This Document was Adopted by the Wayne County Commission on June 5, 2017.

# WAYNE COUNTY

# PUBLIC LANDS RESOURCE MANAGEMENT PLAN

2017

# Forward

This document was completed to fulfill a legislative mandate that requires every county in Utah to have a public lands Resource Management Plan (RMP) which is part of their general plan, as required by UCA Title 17, Chapter 27a, Part 4. This law outlines the requirements and process for development and adoption of such a plan. This RMP outlines Wayne County's position of multiple use of public lands, and must be considered by federal agencies and provide a basis for communicating and coordinating with the federal government on land planning and resource management issues.

Wayne County is a unique and beautiful place steeped in pioneer heritage and culture. The hearty souls that settled this county and their generations of offspring to follow, have a rich history of making a living utilizing the public lands within it. The early settlers and those that followed, up until the 1970's, had no idea the government would start locking up land, limiting their access and use of the land. It could be said we have all been naïve while bit by bit land has been taken from our reach and set aside in monuments, parks, recreation areas, wilderness study areas, wilderness characteristic areas, roadless areas, and other designations. All land uses except recreation have been almost entirely eliminated, and that has been limited and controlled to the point that some people are completely prevented from visiting some areas. This elimination of use has severely affected the livelihoods, families, economics, and entire lives of those who have remained and tried to raise families in the county. The slow choking out and change to a seasonal and recreational economy is devastating. As kids move away, farms and ranching operations are sold, houses are sold for second homes or short term rentals, and tourists flock in, good traditional jobs, and families disappear.

It can be said that almost everything that sustains life comes from the earth, except sun light. Life as we know it, and especially with increasing population, cannot and will not go on without an increase in use of and products from the

earth. Renewable energy is really not renewable, it requires products mined from the earth to make solar panels or wind mills which periodically need to be replaced which requires more mined products from the earth. As more and more land in the county is locked up, more of everything that sustains life must be transported in. Carry this scenario to the extreme and the result is a place none of us would want.

This Resource Management Plan is an effort to outline how the majority of Wayne County residents would like the public lands that surround us managed.

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# Wayne County Resource Management Plan

Chapter 1

## Purpose and Need

### *1.1 Introduction*

Wayne County has developed a resource management plan (RMP) as required by Utah House Bill 323, which requires a county to develop a RMP (H.B. 323, 2015 General Session). The RMP will be part of the county's existing general plan. H.B. 323 has established the content requirements for a county's RMP. The requirements of H.B. 323 was amended in the 2016 legislative session by H.B. 219.

Utah State Statute directs the development of county-level plans. Section 17-27a-401 of the Utah Code provides:

"*…each County shall prepare and adopt a comprehensive, long range general plan."*

Specific components which are required to be addressed within these plans include: land use, transportation, environmental issues, public services and facilities, rehabilitation and redevelopment, economic concerns, recommendations for plan implementation, and "any other elements that the county considers appropriate".

In 2015, the Utah Legislature amended Title 17-27a-401 to also require that County General Plans include a Resource Management Plan to provide a basis for communicating and coordinating with the federal government on land planning and resource management issues. This Resource Management Plan is the fulfillment of those requirements. In 2016, HB 219 resulted in amendments to Title 17-27a-401, 403, 404, also 63J-4-607.

Pursuant to HB323/219 and Title 17-27a, Wayne County prepared and adopted a comprehensive, long-range general plan for present and future needs of the county; for growth and development of all or any part of the land within the unincorporated portions of the county; and as a basis for communicating and coordinating with the federal government on land and resource management issues.

In addition, Title 17-27a-401(3) (a) the general plan shall contain a RMP for public lands within the county. (b) Specifically the RMP shall address:

(A) mining;
(B) land use;
(C) livestock and grazing;
(D) irrigation;
(E) agriculture;
(F) fire management;

(G) noxious weeds;
(H) forest management;
(I) water rights;
(J) ditches and canals;
(K) water quality and hydrology;
(L) flood plains and river terraces;
(M) wetlands;
(N) riparian areas;
(O) predator control;
(P) wildlife;
(Q) fisheries;
(R) recreation and tourism;
(S) energy resources;
(T) mineral resources;
(U) cultural, historical, geological, and paleontological resources;
(V) wilderness;
(W) wild and scenic rivers;
(X) threatened, endangered, and sensitive species;
(Y) land access;
(Z) law enforcement; and
(AA) economic considerations.
(AB) air quality

Wayne County is located in south central Utah, lying within the Colorado Plateau. The Fremont River flows into the county from Fish Lake in Sevier County and then east converging with the Muddy River to form the Dirty Devil River which then flows south into the Colorado River in Garfield County.

The Bureau of Land Management (BLM); United States Forest Service (FS) including the Dixie and Fishlake National Forests; the National Park Service (NPS) including Capitol Reef National Park, Glen Canyon National Recreation Area and Horseshoe Canyon, Canyonlands National Park; and State lands manage large amounts of land in the county.

- BLM- 891,978 acres or 56.54 %
- Forest Service- 160,080 acres or 10.14 %
- National Park Service- 199,589 acres or 12.65 %
- National Recreation Area- 88,170 acres or 6.22 %
- State of Utah- 169,159 acres or 10.72 %
- Private Lands- 57,721acres or 3.65 %

A land use plan must be based on the goals, objectives and values as well as on objective scientific, economic or legal bases. The goals and desired conditions used by the federal agencies

are shaped by values of interest groups, their own personnel, and some scientists to achieve their desired conditions. These may not always be the same as those of the local residents, and some of the science used to support these views is usually open to different interpretation.

*1.2 County Goals*

Wayne County has a responsibility to the citizens of the county, to landowners in the county, and to the people who visit the county for business or recreation, to:

1. Protect and expand the tax base and level of economic activity in the county to provide a good standard of living and county services for its residents.
2. Provide for the health and safety of the residents of and visitors to the county.
3. Provide a quality environment for the enjoyment and use of its citizens, including protection of local values and lifestyles.
4. Protect and improve the natural environment, including wildlife, plant life, soils, water, and air for the benefit of current and future generations.
5. Represent the interests of its residents in coordinating the planning, management, and regulatory activities of other local, state and federal agencies.

A General Plan for Wayne County was completed in May 1994, as an effort on the part of the citizens of Wayne County to define the values and the goals of the county and to identify the means by which to meet those goals. In addition, a Wayne County Resource Management Plan was completed in January of 2011.

This plan will address each of the resources named above.

*1.3 General Positions of Wayne County*

*1.3.1 Adaptive Management*

Forest Service and BLM policy is to employ an adaptive management approach to management of the federal lands. In essence, this approach involves defining objectives, planning and implementing management designed to reach objectives, monitoring to see if progress is being made, and adjusting plans as required if not. The County supports this approach. However, the county also believes that Forest Service and BLM too often subvert this approach by setting rigid guidelines or restrictions both in general land management plans, leasing plans, and specific allotment management plans. Rigidly enforced guidelines on forage utilization, grazing dates, acceptable land treatments, and other practices restrict flexibility and case by case decision making which are fundamental to the concept of adaptive management. The county believes that management plans should concentrate on the desired results of the plan and provide for flexibility, innovation, and site specific monitoring to achieve those objectives.

*1.3.2 Federal Land Management Policy*

The policy of the federal government in managing both the national forests and the public lands (BLM) has long been one of sustainable multiple use. This contrasts with the policy used on national parks, wildlife preserves, military reservations or other government lands. The county supports the concept of sustainable multiple use. However, in recent years federal policy has been substantially altered toward a policy of restoration and protection of "natural" ecosystems and a reduction in traditional land uses such as grazing, logging, mining, exploring, and even some forms of recreation. This change in policy has been justified largely by a need to restore natural functioning of ecosystems, promote resilience and diversity, protect endangered species, mitigate climate change, and other factors which often seem to be driven more by a political philosophy than scientific fact and a commitment to meet the needs of taxpayers. Increased land area formerly managed under a multiple use philosophy has had the range of uses and land management practices reduced either through formal designation as monuments, wilderness, etc. or by imposition of rules and regulations on the remaining lands. It has placed unnecessary restrictions on the range of land uses and land use practices on federal lands. The county opposes this change in the management policy of federal lands.

*1.3.3 Wilderness*

The County supports the concept of setting aside some areas to be managed as wilderness areas. However, in this county there is already thousands of acres under management of the Park Service and much land is already managed as wilderness. Much of the land proposed for wilderness is so rough and remote that it is and always will be wilderness with or without designation as such. Our country is young and relatively lightly populated so that we have such areas and can afford to keep them in a relatively wild condition. However, the policies and regulations governing these areas must take into account not only traditional and historic uses by the local residents, but also the need to implement management in these areas to ensure that such areas remain in a healthy ecological condition and that they do not cause undesirable impacts on the use and management of adjacent lands. The county believes that the practice of cherry stemming to designate some areas as wilderness characteristic or wilderness study areas is a ruse to extend wilderness management to areas that do not meet the ideal. It should be stopped and areas based on such practices eliminated.

*1.3.4 National Environmental Policy Act (NEPA)*

The County believes that NEPA, as passed by Congress, was a rational and reasonable act. It required that the federal government consider the consequences of any major action on the human environment and consider alternatives to that proposed action. However, the concept of NEPA has been distorted by agency regulations and used as a way to delay or prevent, and greatly increase the cost of, almost every action taken by the government no matter how worthy. The

county believes that the law and regulations should be revised to fit the original intent and that general guidelines for implementation of routine practices should be developed to eliminate the need for detailed analysis of every individual project.

*1.3.5 Threatened and Endangered Species*

The Endangered Species Act (ESA) was passed in response to concerns over possible extinction of species of plants or animals as a result of human actions. This is a laudable goal and one the county could support. However, the act has been interpreted by regulatory agencies and the courts in ways that have served to eliminate, reduce, delay or prevent all manner of sound land management practices at a tremendous expense to the taxpayers and local communities. More often than not, these actions do not have any appreciable or detectable impact on the survival of the subject species, and may even be detrimental to their survival. The Act has become an instrument used by special interests, including some government entities, to thwart sound land management. The county believes that both the Act and the regulations must be revised to put them on a solid scientific and realistic basis.

*1.3.6 Coordination*

The federal government owns a large percentage of the land in Utah and especially in this County. While these lands are managed under laws passed by the federal government and administered by federal employees, they are within the legal jurisdiction of the State of Utah and the county governments. The counties believe the federal government is obligated to coordinate any of their land planning and management activities with those of the county in which it occurs and with the State government, and to accommodate the objectives and policies of those jurisdictions to the extent that federal law allows.

*1.3.7 Law Enforcement*

The County believes that law enforcement is a local responsibility other than in the special circumstances involving some interstate or international offenses. They do not believe that land management agencies should have law enforcement responsibility. Local law enforcement on federal lands should be the responsibility of county law enforcement agencies on federal land and all other land ownerships within the county.

*1.3.8 Wildlife*

The County supports management to produce a thriving and diverse population of wildlife, including both game and non-game species. They also believe that most management practices designed to provide for a diversity of vegetation, good watershed condition, managed livestock grazing, and other resource values will usually benefit wildlife. Any land treatment or management practice will impact some species of wildlife positively and some negatively, thus

consideration of wildlife effects must be considered on a landscape scale and recognize the tradeoffs among species.

*1.3.9 Fire*

Fire, or lack of it, has always been an ecological factor in shaping the type and distribution of plant communities, and therefore the uses and values of those communities. In recent years, the importance of fire has been more widely recognized as a natural force and advocated as a management tool. The County recognizes that fire can be a valuable management tool and support its use with proper precautions. The county also recognizes that an understanding of "natural" or "pre settlement" fire history is useful for understanding responses of vegetation and soils to fire. However, the emphasis on restoring "natural" fire frequency seems to be misplaced for two reasons. First, the vegetation conditions resulting from the "natural" fire frequency may or may not be the desired condition today or in the future. Second, the historic fire frequency may not be achievable or realistic under current conditions. Changing climatic patterns and in fuel loads create the risk of catastrophic fires which not only cause unprecedented changes in vegetation but also create serious threats to life and property. The county urges that planning for the management of wildfire and use of prescribed fire concentrate on achieving desired conditions for the present and future rather than mimicking the past.

*1.3.10 Climate Change*

The County believes that climate change is occurring because the geologic record shows that it always has. It is less clear exactly how it is changing or what role man's activities have had in causing it or what measures could prevent it. Therefore, the county supports further research into the processes and trends of climate change, and shorter term weather prediction as well, but do not support drastic policy changes and regulations that unnecessarily burden the economy, or expenditure of taxpayer money on measures that may cost more than the predicted and uncertain benefits that would accrue far into the future.

