water)</td>
<td></td>
</tr>
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Source: UDWQ Beneficial Uses and Water Quality Assessment Map (www.wq.deq.utah.gov/)
Appendix C

Morgan County Sensitive Species List

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>State Status</th>
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<tbody>
<tr>
<td>Bald Eagle</td>
<td>Haliaeetus leucocephalus</td>
<td>SPC</td>
</tr>
<tr>
<td>Bluehead Sucker</td>
<td>Catostomus discobolus</td>
<td>CS</td>
</tr>
<tr>
<td>Bobolink</td>
<td>Dolichonyx oryzivorus</td>
<td>SPC</td>
</tr>
<tr>
<td>Bonneville Cutthroat Trout</td>
<td>Oncorhynchus clarkii Utah</td>
<td>CS</td>
</tr>
<tr>
<td>Deseret Mountainsnail</td>
<td>Oreoheliz peripherica</td>
<td>SPC</td>
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<tr>
<td>Ferruginous Hawk</td>
<td>Buteo regalis</td>
<td>SPC</td>
</tr>
<tr>
<td>Gray Wolf</td>
<td>Canis Lupus</td>
<td>S-ESA</td>
</tr>
<tr>
<td>Grasshopper Sparrow</td>
<td>Ammodramus savannarum</td>
<td>SPC</td>
</tr>
<tr>
<td>Greater Sage-Grouse</td>
<td>Centrocercus urophasianus</td>
<td>S-ESA</td>
</tr>
<tr>
<td>Lewis’s Woodpecker</td>
<td>Melanerpes lewis</td>
<td>SPC</td>
</tr>
<tr>
<td>Lyrate Mountainsnail</td>
<td>Oreohelix haydeni</td>
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<tr>
<td>Mountain Plover</td>
<td>Charadrius montanus</td>
<td>SPC</td>
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<tr>
<td>Northern Goshawk</td>
<td>Accipiter gentilis</td>
<td>CS</td>
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<tr>
<td>Sharp-Tailed Grouse</td>
<td>Tympanuchus phasianellus</td>
<td>SPC</td>
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<tr>
<td>Western Pearlshell</td>
<td>Margritifera falcate</td>
<td>SPC</td>
</tr>
<tr>
<td>Western Toad</td>
<td>Bufo boreas</td>
<td>SPC</td>
</tr>
<tr>
<td>Yellow-Billed Cuckoo</td>
<td>Coccyzus americanus</td>
<td>S-ESA</td>
</tr>
</tbody>
</table>

Symbol Definition

S-ESA  Federally-listed or candidate species under the Endangered Species Act
SPC   Wildlife Species of Concern
CS   Species receiving special management

Disclaimer: This list was compiled using known species occurrences and species observations from the Utah Natural Heritage Program’s Biodiversity Tracking and Conservation System (BIOTICS); other species of special concern likely occur in Utah Counties. This list includes both current and historic records. (Last updated on March 29, 2011).
Appendix D

Morgan County Water Bodies and Watershed Boundary Maps

Water Bodies in Morgan County

Morgan County Watersheds

Lakes, Rivers and Canals
- Lake, pond or reservoir
- River or stream
- Ditch or canal
- Major road
Appendix E

Morgan County Fire Hazard Map

Wildland Fire Hazard in Morgan County

Hazard
- Low
- Moderate
- High
- Extreme

- Interstate
- Stream
- Lake
- Morgan City Limits
- Unincorporated Community
## Morgan County Century Farm List

<table>
<thead>
<tr>
<th>Carter Farm 1</th>
<th>Rollins Family Farm/Ranch</th>
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<tr>
<td>Morgan, 84050</td>
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<table>
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<table>
<thead>
<tr>
<th>Dee’s Dairy, Inc.</th>
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<td>Morgan, UT 84050</td>
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<table>
<thead>
<tr>
<th>Gorder Brothers</th>
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<table>
<thead>
<tr>
<th>Hopkin Farm</th>
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<tr>
<td>Croydon, 84018</td>
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<tr>
<th>M. R. Wilde and Sons</th>
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<table>
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<th>O Ranch</th>
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<table>
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