*1.3.11 Native Species*

The policy of the federal land management agencies is to use native species for seedings done for livestock forage, wildlife habitat, or rehabilitation after wildfires or other events, unless native seed is unavailable for some reason. This policy is apparently dictated more by the general policy of "restoring the natural ecosystem" than by practical considerations. While the county supports the use of native seeds, alone or in mixtures with non-natives, they believe the decision of seeding mix should be based on likelihood of success, how well the species meets management goals, and economics (i.e. the tradeoff in acres seeded vs cost per acre). The county does not believe that being native or non-native correlates well with desirable or undesirable. For example, crested wheatgrass is non-native but has had unquestioned benefits to livestock, some species of wildlife, soil protection and wildfire hazard reduction, while juniper is a native that has had undesirable effects on resource condition and uses that exceed non-native species.

### *1.3.12 Feral Horses and Burros*

The County believes that the numbers and area occupied by feral horses and burros must be strictly controlled to prevent resource damage, competition with livestock and wildlife, and for the welfare of the horses and burros themselves. Federal agencies express the intent to do this, but in practices often fail to do so due to budget or personnel limitations. The county believes that horse and burro management can be done efficiently and inexpensively by periodic roundups and selling at auction of excess horses, and humanely destroying crippled or aged individuals.

### *1.3.13 Biological Soil Crusts*

In recent years there has been increasing interest and research on the role of biological soil crusts on rangelands – southern Utah is a major focus of that effort. As a result some of the agencies have started to incorporate evaluation of biological soil crusts into management plans, environmental impact statements, and range assessments such as rangeland health. While the recent and current research has increased our knowledge of how these crusts function, most of it has been based on comparative studies, small plot experiments, or laboratory research which must be extrapolated with caution to landscape scale ecosystems. The county does not believe that there is sufficient knowledge or consensus on the role of these crusts to incorporate them as major factors in evaluating rangeland condition and trends or prescribing grazing management.

### *1.3.14 Allotment Buyouts or Retirement*

Grazing permits should remain in grazing use at full stocking levels unless the resources of the allotment do not permit a reasonable use of the land for livestock grazing. Temporary reductions in stocking or destocking may be allowed when prudent management dictates (for drought, fire, or land treatments) but permanent destocking should not be allowed at the whim or the holder of the permit. Livestock grazing is an important part of the economy of the county and individuals should not make decisions on use of public land that impact that support.

### *1.3.15 Grass Banks or Forage Reserves*

Agencies, and some other groups, have advocated using "vacant" or "retired" grazing allotments as grass banks or forage reserves to be used by permittees holding active allotments in case of emergency, e.g. severe drought, wildfire, etc. Assuming the active permits are properly stocked, the designation of grass banks effectively reduces the overall stocking level in the county, and thus impacts the county's economy. Although attractive in theory, the existence of grass banks or forage reserves often does not work in practice. When needed to address an emergency the forage reserves may be inadequate to meet the demand, too distant or impractical to reach, or the improvements (fences, water, etc) may not be useful due to lack of maintenance. The county does not encourage this practice.

### *1.3.16 Mineral Leasing*

Efforts have been made by federal agencies to implement special oil and gas leasing plans which are in addition to the usual management plans that historically have included leasing. These additional management plans directed specifically at leasing (example-Master Leasing Plans) have been used to effectively eliminate leasing by requiring no surface occupancy and other conditions and requirements that make exploring and drilling impossible. The County does not believe these special plans are necessary and prefers using the regular resource management planning documents.

Chapter 2
# Land Use and Land Access

## *2.1 Resource Findings*

Almost Ninety-Seven percent of the land within Wayne County is public or government managed land. County industries such as agriculture, mining, energy development, tourism, and recreation depend on these lands and their accompanying resources for economic stability.

### *2.1.1 Land Use Planning Process and Legal Framework*

(much of this section was copied or fashioned after the Rio Blanco, Co. plan, 2016)

Locally elected governments and elected officials have far ranging and important responsibilities to their constituents, described by state statutes as protecting their "health, safety and welfare." That responsibility includes specifically interacting with federal agencies on all federal issues impacting the local community, county or conservation district(s). To give the locally elected government the strongest voice it can have during this "government-to-government" interaction, local governments can adopt "local land use plans" or "resource plans" to set local policy regarding the use and management of federal lands and the adoption of federal policies, programs, and other types of federal decision-making. These local land use policies are not zoning and do not regulate the use of private lands. This plan is intended to protect the local citizens' use of and access to federal and public lands and resources.

Federal agencies and departments are mandated by various federal statutes to engage local governments in federal decision-making processes related to federal plans, policies, and programs that will impact the local land use, management of natural resources, the citizens, and the local tax base. The adoption of a local land use or resource plan by a local government is a critical tool allowing a local government to have a substantive impact on federal decisions, plans, policies, and programs. In fact, federal agency consideration of a local land use plan, resource plan, or "officially adopted policy" plays a key role in the success of a local government engaging as a cooperating agency or with consistency review under the NEPA, coordination under the FLPMA, or the NFMA, and in assisting in the Governor's consistency review process.

### *2.1.2 Local "Land Use Plan" Defined*

When people think of local "land use plans," they typically have in mind the general planning document that counties use to determine zoning, public services and facilities, transportation, and the like. But these plans apply to land that is largely within the county's jurisdiction and are based upon specific state authorization. By contrast, many rural counties and conservation districts have also officially adopted a separate land use plan or natural resources management plan that contains policies relating to the surrounding federal land and reflects the local government's position on federal decisions. These local plans also describe the local economic or tax base as well as local "customs and cultures" which the federal agencies are required to consider. It is this second type of planning that is being undertaken by this process.

For those unfamiliar with local land use planning participation for federal decisions, the very idea may seem odd. Local governments do not have jurisdiction over the federal government, and local land use plans cannot require federal land managers to take specific actions. For example, a conservation district cannot dictate in its land use plan how many grazing animal unit months (AUMs) will be allocated for a given grazing allotment, or that wild horse populations shall be managed below appropriate management levels (AML) to provide more forage for livestock grazing. These decisions are within the authority of the federal agency. However, rural counties' socioeconomic well-being, health, safety, and culture can be strongly impacted by the management of the surrounding federal or public lands. The reason a local government would go through a process to develop a land use plan is to ensure the local socioeconomic wellbeing, the culture and customs of the constituents, and natural resource health are considered in federal decisions.

*Statutory Requirements for Local Government-to-Federal Interaction and Influence*

*2.1.3 The National Environmental Policy Act (NEPA)*

NEPA applies to "every major Federal action significantly affecting the quality of the human environment" (42 U.S.C. § 4332(2)(C)). The courts have interpreted this to mean that every time the federal government spends any amount of money for almost any action, NEPA compliance is required. There are several ways local governments can participate in the NEPA process, depending on the type of federal decision, the level of commitment of the local government, and the goal of the local government.

First, the local government can use its local land use or resource plan as part of the federal agency's "consistency review" process. Under this provision, if the federal agency, in the course of writing an EIS, receives a local land use or resource plan, NEPA commands the federal agency to "discuss any inconsistency of a proposed action with any approved State or local plan and laws (whether or not federally sanctioned). Where an inconsistency exists, the environmental impact] statement should describe the extent to which the [federal] agency would reconcile its proposed action with the [local government] plan or law." (40 C.F.R. §§ 1506.2, 1506.2(d)). NEPA also requires that copies of comments by State or local governments must accompany the EIS or EA throughout the review process (42 U.S.C. § 4332(c)).

Second, local governments can separately participate in the NEPA process as a "cooperating agency" (40 C.F.R. § 1508.5). Pursuant to NEPA, an applicant for cooperating agency status must both (1) be a locally elected body such as a conservation district board of supervisors or a county commission; and (2) possess "special expertise." A local government's special expertise is defined as the authority granted to a local governing body by state statute. Utah Code § 17-27a-401(4) allows Wayne County to "define the county's local customs, local culture, and the components necessary for the county's economic stability." (Emphasis added.) Subsection (5) of that statute gives the County sole discretion, subject to certain restrictions not relevant here (see 17-27a-403(2)), to "determine the comprehensiveness, extent, and format of the general plan." In other words, Wayne County has the legal green light to make its General Plan broad and comprehensive to address all land use issues on federally owned ground in

Wayne County. Under Utah Code § 17-27a-401(2), Wayne County's general plan may provide for:

(a) the health, general welfare, safety, energy conservation, transportation, prosperity, civic activities, aesthetics, and recreational, educational, and cultural opportunities;
(b) the reduction of the waste of physical, financial, or human resources that result from either excessive congestion or excessive scattering of population;
(c) the efficient and economical use, conservation, and production of the supply of:
(i) food and water; and (ii) drainage, sanitary, and other facilities and resources;
(d) the use of energy conservation and solar and renewable energy resources;
(e) the protection of urban development;
(f) the protection or promotion of moderate income housing;
(g) the protection and promotion of air quality;
(h) historic preservation;
(i) identifying future uses of land that are likely to require an expansion or significant modification of services or facilities provided by each affected entity; and
(j) an official map.

County ordinance powers do carry the weight or force of law, but county ordinance making authority does not extend to federally owned lands. Utah Code 17-27a-304. County plans are advisory and do not of themselves carry the weight or force of law, like a county ordinance does. Utah Code § 17-27a-405. But County planning authority is broad enough to cover federally owned lands.

These statutes clearly define the local government's "special expertise" required to be a cooperating agency pursuant to NEPA.

*2.1.4 Federal Land Policy and Management Act (FLPMA)*

FLPMA, which governs the Bureau of Land Management (BLM), provides detailed requirements for "coordination" and "consistency" with local land use plans. With regard to the requirements for "coordination", FLPMA states (43 U.S.C. § 1712): To the extent consistent with laws governing the administration of the public lands, coordinate the inventory, planning and management activities for such lands with the land use planning and management programs of other Federal departments and agencies of the State and local governments within which the lands are located . . . considering the policies of approved State and tribal land resource management programs.

Such coordination is to be achieved by:
To the extent practical, the BLM must stay apprised of local land use plans (43 U.S.C. § 1712(c)(9)).

- The BLM must assure that local land use plans germane to the development of BLM land use plans are given consideration.

- To the extent practical, the BLM must assist in resolving inconsistencies between local and BLM land use plans.

- The BLM must provide for the meaningful involvement of local governments in the development of BLM land use programs, regulations, and decisions. This includes early notification of proposed decisions that may impact non-federal lands.

Additionally, FLPMA requires BLM land use plans to be consistent with local land use plans, provided that achieving consistency does not result in a violation of federal law. FLPMA states: (43 U.S.C. § 1712(c)(9)).

Land use plans of the Secretary [of the Interior, BLM] under this section shall be consistent with State and local plans to the maximum extent he finds consistent with federal law and the purposes of this Act. In other words, FLPMA requires both "coordination" and "consistency" review." Coordination should include both regularly scheduled meetings between the various local governments and BLM managers as well as inviting local BLM staff to local government meetings (Bureau of Land Management 2012). FLPMA's consistency review requirement states that if a BLM land use plan is inconsistent with a local land use plan, the BLM owes an explanation of how achieving consistency would result in a violation of federal law.

Finally, FLPMA requires that the BLM also provide for a Governor's consistency review as part of the land use planning process (43 C.F.R. § 1610.3-2(e)).

*2.1.5 The National Forest Management Act (NFMA)*

NFMA, which governs the U.S. Forest Service (USFS), requires the agency to "coordinate". The NFMA requires: The Secretary of Agriculture shall develop, maintain, and, as appropriate, revise land and resource management plans for units of the National Forest System, coordinated with the land and resource management planning processes of State and local governments and other Federal agencies (16 U.S.C. § 1604(a)).

The fact that the USFS is directed to "coordinate" with local governments implies, by its plain meaning, that the USFS must engage in a process that involves more than simply "considering" the plans and policies of local governments; it must attempt to achieve compatibility between USFS plans and local land use plans.

*2.1.6 Governor's Consistency Review Process*

State Governors are entitled to a separate consistency review of BLM and land use plans, revisions, and amendments. Title 43 C.F.R. §1610.3-2 provides an opportunity for the Governor to review all proposed plans to identify any inconsistencies with State or local plans. If the Governor's comments result in changes to the plan, the public should be re-engaged in the process.

### *2.1.7 County and District Expectations from Land Use Planning Process and Land Use Plan*

While the statutes and regulations outlined above spell out the legal requirements of the federal agencies in their duties in dealing with local governments, the County also recognizes that part of this land use planning process is to develop a solid working relationship with the federal agencies doing business in Wayne County. The County also recognizes that "coordination," "cooperating agency status" and "consistency review" is required actions on behalf of both the federal agencies and the local governments. To that end, the County commits to the following actions:

1. Within 30 days of the date of adoption of this plan, the County will inform the federal agencies of the date, time, and location of their regularly scheduled meetings with an open invitation that federal agency personnel should attend such meetings if there are issues to discuss.

2. Within 30 days of the date of adoption of this plan, the County will transmit a copy of this local land use plan to the state, regional, and local federal agency offices doing business within Wayne County for their consideration as part of any consistency review that is required pursuant to federal statute.

3. Within 30 days of the adoption of this plan, the County will contact the BLM and USFS offices to determine a protocol for informal communication that should occur so that each is apprised of issues and concerns as early as possible.

4. In a timely manner, the County will review NEPA documents to determine if they will request "cooperating agency status" and will consider entering into Memorandums of Understanding (MOU) or Memorandums of Agreement (MOA) as appropriate. The County reserves the right to negotiate a MOU or MOA on a case-by-case basis, although a MOU or MOA is not appropriate nor necessary in all cases.

### *2.1.8 Multiple-Use and Sustained-Yield*

Both the Forest Service and the BLM are required to manage the lands under their jurisdiction pursuant to the principles of multiple-use and sustained-yield. These terms have been defined within the provisions of FLPMA for the BLM and within the provisions of the Multiple-Use Sustained-Yield Act of 1960 for the Forest Service.

The definitions state that multiple uses are to be considered in the context of the best combination of land use that meet the present and future needs of the nation with respect to recreation, range, timber, minerals, watershed, fish and wildlife, and natural, scenic, and historical values. Furthermore, these resources are to be managed in a *'"harmonious and coordinated manner that does not lead to permanent impairment of the productivity of the land and quality of the environment."* Finally, multiple-use does not, by definition, mean the greatest economic return or the greatest unit output for the natural resources. 43 U.S.C. §1702(c); s*ee also* 16 U.S.C. § 531(a).

For the Forest Service, the *"establishment and maintenance of areas of wilderness"* is specifically determined to be consistent with the principle of multiple-use. 16 U.S.C. § 529. The term "sustained-yield" is defined to mean the achievement of a *"high level annual or regular periodic output of the various renewable resources of the public land consistent with multiple-use."* 43 U.S.C. § 1702(h); *see also* 16 U.S.C. § 531(b).

Wayne County's definition of multiple-use includes, but is not limited to, traditional consumptive and non-consumptive uses such as grazing, all season recreation, timber harvest, mining, oil and gas exploration and development, agriculture, wildlife, hunting, fishing, camping, historic and prehistoric cultural resources, and watershed. County industries such as agriculture, timber, grazing, tourism, and mining depend on the continued use and availability of public land and its resources.

*2.2 Objectives*

Wayne County's objectives as to land use and land access are to apply multiple use and sustained-yield management principles. To keep land accessible and to maintain and keep open roads to and across federal land, including all rights-of-way vested under R.S. 2477. Wayne County does not support any further expansion of Capitol Reef National Park or buffer zones around it. The County is already bifurcated by the park. This essentially separates the County into two distinct parts. This separation makes management and coordination of public affairs very difficult. In an ideal situation the County would have a transportation corridor through the park over which the County had full control, and could utilize for such necessary facilities as an adequate and safe highway, power lines, pipelines, livestock trailing, and others unforeseen. The County supports no net gain of federal lands.

Land Use and Access are essential to any energy development, transportation and transmission. It is of no use to discover or develop energy sources if you can't get them to where they are needed. To be land locked by federal land and management restrictions prevents any exploration of resources including renewable resources.

Land Use and Access are essential to providing emergency services. Emergency services cannot be adequately provided unless roads are kept open.

All public land that is not in a national park, state park, national recreation area, or wilderness area is considered by the county to be under multiple use management.

2.3 Policy Statements

1. Multiple use and sustained-yield management principles shall be applied in public land use and natural resource planning and management in Wayne County. This is how the citizens of Wayne County are best served. Multiple-use and sustained-yield management means that land owners and land management agencies should develop and implement management plans and make other resource-use decisions that support these statements.

2. Achieve and maintain in perpetuity a high-level annual or regular periodic output of agricultural, mineral and various other resources from public lands in Wayne County.
3. Support valid existing transportation, mineral, and grazing privileges in Wayne County at the highest reasonably sustainable levels.

4. Plans shall be designed to produce and provide the desired vegetation for the watersheds, timber, food, fiber, livestock forage, and wildlife forage, and minerals that are necessary to meet present needs and future economic growth and community expansion in Wayne County without permanent impairment of the productivity of the land.

5. Plans shall meet the recreational needs and the personal and business-related transportation needs of the citizens of Wayne County by providing access throughout the county.

6. Plans shall meet the needs of wildlife, provided wildlife populations are kept at a reasonable minimum so as to not interfere with originally permitted AUM levels under the Taylor Grazing Act.

7. Plans shall meet the county's needs of economic development.

8. Plans shall meet the needs of community development.

9. Plans shall support transportation and access routes to and across federal lands, including all rights-of-way vested under R.S. 2477, are vital to Wayne County's economy and to the quality of life in the County, and must provide, at a minimum, a network of roads throughout the County that provides for:

> (i) movement of people, goods, and services across public lands;
>
> (ii) reasonable access to a broad range of resources and opportunities throughout the County, including livestock operations and improvements, water rights maintenance and development, solid, fluid, and gaseous mineral operations, recreational opportunities and operations, including motorized and non-motorized recreation, search and rescue needs, public safety needs including emergency services, and access for transportation of wood products to market;
>
> (iii) access to federal lands for people with disabilities and the elderly; and
>
> (iv) access to state lands and school and institutional trust lands to accomplish the purposes of those lands.

10. Plans shall support Wayne County's transportation plan showing all of its RS 2477 Class B and D roads as referenced. Wayne County urges expeditious recognition by the federal government of Wayne County's R.S. 2477 rights of ways on Class B and D roads as shown in the map attached. Wayne County reserves the right to alter and update this map as further changes are warranted.

11. Plans shall support Wayne County's continued use reasonable administrative and legal measures to protect and preserve valid existing rights-of-way granted by Congress under R.S. 2477, and to support and work in conjunction with the State to redress cases where R.S. 2477 rights-of-way are not recognized or are impaired.

12. Wayne County believes that none of the so-called Forest Service roadless areas on public lands in Wayne County meets the standards and criteria for wilderness designation. Therefore all should be abolished as so-called "roadless areas," all restrictions under any so-called "roadless rule" should be terminated, and those areas should go back into regular multiple use and sustained yield management.

13. Wayne County opposes the de-classification of existing roads in the Forest Service unless multiple side by side roads exist running to the same destination and Wayne County expressly consents to close or declassify the extra road.

14. The roads shown as open in the recent Dixie National Forest Travel Management Plan and Fishlake Forest Travel Management Plan should remain open. Wayne County reserves the right to amend this Resource Management Plan to show additional roads on the Forest Service that should remain open or be opened, above and beyond those showing as open on the current Forest Travel Management Plans.

15. Wayne County's plan for the forested lands in its boundaries does not allow for the exclusion or diminishment of traditional multiple-use activities, including grazing and proper forest harvesting, and the enjoyment and use of valid, existing rights, including water rights, local transportation plan rights, R.S. 2477 rights, grazing allotment rights, and mineral leasing rights.

16. Wayne County's plan calls for the development of additional forested roads as reasonably necessary to pursue traditional multiple-use activities such as logging and other healthy forest management.

17. Wayne County supports that public lands must be managed in a manner that recognizes the Nation's need for a domestic source of minerals, food, timber, and fiber.

18. Wayne County supports that domestic livestock grazing shall continue to be recognized as an important multiple use on BLM and USFS lands as documented in FLPMA, NFMA and the Taylor Grazing Act. The custom and culture of Wayne County is based on continued access to BLM and USFS lands for livestock grazing, commensurate with and adjudicated to their private land base properties.

19. Wayne County supports that access to all resources on federal lands shall be recognized as part of the custom and culture of Wayne County.

20. Wayne County supports that Federal land management agencies conduct assessments of visual impacts in determining how an area should be managed with the goal of protecting the visual resource while not burdening authorized land uses and maintaining economic stability.

Federal and state land management agencies must recognize the importance of communication sites, electric transmission lines, and transportation corridors to the security, health and welfare of the county's residents when considering visual resource management objectives.

21. Wayne County asserts that all of the roads in the Glen Canyon National Recreation Area (GCNRA) and within county boundaries are County roads under our jurisdiction. We assert the GCNRA has no scientific basis for differentiating use between various types of vehicles. We further assert that impacts on the land, wildlife, resources and management of the GCNRA are substantially identical for the various types of vehicles using the roads. We assert the GCNRA is not in compliance with its enabling legislation and management plan and is failing to maximize the recreational experience and number of opportunities for enjoying the recreation area, especially Off Road Vehicle (ORV) recreation. We also assert that the GCNRA is far from balanced regarding its treatment and policies for various modes of recreation. Wayne County asserts that both the North and South "Poison Springs Loops" should be available for use by all classes of ORVs.

Chapter 3
# Livestock, Grazing and Agriculture

## *3.1 Resource Findings*

### *3.1.1 The Evolution of Wayne County's Livestock Industry*
*(References for this section Murphy, 1999 & Snow, 1953)*

A brief look at the early livestock industry in Utah helps put the Wayne County experience into perspective. The livestock industry began with the arrival of the first Mormon wagon trains and their accompanying cattle, horses, and sheep. The Mormon migration, part of a mass westerly movement in the latter half of the nineteenth century, brought animals and husbandry practices from the other parts of the country. As Utah became a supply hub for immigrants headed for California and Oregon, local herds continued to grow, in part because travelers frequently exchanged livestock for other necessities before continuing their journey west. The early types of beef cattle in Utah were shorthorn (Durham) along with a few Devon and Red Poll breeds. Herefords, the great western range cattle, did not take hold in Utah until the 1880s.

Before the first settlers and their livestock arrived in Wayne County, Utah was already exporting cattle, and in the late 1870s an estimated 180,000 head were driven east to market. Because it was common for cattlemen to under count the number of animals they owned, the actual count may have been much higher. Utah was fast becoming cattle country, and Wayne County would soon begin to create its own niche in the livestock industry—especially with sheep and cattle.

### *3.1.2 Livestock History and Traditions in Wayne County*

Almost every early description of Wayne County noted the native grasses that grew stirrup high in Rabbit Valley, along streams, and on Boulder Mountain. One early settler, Franklin W. Young, apparently cut the wild grass in Rabbit Valley like hay and stored it for winter feed before leaving for Millard County to fetch his family. Indian rice, needle and thread grass, western wheatgrass, and other grasses grew in the rugged country of eastern Wayne County, including Robbers Roost, Hans Flat, and The Spur. The Indians knew where good grazing areas could be found and may have moved the first domestic cattle into the county because of it. Jack Hillers, photographer with the John Wesley Powell expedition, said that Ute Indians used the lower Pleasant Creek area with its abundant native grasses as a place to hide cattle stolen from the Mormon settlements. As noted, several LDS church co-op herds as well as families needing range land found the grazing potential of Rabbit Valley and the surrounding mountains a powerful draw. At first there was ample grazing in the valley itself; gradually, though, owners moved their herds to other areas. "Before the turn of the century," Anne Snow's account states, "cattle in the upper part of the county ranged in the valley and around Fish Lake. Then as more grazing territory was needed and Forest Reserve restrictions became effective,

some cattle were taken to the deserts east of Thousand Lake Mountain and in the summer, southwest to the Parker Mountain and to Antelope." Thurber cattlemen like the Brinkerhoff and Meeks brothers moved their growing herds out of the valley and onto Boulder Mountain after more land was taken up for homesteads by later arrivals. The first settlers in Teasdale also grazed their herds on Boulder Mountain. Before long, herds from upper Wayne County ranged as far as the Henry Mountains.

As Utah's livestock industry evolved, the farm village of the early years acquired elements of the larger ranching traditions of the West, forming a "livestock culture characterized by an extremely large number of farm-based owners," according to Charles Peterson. In Wayne County, too, farm-based livestock operations appear characteristic, especially in the western and central portions of the county. East and south of Hanksville, however, ranches often were more isolated and fewer farm crops were grown. By 1930 more than 15,000 farms in Utah (almost half) "depended on livestock, which generated 56 percent of all agricultural income." The percentage of agricultural income derived from livestock has always been greater in Wayne County than it has been in the state as a whole.

Data on the number and size of farms in Wayne County tells a graphic story of constant change. Many early settlers took up quarter sections. For a few families, 160 acres proved to be more than they wanted to irrigate and farm. Surrounded by thousands of acres of public land freely available for grazing cattle and sheep, some settlers sold part of their land to newcomers or neighbors. Others sold out entirely and left the county or moved to other places in Wayne County. More frequently, perhaps, larger holdings were divided among surviving family members to settle estates. There was a very strong countercurrent at work as well, and a number of farmer/ranchers worked hard to acquire as much land as they could in order to make the future more secure for their families. Numerous property transactions are mentioned in the town histories included in *Rainbow Views (Snow,1953).* In 1900 some 170 Wayne County farmers with more than twenty-five acres were listed in the *Utah State Gazetteer. A* little more than a third of them (sixty-one) had more than 100 acres, and ten of those had more than 200 acres. During the period from 1900 to 1920 the number of farms over twenty-five acres increased to 311, and thirty-eight of those had more than 200 acres. A few farmers had fairly large holdings for that time in Wayne County.

In the following decades the average size of farms generally increased, with one or two dips, until the mid-1970s. Most area farmers and ranchers had moved beyond the subsistence level of the earlier era and hoped to prosper, not merely survive. It required larger holdings to do that. In 1974 the average size of a farm in Wayne County was 736.8 acres, five times the average size of 142.5 acres in 1930. In 1992 county livestock (including poultry and livestock products) had a market value of $8,221,000, while crops were valued at $492,000. By 1992 the average county farm size had declined to 559 acres, and the county had a total of 189 farms. Census data reveal that Wayne County is still dependent on its livestock industry, but less so than in former times. Federal, state, and local government jobs and entitlements such as Social Security and veterans' benefits now provide a much larger percentage of personal income in the county. As the

twentieth century ends, a startling fact is that only three to five families in the county are able to live on their farm/ranch income alone. Among those old enough to be eligible for Social Security, monthly benefit checks supplement agricultural income. For younger couples raising children, "it's a two income economy. The traditional stay-at home farm wife of earlier times who supplemented the family income with "butter and egg money" is as out of date as her butter churn.

### *3.1.3 The Rise and Decline of Sheep*

Sheep had an advantage over cattle in some ways: they multiplied more rapidly and produced wool as well as meat, giving a farmer two crops. Farm children often raised orphan lambs to start their own herds or sold them to begin savings accounts or to help their families. On the down side, however, sheep on the open range required one or more herders who had to be supplied with food and other necessities. Shearing the wool and shipping it cut into profits as well.

The sheep industry really began to take off in Wayne County around the turn of the century. For a time, sheep competed with large herds of cattle; but during the mid-1910s to the late 1920s sheep gradually replaced cattle in this area. An estimated 50,000 sheep were sheared each spring at the Durfeys' huge sheep-shearing operation at Notom and at the Sandy Ranch to the south. Shearing operations were also found at the King Ranch and the Fairview Ranch. Until about 1918, according to local historian Anne Snow, sheep were sheared by hand. The wool clip was hauled to Salina by horse and wagon until about 1925 when trucks took over. Snow reported that it cost 75 cents per hundred pounds to truck wool from Notom to Salina. Sheep, lambs and wool from the eastern reaches of the Wayne County were marketed at the railhead in Green River; those in upper Wayne County were driven to Marysvale or Salina. Sheep operations in western Wayne County never matched the size of those in the southern and eastern areas of the county, in part because of restrictions imposed on grazing when forest reserves were established. To secure better prices for their wool, local sheep owners formed a woolgrowers association about 1910, just as the sheep industry was expanding rapidly in Wayne County.

Passage of the Taylor Grazing Act in 1934 and cuts in Forest Service permits for sheep grazing in national forest areas dealt a double blow to some of Wayne County's sheep ranchers. Because the Taylor Grazing Act favored local ranchers, Wayne sheep owners who used the Circle Cliffs area of Garfield County for a winter range lost out to the Boulder cattlemen from that area. World War II, which created a greater market for farm products, also took away many young men who might have gone out on the range to herd sheep. Even after the war it was difficult to find sheepherders. As a result, in the 1940s many sheep permits were converted to cattle permits. Then, in the 1970s, when a type of poison coyote bait became illegal other sheep owners sold their herds. Local tax rolls in 1946 showed 14,971 sheep in the county; in 1977 it was estimated that there were 10,000. That number remained fairly stable to the end of the twentieth century, with two county sheep operations running as many as a thousand sheep, while most of the county's smaller herds were managed cooperatively.

*A sheepherder and his outfit on Aquarius Plateau, circa 1910 to 1915, David D. Rust photographs. Church History Library, The Church of Jesus Christ of Latter-day Saints, Salt Lake City, Utah, ©2017 Intellectual Reserve, Inc. All rights reserved.*

*3.1.4 Beef Cattle*

Beef cattle were brought into the county in the late 1800's starting mostly with LDS Church cattle and other Co-op cattle companies. In 1884 the Church sold its cattle. In the meantime about 1879-1880 others had brought cattle and horses into Rabbit Valley. As the herds increased in size and land was taken up for homesteads, the cattle were moved to the Boulder Mountain. Before the turn of the century cattle in the upper part of the county ranged in the valley and around Fish Lake. Then as more grazing territory was needed and Forest Reserve restrictions became effective, some cattle were taken to the deserts east of Thousand Lake Mountain and in the summer, southwest to the Parker Mountain and to Antelope.

Before long, cattlemen had established ranches in lower Wayne County. In 1909 Joe Biddlecome took his wife Millie and their infant daughter Pearl east of Hanksville into one of the

most remote sections of the West to claim land in the Robbers Roost area for a cattle ranch. The outlaws who had frequented the area were gone by then, and all Biddlecome could see was plenty of good range that had not yet been claimed because of its remoteness. Pearl Baker details the development of this ranch in *Robbers Roost Recollections.* Feisty and outspoken, Baker may have offended some, but her book is valuable because it documents range management and ranching life and customs in eastern Wayne County, including the building of brush corrals, developing water, managing cattle on the range, branding, making rawhide hatbands, and much more. By 1925 Biddlecome thought the local range was overstocked, and so he "trailed out to market over a thousand head of cattle. . . . This left a comfortable herd on the range, which had increased to about six or seven hundred head when the estate was settled in 1928." As remote as eastern Wayne County was and still is, it was quite heavily traveled by resident stockmen and ranchers from Emery County and elsewhere. Richard F. Negri's book *Tales of Canyonlands Cowboys* contains detailed information about the ranches and transient herds of cattle and sheep all along the country bordering the Green River—from the San Rafael River in Emery County south through Wayne County to Ernie Country in Garfield County and the confluence of the Green and Colorado Rivers. Men and their four legged animals seem to have been constantly on the move out there.

*Arthur Ekker and Hazel Biddlecome Ekker separating yearlings and old cows at Twin Corrals Flat, c. 1958. (Utah State Historical Society)*

During Theodore Roosevelt's administration, he set aside 148 million acres of western forest lands as reservations. By 1910, the Federal Forestry Service had put into operation policies and regulations governing the reservations. For 10 to 15 years cattlemen didn't seem to be much affected by the regulations, but as time went on, fees increased, the grazing period was shortened, and the number of animals allowed on the reserve was reduced. During the period 1925 to 1950 the reduction in some areas was about fifty percent. The inability of range to support the large numbers was in part due to periods of drought and according to cattlemen increase in deer and especially elk herds.

The Taylor Grazing Act passed in 1934 sponsored by Congressman Edward T. Taylor of Colorado and shaped in great part by former Utah congressman Don B. Colton, the bill was controversial in those western states where most of the public lands were that it affected. Ranchers who believed that something needed to be done to improve rangeland did not necessarily believe that the federal government should be the entity to do it. Drought, depression, large numbers of cattle and sheep on public lands, and terrible dust storms in the summer of 1934 combined to help secure the passage of the act. The system of land use it instituted was designed to favor local livestock owners over transient stockmen who ranged their cattle and sheep far from home. Among other things, the act created local grazing districts with locally elected leaders—Wayne County was in Grazing District 5—required the payment of fees, and introduced a permit system that gave preference to ranchers who owned property adjacent to public lands and had traditionally grazed stock there. An immediate result was that ranchers knew what ranges they would be using from year to year. This in turn encouraged the building of line cabins and corrals, the digging of wells, and the creation of other more or less permanent improvements. As promised, in connection with the passage of the Taylor Grazing Act, the Civilian Conservation Corps (CCC) undertook numerous range improvement projects. In Wayne County most of the CCC work of this kind centered on developing or improving water sources for livestock. The CCC built a trail up on the South Caineville Mesa, lack of water always limited the grazing up there. Before Taylor's bill was passed, the federal government had already carried out a controversial sheep and cattle buying program in an attempt to reduce the number of stock on the range, improve their quality, and shore up falling beef and lamb prices. Ranchers received from two to twenty dollars a head.

### *3.1.5 Livestock and Capitol Reef*

The story of livestock and Capitol Reef National Park is certainly as complex as that of the BLM and grazing even though the latter agency manages far more land in the county than does the NPS. Access to livestock driveways was specifically included in Franklin D. Roosevelt's proclamation creating Capitol Reef National Monument in 1937: "Nothing herein shall prevent the movement of livestock across the lands included in the monument under such regulations as may be prescribed by the Secretary of the Interior and upon the driveways to be specially designated by said Secretary." Stock driveways were one thing, grazing another. The new monument's remoteness and lack of supervision locally got Capitol Reef off to a poor start administratively. Limited funding and no clearly articulated management plan meant that some

sheep, cattle, and horses continued to graze on monument land for years. Active grazing permits on private, county, and state land within the monument and the lack of fencing and boundary markers added to the problem. Livestock trespassing was almost inevitable. The monument's first superintendent, Charles Kelly, attempted to deal with the problem as best he could. Diplomacy was not one of his virtues, however, and his efforts sometimes created unnecessary friction, especially with his neighbors in Fruita. The sudden, huge expansion of the monument in 1969 caught local people off guard and created a furor in Wayne and Garfield counties. LBJ was the first president to set his sights on Utah, the town of Boulder wanted to change its name to Johnson's Folly. Since most of the expanded monument consisted of BLM land, ranchers with grazing permits on the affected allotments were justifiably alarmed. Local NPS officials, who were given no advance information, could not respond adequately to ranchers' concerns. With various proposals in the air to make Capitol Reef a national park, little was done other than to have the BLM continue to oversee use of its former lands by current permit holders. The 1971 act creating Capitol Reef National Park included a provision for continuing use of traditional stock driveways and required the phasing out of grazing privileges within the park in ten years. According to Bradford Frye, the ten-year phaseout was bound to cause problems because of the large number of permits involved and their varying expiration dates. From the National Park Service's point of view, time eventually solved most of the problems associated with the stock driveways. More ranchers began trucking livestock from one range to another, and by the early 1990s the actual number of stock regularly trailed through the Fremont River Canyon (less than one hundred) and places like Oak Creek and Pleasant Creek Canyon had markedly declined. The phaseout was another matter. In 1981, with the first permits scheduled to expire in less than a year, local officials, Utah's congressional delegation, the Utah Farm Bureau, and concerned ranchers campaigned on several fronts. Among the proposals widely discussed were boundary changes to the park that would eliminate winter grazing areas and the extension of grazing permits to the heirs of current owners. The ranchers won a temporary victory when a bill passed in October 1982 postponed the grazing phaseout for ten years. The most important move with regard to phasing out grazing in the park took shape when Martin C. Ott became superintendent of Capitol Reef National Park in 1987. Ott was perhaps the perfect man to help resolve the issue. His family background included both the Park Service tradition and the ranching tradition—he spoke both languages. Within two years he had successfully negotiated the sale of 69 percent of the total permits in the park. Ranchers who chose not to sell, particularly those who "were almost solely dependent on lands within Capitol Reef . . . for their winter grazing needs," would be given the protection of a gradual phaseout.

### *3.1.6 Cattle Today*

As noted earlier, only a handful of families are able to live on their agricultural income alone. In the late 1990s the larger cattle operations in the county were running between 200 and 600 head, with one herd likely to grow to 1,000 head by the millenium. Cross-breeding and artificial insemination have improved herds. Just as Herefords succeeded the largely Durham stock of the pioneers, ranchers have continued to improve their cattle by introducing black and red Angus and other breeds. Cattle buyers/brokers come to Wayne County to purchase calves

that are shipped to Nebraska, Kansas, eastern Colorado, and other localities, and local cattle are also sold at the Producers Livestock Auction in Salina and R Livestock Auction in Monroe. A new law that went into effect in 1999 requires bulls to be tested for a protozoan disease, trichomoniasis. Vaccination for leptosporosis is also required. In earlier times, animals were treated with home remedies or by visiting veterinarians. Local professional veterinarian services are available to ranchers and farmers today. Despite changes in the way cattle are bred, cared for, and marketed and the closing of some areas to grazing, the cattle business retains much that is traditional. Cattle are still watered and fed hay, moved from one range to another, and rounded up and branded in seasonal cycles that link the ranchers of today with their Wayne County forebears and with the traditions of the larger American West.

### *3.1.7 The Dairy Business*

The dairy business began when the first families came to the Fremont Valley. Those with more than a few dairy cows soon began making butter and cheese to sell. Dairy operations sprang up near Fish Lake and Thousand Lake Mountain to the north and on Boulder Mountain to the south. Some families spent the summer near a mountain stream with their cows. Milking cows at summer dairy operations was a traditional job for some farm girls in Wayne County and in other parts of the state like Cache Valley, where dairy herds were even more common. Butter and cheese were traded locally for products like honey and molasses and freighted by wagon over the plateau to the Sevier Valley towns and as far north as Nephi. In the early twentieth century the George Brinkerhoff family operated a cheese factory with the latest equipment and shipped the cheese to Salt Lake City and other markets. With the advent of cream separators, many Wayne County milk producers had surplus cream to sell. For a time the upper county had two competing creameries, the Wayne Creamery Company and the Loa Creamery and Produce Company. Farmers found an unusual way to ship their cream to the Mutual Creamery in Salt Lake City—parcel post. As strange as this may seem today, parcel post was cheap enough in the early part of the century that Utahns found several inventive ways to use it. Bricks were shipped by parcel post to Vernal, for example, to build a bank, still referred to as the parcel-post bank. Wayne farmers continued to use the U.S. mail to send cream to Salt Lake City until the late 1920s, according to Anne Snow. In 1927 the Nelson-Ricks Company, another Salt Lake creamery, began competing with Mutual Creamery for Wayne County's cream production, and since its trucks picked up the cream in Wayne, Nelson-Ricks won over local farmers. About 1936 Nelson-Ricks sent Royal Harward to Loa to open Nelson-Ricks Creamery. Later, Harward purchased Circle Cliffs Dairy from the Ernest Brinkerhoff family and produced milk, cheese, and ice cream. In the 1940s Circle Cliffs, located between Bicknell and Teasdale, created a market for its milk and milk products at Fish Lake resorts during the summer and supplied local school districts the rest of the year. The Chappell Cheese Company in Loa was the county's only remaining commercial cheese producer, now closed. Over the years, dairy farmers have worked to improve their herds. The pioneer Durham stock began to be replaced with traditional dairy cattle breeds like Jersey, Guernsey, and Holstein about 1915.

When the *Local Government Planning Project Draft General Plan for Wayne County was* issued in October 1993 the planning committee, with input from residents, clearly articulated goals for the future and suggested possible strategies for attaining them. Regarding the livestock industry and agriculture, including timber harvesting, the report stated in part: "The origins and traditions of the county are based on the livestock and agriculture industries.... [They] have historically provided a major contribution to the county economic base and provide the very foundation supporting the county's custom and culture. These industries . . . are heavily dependent on the use and availability of public lands and resources. The county views the use of these lands as a traditional right, not a privilege." In other words, livestock and agriculture are not simply a means of livelihood that can be replaced by some other income-producing occupations; they are an integral part of who the people are and what their lives mean. Although some may dispute the "traditional right" concept, this important document does suggest many ways that county residents and federal land managers might work together to implement policies that will preserve the custom and culture of the county.

### *3.1.8 Economics and Production Agriculture (Jakus, 2013)*

The importance of production agriculture to county economies in Utah varies across the state. Although food manufacturing is an important source of manufacturing employment in metropolitan regions, the role of traditional production agriculture (that is, the production of livestock and crop commodities such as cattle and hay) is almost nil in most metro areas. In contrast, production agriculture remains a key component of rural economies such as that found in Wayne County.

Our measure of economic contribution is “gross value added”. Value added simply measures the net contribution of the production process in creating value; one can think of value added as the difference between an industry’s total value of output and the cost of its intermediate inputs. In our focus on livestock production, a rancher uses raw materials (cows, a bull, range forage, purchased hay, and veterinary services) to produce calves which can be sold at a market price. The value added by livestock producers can be measured by payments to hired labor, return to the rancher (roughly, the rancher’s profit), and any taxes that must be paid. For example, if a producer uses $75 worth of raw material and, via a production process that includes hired, family, and proprietor labor, transforms those inputs into a product that can be sold for $100, the value-added is $25.

Wayne County has a low population, with just over 2700 residents in 2012. Median household income is $49,847. The Wayne county economy contributes $78 million in value added to the state economy, on sales of $159 million (Figure 3). The largest sector of the economy is Public Administration (24.5%). Production Agriculture is the second largest economic sector, accounting for 15.1%, with the Service sector of the economy following closely at 14.6%. Cash receipts for agricultural producers were $14.6 million (19% of gross sales in the county), some 92% of which were generated by sales of livestock products.

With a change in public policy that prohibits private grazing on federal lands. Analysis of livestock budgets revealed that, at current prices of outputs and inputs, ranching would become unprofitable in Wayne County (Jakus, 2013).

Table 1: Livestock Inventory, by County

| | Wayne | State of Utah |
|---|---|---|
| All Cattle & Calves | 26,000 | 800,000 |
| Beef Cows | 13,800 | 330,000 |
| Milk cows | 1,600 | 90,000 |
| Sheep and Lambs | 5,600 | 305,000 |

Source: 2012 Utah Agriculture Statistics

Table 2: The Economic Contribution of Cattle Ranching, by County, 2011

| | Direct Effect | Indirect and Induced Effects | Total Effect |
|---|---|---|---|
| Wayne | | | |
| Output | $10,765 | $6,937 | 17,702 |
| Value-Added | $5,966 | $3,515 | $9,481 |
| Labor Income | $4,383 | $1,957 | $6,339 |
| Jobs | 39 | 37 | 76 |

All dollar values measured in $1000 units. Jobs include paid full and part-time jobs

Source: IMPLAN

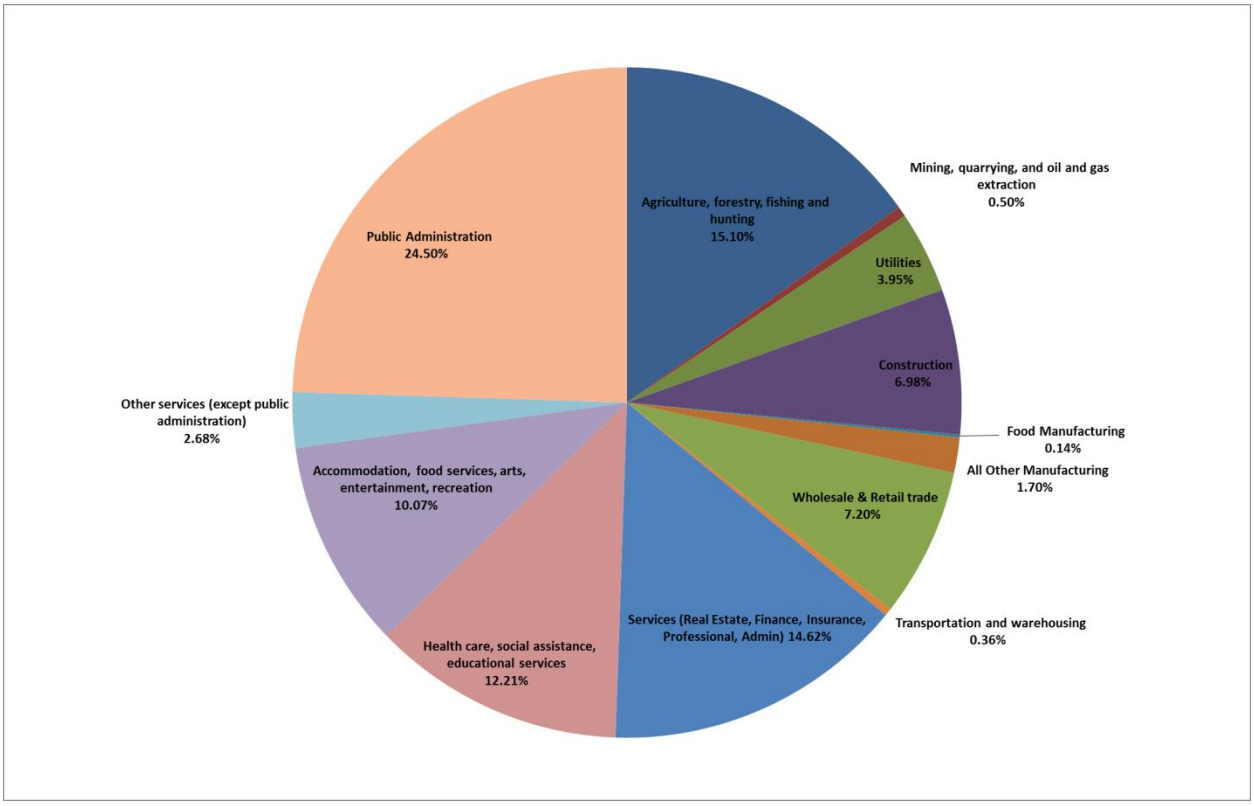



Figure 3. The $78 million Economy of Wayne County, 2011. Source: IMPLAN data.

### *3.1.9 Description and Ecology of Rangelands*

A report was developed under a contract with the 5 & 6 County Association of Governments (AOGs) to describe the nature, extent, potential, current status and management needs of the rangeland resources of these 11 counties (Lamar Smith, 2016). The report describes rangeland resources for the entire 11 County Area in general terms. It does not address individual allotments or ranches. The report can be found as an appendix to this plan. Refer to this report for specifics of the three general objectives listed below.
Three general objectives of the project to be addressed:

1. Describe the kind of rangelands occurring in the area, their location and extent, and some of the ecological processes of each.
2. Describe the history of land use and changes in vegetation, soil and productivity that have occurred in each major range type in the past.
3. Describe the desired future conditions for these rangelands, the measures needed to achieve those conditions, and constraints to success.

### *3.1.10 Major Land Resource Areas and Climate Zones*

Major Land Resource Areas (MLRAs) are areas of similar patterns of climate, soils, topography and land use that have been described and mapped by the Natural Resources Conservation Service. Climatic zones are classifications of soil moisture and temperature regimes that are related to the ability of soils to produce distinctive types and amounts of vegetation. These are related to vegetation productivity, livestock carrying capacity and response to brush control and seeding. Both the MLRAs and climatic zones were described fully in the 5-6 County Description and Ecology of Rangeland Report.

Map 1 (appended) shows the extent of MLRAs and climatic zones in Wayne County. The eastern three quarters of the county lies in MLRA 35 Colorado Plateau. The western end of the county is in MLRA 47 Wasatch and Uinta Mountains. A very small portion is located in MLRA 34 Warm Central Desertic Basins and Plateaus. (For description of these MLRAs see 5-6 County Description and Ecology of Rangelands Report).

There are 6 climatic types based on soil temperature and moisture regimes. These are grouped into 4 climate zones. The Desert Zone (MA) covers a large part of the central and eastern parts of the county. It has a mesic soil temperature regime (46-59$^{o}$F average temperature at 20 inches depth) and an aridic soil moisture regime (usually dry). Average annual precipitation is about 5-9 inches and annual dry matter production is 300-500 pounds per acre, depending on soil depth, precipitation, slope aspect and vegetation type. The main vegetation types are salt desert shrub and blackbrush. Brush control and seeding are not usually recommended in these types due to the low precipitation and low chances of success. Where brush is removed by wildfire, seeding with perennial grasses may be attempted to try to prevent dominance of annual grasses, which can permanently alter the fire regimes and vegetation in these types. These types should be protected from fire.

The Semidesert Zone (MAU) occurs in several portions of the eastern part of the county at higher elevation and slightly higher precipitation. MAU has a soil temperature regime of mesic with a moisture regime that is intermediate between aridic and ustic. This means the soil is usually dry but has longer periods of available moisture than the aridic type. Annual precipitation in this zone is about 8-12 inches and tends to occur mainly in summer. Annual dry matter production is 400-700 pounds per acre. The main vegetation types in this zone are pinyon-juniper and sagebrush. Pinyon-juniper has probably increased in cover at the expense of sagebrush during historic times. Brush control and seeding have a better chance of desirable results here than in the desert zone, however, there is still a significant risk of failure of seedings. Invasive annuals will invade areas where shrub cover is removed by fire or treatments and/or where perennial grass cover is reduced by heavy grazing, shrub invasion, or drought.

The Upland Zone occurs in the western portion of the county, mainly in MLRA 47. It includes 3 climatic types based on soil temperature and moisture regimes, FU, FX, and CU. The FU type has a frigid temperature regime (mean soil temperature at 20 inches = 32-46$^{o}$F) and a ustic moisture regime (dry periods but with good seasonal moisture mainly in summer). This type is extensive in the lower mountains. The FX type has a frigid temperature regime but a xeric moisture regime. Xeric is similar to ustic, but the moisture occurs mostly in winter. This type is found in a small area in the northwestern part of the county. CU has a cryic soil temperature regime (mean soil temperature of 32-46$^{o}$F) and a ustic soil moisture regime. It is found at somewhat higher elevations and has better growing conditions than the FU type. Annual precipitation in the Upland Zone is about 12-16 inches and annual production is about 800-1000 pounds per acre. The main vegetation types in this zone are pinyon-juniper and sagebrush, with Wyoming big sagebrush in the drier portions and mountain big sagebrush at higher elevations. Where pinyon- juniper and sagebrush have reached densities that reduce herbaceous understory, brush control will increase ground cover and forage production for livestock and wildlife. If adequate residual perennial grass is lacking, seeding of perennial grasses will usually be successful in this zone. There is a risk of annual invasion due to wildfire or other disturbances, especially in the lower precipitation parts but the risk is lower than in the Semidesert Zone.

The Mountain/High Mountain Zone (CD) is located in the highest elevation portions of the county on the west side. The soil temperature regime Is cryic and the soil moisture regime Is udic (usually moist). Precipitation in this zone averages over 16 inches and may range up to 30 inches or more depending on elevation, slope exposure and storm patterns. Average annual production per acre is about 1500-3000 pounds per acre depending on soil depth, topographic position, slope aspect, and elevation type. Vegetation types in this zone include mountain big sagebrush, mountain grassland/meadows, aspen, and spruce-fir/mixed conifer types. Areas where mountain big sagebrush is dense can respond to brush removal or thinning. Mountain grasslands and meadows were often degraded by past heavy livestock grazing, and may be invaded by noxious weeds. However, these areas will usually respond to improved grazing management where season long elk grazing is not excessive. If seeding is necessary, it will

usually be successful in this zone due to favorable moisture conditions. Clearing or thinning of forest stands by wildfire or harvesting will produced large amounts of forage for livestock and wildlife, which gradually diminishes over time as the forest recovers.

*3.1.11 Land Cover Types*

The SWReGAP land cover types were used as a basis for describing the range resources and their management in the 5-6 County Area. This mapping is the main one that covers all land ownerships using the same criteria and has been widely used by several of the federal and state agencies. The mapping is based on remote sensing of currently existing vegetation and other land cover types; In other words it does not represent potential vegetation.

GAP cover classes identified in the 11 County area include 72 cover types. For purposes of analysis, discussion and presentation, these were simplified into 18 cover types as shown in Table 4 of the 5-6 County Description and Ecology of Rangelands Report. These 18 types were developed by combining GAP cover types based on similarity of dominant vegetation, i.e. all the cover types described as Pinyon-Juniper were grouped into one Pinyon-Juniper type. The Forest Service, BLM, and Utah State University have also grouped GAP types into fewer major types for discussion and reporting purposes. The various groupings are not exactly the same among these various entities because each used criteria to suit their own purposes. However, the groupings are very similar and are similar to the ones used in this report.

Map 2 (appended) shows the GAP cover types for Wayne County. All 18 of the cover types are mapped, but the colors are combined for types representing similar ecological zones. For example, all the forest types and mountain grasslands are colored dark green. This was done to make the map more readable at a small scale.

The map shows the pattern of land cover ranging from desert shrub in the central and eastern portions of the county to pinyon-juniper and sagebrush on the lower mountain slopes and higher valleys. The forest and mountain sagebrush types are concentrated in the western mountainous portions of the county. Table 1 (appended) shows the estimated acreage of each of the GAP land cover types in each of the major 18 types used for this report.

The largest land cover category for the county is Barren, with 34% of the area. The most extensive vegetation type is blackbrush with 17%. Blackbrush, salt desert shrub, invasive grass, and semidesert shrub types combined make up 28% of the total area. Sagebrush types cover 17% of the county and pinyon- juniper makes up 13%. The rest is composed of various mountain types, agricultural lands, etc. These cover types are based on remote sensing of current vegetation or other land cover and do not reflect the original or potential vegetation of the county. It is likely that substantial changes have occurred due to invasion of pinyon-juniper, wildfires, and other factors.

*3.1.12 Soils and Ecological Sites*

Wayne County is covered by the following soil surveys done either by the NRCS or USFS. These include:
UT 646 – Dixie NF – Boundary only on WSS; map available on FS website.
UT 651 – Fishlake NF – Boundary only on WSS; map on FS website.
UT 629 – Loa-Marysville – Boundary only on WSS
UT 689 – Glen Canyon NRA; Complete data on WSS
UT 631 – Henry Mountains; Complete data on WSS.
UT 685 – Capitol Reef NP; Complete data on WSS
UT 688 – Canyonland NP; Complete data on WSS; covers small part of the county.

Where soil survey data are available on Web Soil Survey (WSS) a map of ecological sites can be obtained and detailed information on each ecological site is available. Map 3 (appended) shows soil survey boundaries for Wayne County. The ecological site maps are generated from the soils maps with each soil mapping unit assigned the corresponding ecological site name. It should be recognized that soil mapping units often contain a pattern of two or more soil series that cannot be mapped separately at map scale used, therefore the map unit is a complex or association of soil series. Therefore, a soil mapping unit may contain one ecological site (when both soil series are associated with the same site), or a mixture of two sites where each soil is associated with a different site. The ecological site map generated by WSS assign the entire mapping unit to the most extensive ecological site. Data available on WSS allow the actual acreages of each ecological site within the mapping unit to be calculated.

Map 4 (appended) shows an ecological site map generated from WSS for the Henry Mountain Soil Survey (UT 631). This is the type of map which can be produced where soil survey information is complete. This map is very complex due to the large number of ecological sites represented for an area this large (34 mapping units). If ecological site information is desired for a smaller area, this can be generated on WSS and will produce a map more interpretable at a larger scale. Another alternative is to group ecological sites by the dominant potential vegetation type to produce fewer mapping units.

Table 2 (appended) shows data furnished by NRCS which includes the names and acreage of all ecological sites within the area covered by NRCS soil surveys in Wayne County. These data were obtained by NRCS by clipping the portions of those surveys included in Wayne County. Presumably, it does not include the portions of soil surveys that lie outside Wayne County. The data in Table 2 cover a total of 705,052 acres, which is only about 39% of the 1,804,246 acres mapped by GAP in the county. This is because the areas covered by the Dixie and Fishlake NF are not include, as well as UT 629 Loa-Marysville where data are incomplete. The ecological site acreages also may not include the large amount of area where land cover was mapped as “barren”. These figures should only be considered as approximations since ecological site descriptions and data bases are continually being revised. The data in Table 2 show that, in the soil survey areas, ecological sites characterized as salt desert shrub make up

60% of the area, blackbrush makes up 16%, pinyon-juniper 15% and sagebrush 2%. Clearly, these data relate only to the areas where complete soil surveys exist in the eastern portion of the county and do not include the areas in the western portion where data are unavailable. According to the NRCS the species names associated with each ecological site description are those that are most consistent identifiers of the site, not necessarily the most abundant species. These acreage figures only refer to the area covered by NRCS soil surveys and do not reflect the average distribution of ecological sites over the entire county.

Ecological sites, or "disturbance response groups" (groups of ecological sites that react similarly to land treatments), are the best and most widely used system for classifying, mapping, planning and assessing rangelands. BLM has used ecological sites as a basis for range inventory and condition assessment. Currently they base range health assessments on "reference conditions" developed for each ecological site, ecological site information over all allotments has not been developed due to lack of complete soil surveys. The BLM and NRCS should be encouraged to complete soil surveys on both public and private land as a high priority. The Forest Service has mapped all or most of the national forest lands, but has not incorporated their information into the online database (WSS) and has not developed ecological site descriptions and interpretations for their lands. The Forest Service should be encouraged to do so.

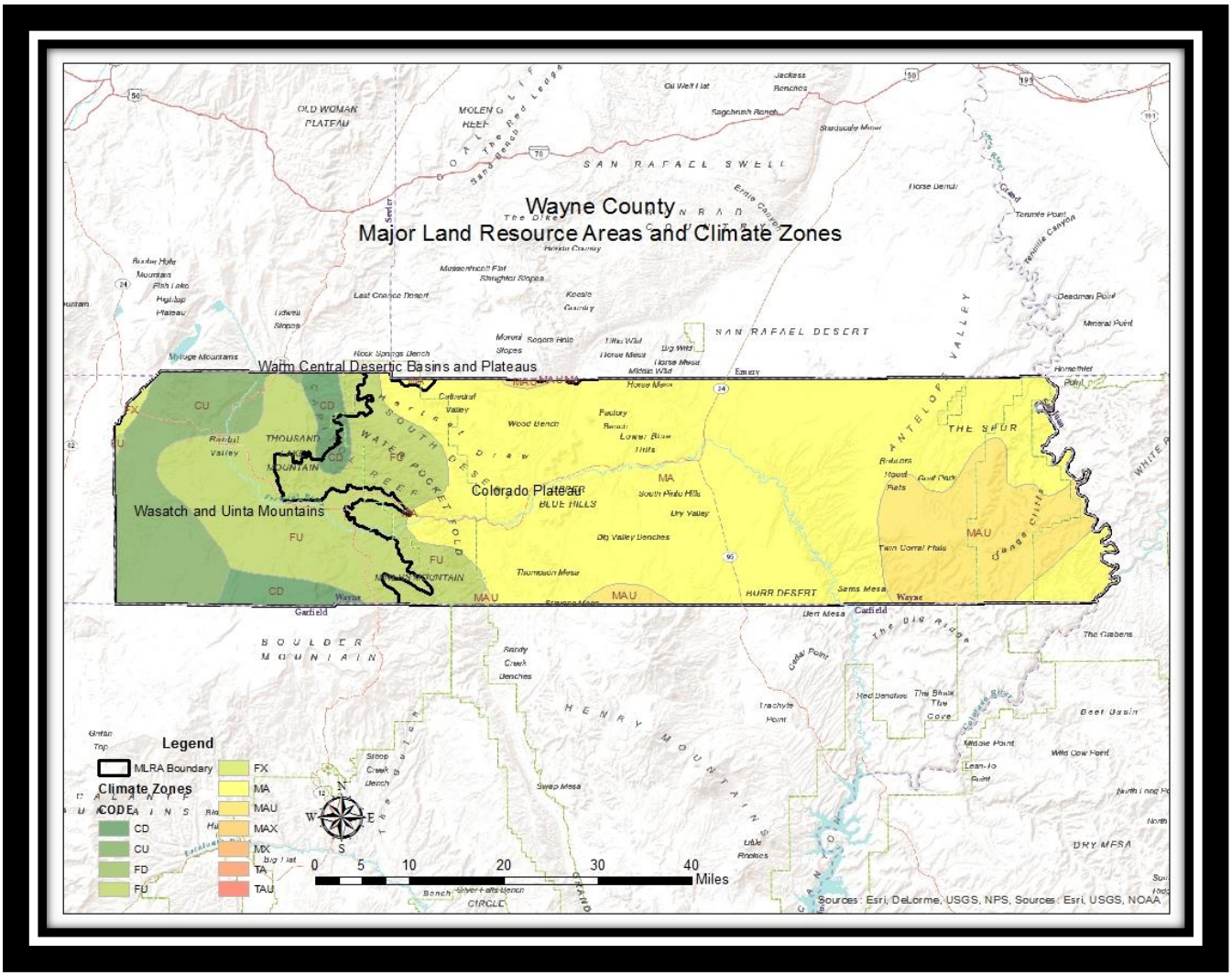
### *3.1.13 Land Treatments*

Map 5 (appended) shows land treatments applied by the BLM in Wayne County. This map is based on shapefiles and tabular data furnished by the BLM office in Cedar City. A map of treatments applied in the Richfield FO and a table listing acreage and type of all treatments is included in the Richfield FO Sections of the 5-6 County Range Management History Resource Condition and Trend Report. Data specific to Wayne County can be obtained from the shapefiles.

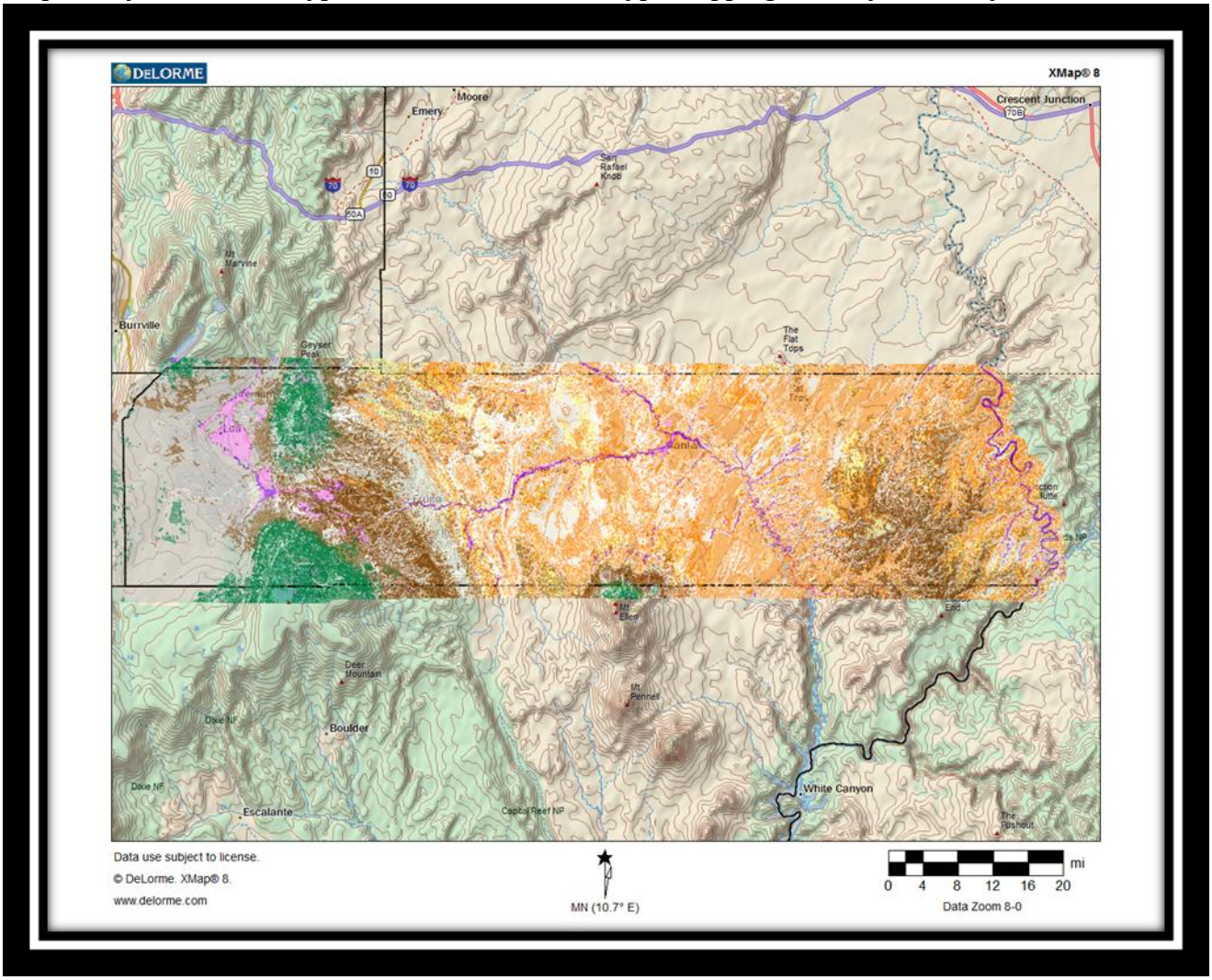
### *3.1.14 Other Rangeland Information*

The Wayne County Resource Assessment by NRCS is a report that present some additional information on rangelands, croplands, and other resources. It can be accessed online. The three reports cited at the beginning of this paper describe rangeland types, condition, management history and management guidelines that apply to Wayne County rangelands in general. More specific data on Wayne County rangelands is not available from the Forest Service, BLM, or NRCS for administrative units larger than the ranch or allotment level. Ranch or allotment level data are not needed for a county plan, and to access these data and summarize them would require an effort beyond the scope of the current project.

Map 1-Major Land Resource Areas and soil temperature/moisture regimes in Wayne County.



Map 2-Major land cover types based on GAP cover type mapping for Wayne County




**Landcover Legend**

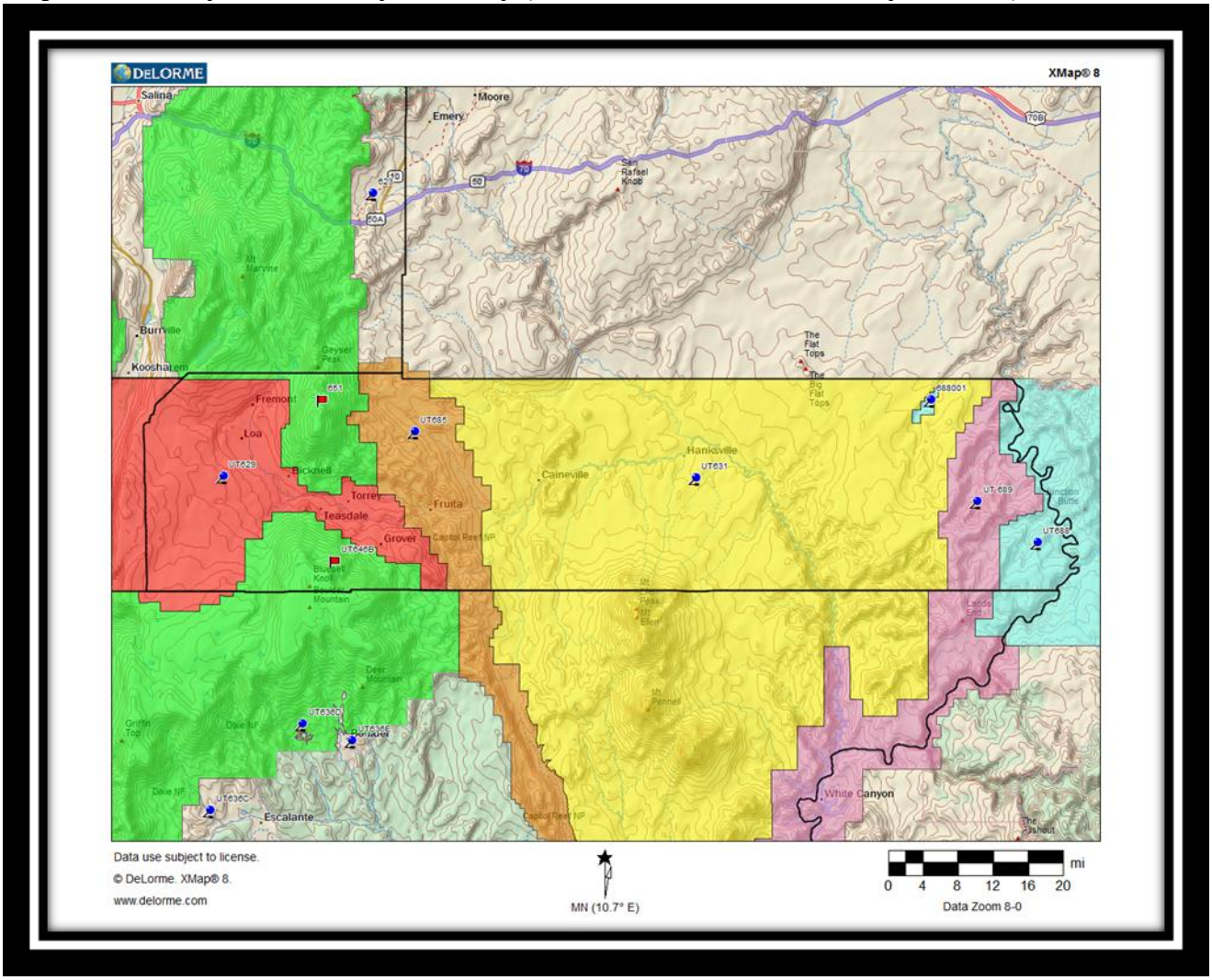
| Color | Type# | Type Name |
|---|---|---|
| Pink | 18 | Other – developed, agricultural, mining, etc. |
| White | 1 | Barren |
| Dark Green | 2 | Alpine/Subalpine |
| | 3 | Mountain Grassland/Mountain Meadow |
| | 5 | Spruce—fir/Mixed Conifer |
| | 6 | Aspen |
| | 7 | Ponderosa Pine |
| Light Green | 8 | Oak/Mountain Shrub |
| Brown | 10 | Pinyon-Juniper |
| Grey | 9 | Mt. Big Sagebrush |
| | 11 | Sagebrush |
| Yellow | 12 | Semidesert Grass/Shrub |
| | 13 | Invasive Grass/Forbs |
| Orange | 14 | Greasewood |
| | 15 | Salt Desert Shrub |
| | 16 | Blackbrush/Mormon Tea |
| Red | 17 | Mojave Shrubland |
| Blue | 4 | Riparian |
| Transparent | | Null |

Table 1-Acres of GAP land cover types grouped by major vegetation type for Wayne County.

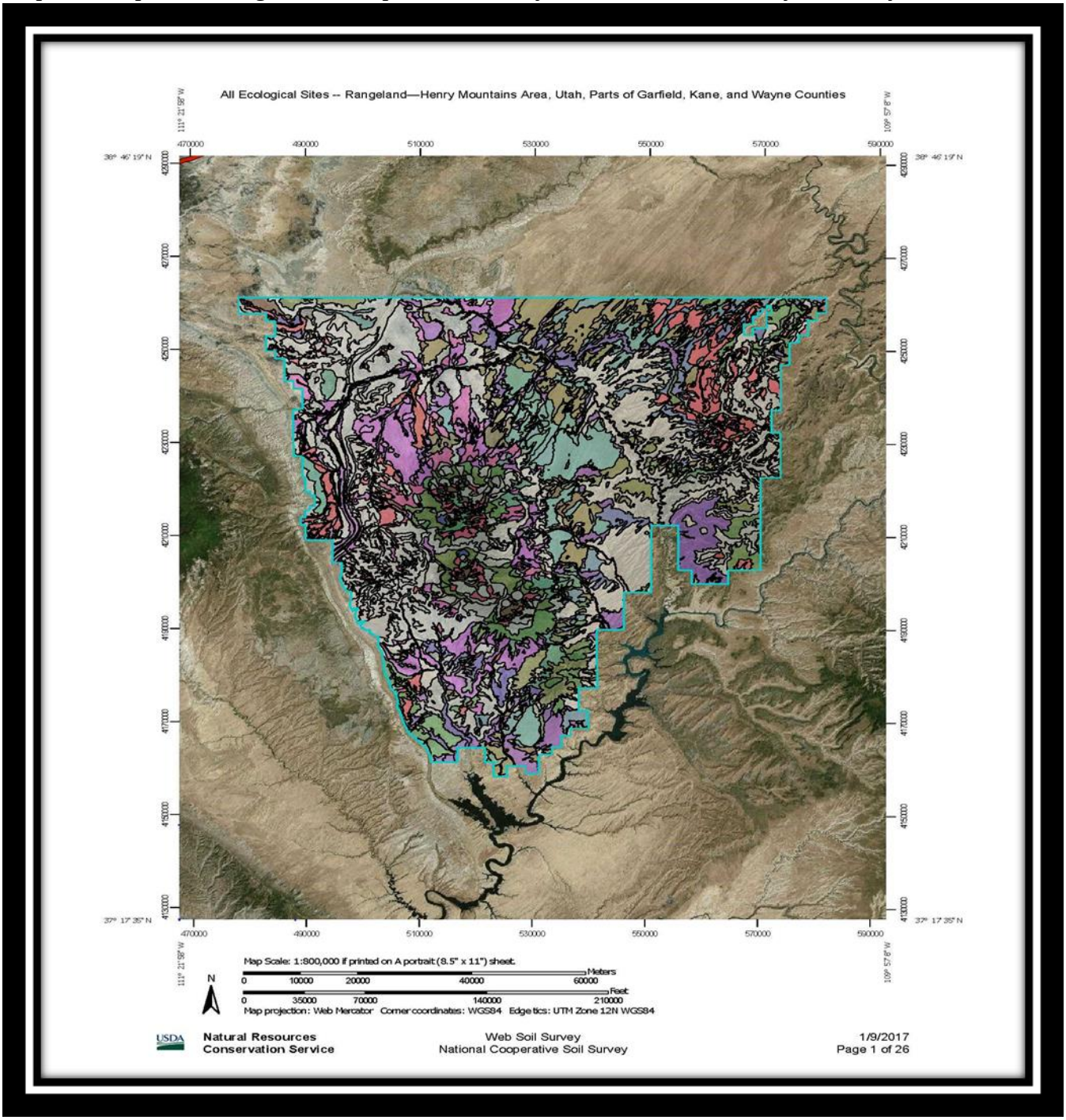
| TYPE # | LAND COVER TYPE | GAP CODE | GAP LAND COVER DESCRIPTION | ACRES |
|---|---|---|---|---|
| 1 | Barren | | | |
| | | S002 | Rocky Mountain Alpine Bedrock and Scree | 268 |
| | | S006 | Rocky Mountain Cliff and Canyon | 15,750 |
| | | S010 | Colorado Plateau Mixed Bedrock Canyon and Tableland | 378,259 |
| | | S011 | Inter-Mountain Basins Shale Badland | 135,465 |
| | | S012 | Inter-Mountain Basins Active and Stabilized Dune | 73,366 |
| | | S013 | Inter-Mountain Basins Volcanic Rock and Cinder Land | 4,713 |
| 2 | Alpine/Subalpine | | | |
| | | S081 | Rocky Mountain Dry Tundra | 11,114 |
| | | | | |
| 3 | Mountain Grassland/Meadow | | | |
| | | S083 | Rocky Mountain Subalpine Mesic Meadow | 2,109 |
| | | S085 | Southern Rocky Mountain Montane-Subalpine Grassland | 1,997 |
| | | S102 | Rocky Mountain Alpine-Montane Wet Meadow | 735 |
| | | | | |
| 4 | Riparian | | | |
| | | S091 | Rocky Mountain Subalpine-Montane Riparian Shrubland | 55 |
| | | S093 | Rocky Mountain Lower Montane Riparian Woodland and Shrubland | 6,322 |
| | | S097 | North American Warm Desert Riparian Woodland and Shrubland | 22 |
| | | D04 | Invasive Southwest Riparian Woodland and Shrubland | 11,766 |
| | | | | |
| 5 | spruce-fir/Mixed Conifer | | | |
| | | S028 | Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland | 35,202 |
| | | S030 | Rocky Mountain Subalpine Mesic Spruce-Fir Forest and Woodland | 7,922 |
| | | S032 | Rocky Mountain Montane Dry-Mesic Mixed Conifer Forest and Woodland | 2,142 |
| | | S034 | Rocky Mountain Montane Mesic Mixed Conifer Forest and Woodland | 2,594 |
| | | D10 | Recently Logged Areas | 1,176 |
| | | | | |
| 6 | Aspen | | | |
| | | S023 | Rocky Mountain Aspen Forest and Woodland | 10,185 |
| | | S042 | Inter-Mountain West Aspen-Mixed Conifer Forest and Woodland Complex | 7,951 |
| | | | | |
| 7 | Ponderosa Pine | | | |
| | | S036 | Rocky Mountain Ponderosa Pine Woodland | 6,766 |
| 8 | Oak/Mountain Brush | | | |
| | | S046 | Rocky Mountain Gambel Oak-Mixed Montane Shrubland | 982 |
| | | S050 | Inter-Mountain Basins Mountain Mahogany Woodland and Shrubland | 108 |
| | | | | |
| 9 | Mountain Big Sagebrush | | | |
| | | S071 | Inter-Mountain Basins Montane Sagebrush Steppe | 244,896 |
| | | | | |

| | | | | |
|---|---|---|---|---|
| 10 | Pinyon-Juniper | | | |
| | | S039 | Colorado Plateau Pinyon-Juniper Woodland | 120,418 |
| | | S040 | Great Basin Pinyon-Juniper Woodland | 81 |
| | | S052 | Colorado Plateau Pinyon-Juniper Shrubland | 106,299 |
| | | D11 | Recently Chained Pinyon-Juniper Areas | 1,707 |
| | | | | |
| 11 | Sagebrush | | | |
| | | S054 | Inter-Mountain Basins Big Sagebrush Shrubland | 62,143 |
| | | S056 | Colorado Plateau Mixed Low Sagebrush Shrubland | 145 |
| | | | | |
| 12 | Semidesert Grass/Shrub | | | |
| | | S079 | Inter-Mountain Basins Semi-Desert Shrub Steppe | 38,196 |
| | | S090 | Inter-Mountain Basins Semi-Desert Grassland | 17,257 |
| 13 | Invasive Grass/Forb | | | |
| | | D08 | Invasive Annual Grassland | 142 |
| | | D09 | Invasive Annual and Biennial Forbland | 10,372 |
| | | | | |
| 14 | Greasewood | | | |
| | | S096 | Inter-Mountain Basins Greasewood Flat | 8,274 |
| 15 | Salt Desert Shrub | | | |
| | | S045 | Inter-Mountain Basins Mat Saltbush Shrubland | 71,633 |
| | | S065 | Inter-Mountain Basins Mixed Salt Desert Scrub | 63,371 |
| | | | | |
| 16 | Blackbrush/Mormon Tea | | | |
| | | S059 | Colorado Plateau Blackbrush-Mormon-tea Shrubland | 289,109 |
| | | S136 | Southern Colorado Plateau Sand Shrubland | 24,205 |
| 17 | Mojave Shrubs | | | - |
| | | | | |
| 18 | Other | | | |
| | | N11 | Open Water | 3,940 |
| | | N21 | Developed, Open Space - Low Intensity | 2,684 |
| | | N22 | Developed, Medium - High Intensity | 384 |
| | | N80 | Agriculture | 21,494 |
| | | D02 | Recently Burned | 514 |
| | | D14 | Disturbed, Oil well | 10 |
| | | | | |
| | Total | | | **1,804,246** |

Map 3-Soil survey areas for Wayne County (Numbers are NRCS soil survey numbers).



Map 4-Example of ecological site map for soil survey number UT 631 in Wayne County.



All Ecological Sites -- Rangeland—Henry Mountains Area, Utah, Parts of Garfield, Kane, and Wayne Counties

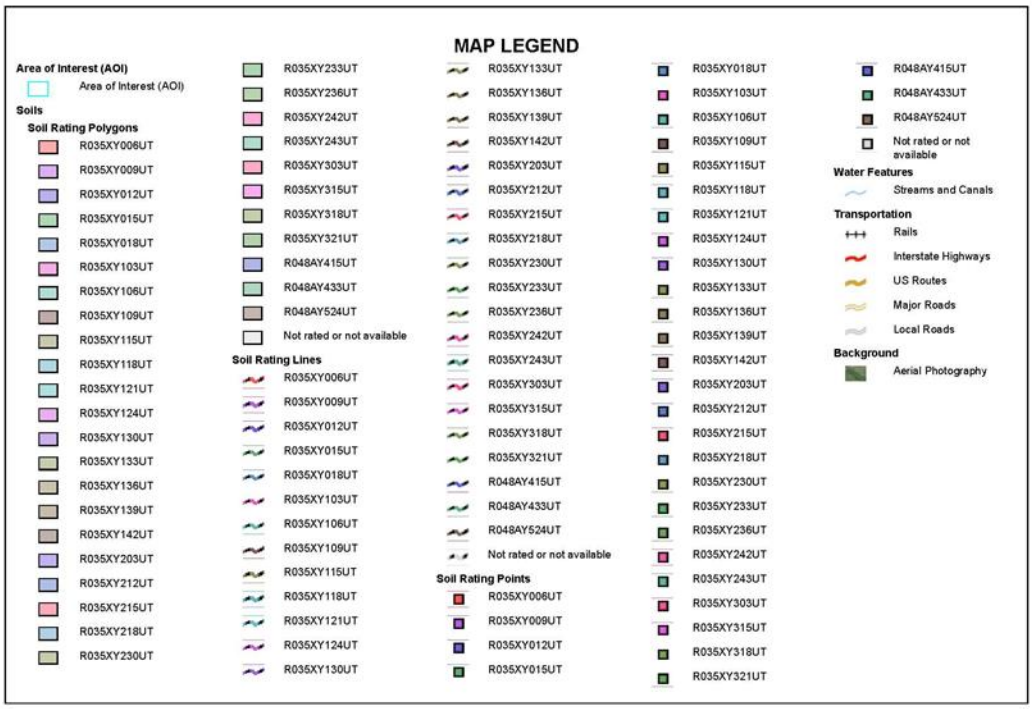
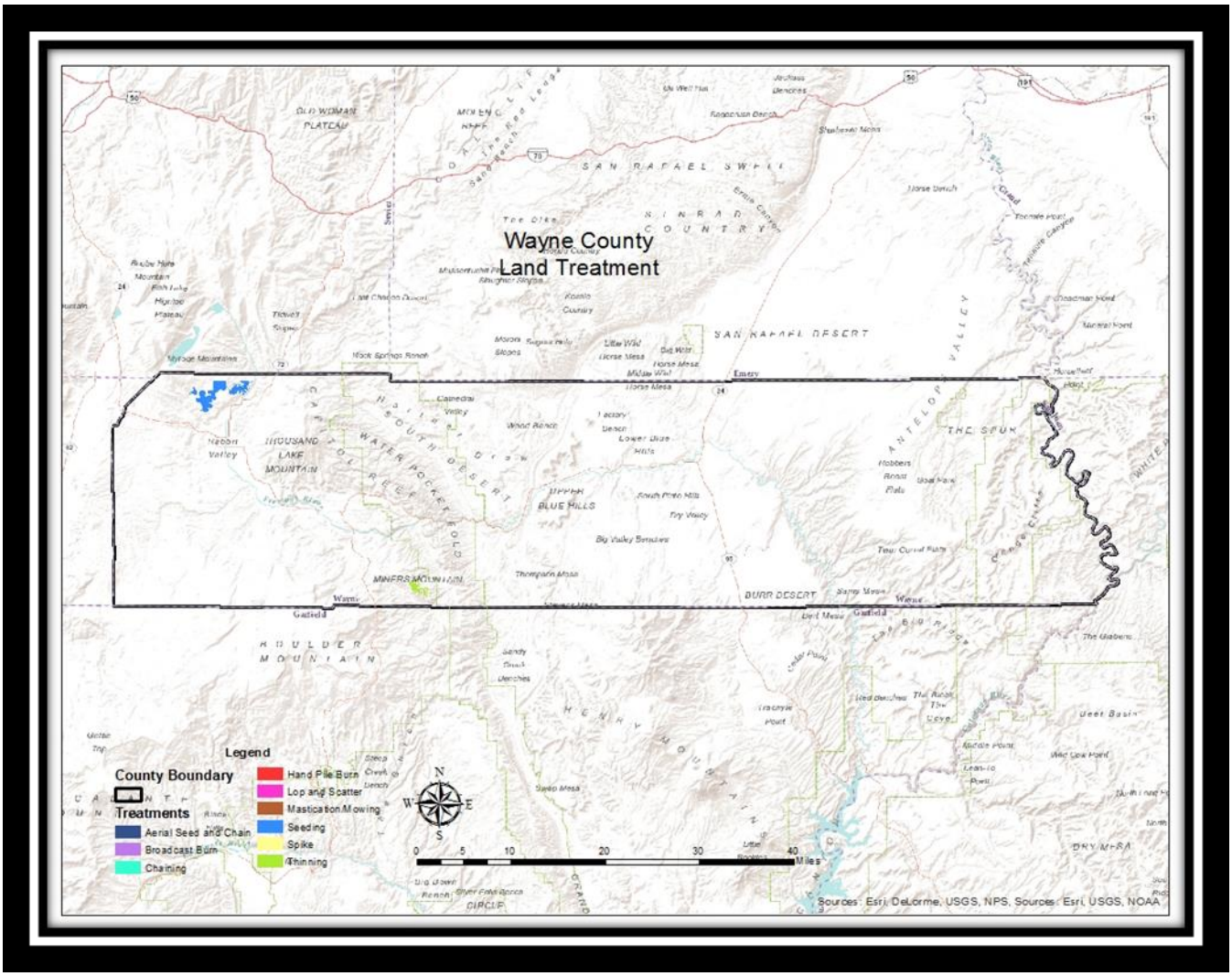


Table 2-Acres of ecological sites by climate zone and vegetation type in areas covered by soil surveys containing ecological site interpretations for Wayne County (Data furnished by NRCS).

| CLIMATIC ZONE | VEGETATION TYPE | SITE # | ECOLOGICAL SITE NAME | ACRES |
|---|---|---|---|---|
| **Interzonal (can occur in several zones)** | | | | |
| | | R035XY003UT | Alkali Bottom (Greasewood) | 1,207 |
| | | R035XY006UT | Alkali Fan (Valley Saltbush) | 9,263 |
| | | R035XY009UT | Alkali Flat (Greasewood) | 19,418 |
| | | R035XY011UT | Loamy Bottom (Basin Big Sagebrush) | 34 |
| | | R035XY012UT | Semiwet Saline Streambank (Fremont Cottonwood) | 2,935 |
| | | R035XY013UT | Semiwet Fresh Streambank (Fremont Cottonwood) | 1,239 |
| | | R035XY015UT | Sandy Bottom | 2,083 |
| | | R035XY018UT | Talus Slope (Blackbrush-Shadscale) | 529 |
| | | R035XY019UT | Shallow Sand Rock Pocket (Utah Juniper/Two-Needle Pinyon) | 9,523 |
| | | R035XY020UT | Colorado Plateau Riparian Complex Perennial (Valley Type IV - B4C Stream Type) | 53 |
| | | R035XY021UT | Colorado Plateau Riparian Complex Perennial (Valley Type VIII - B4C Stream Type) | 77 |
| | | R035XY022UT | Colorado Plateau Riparian Complex Perennial (Valley Type IV - C5/F5 Stream Types) | 855 |
| | | R035XY032UT | Ephemeral Canyon Scrub | 135 |
| | | R028AY006UT | Loamy Bottom (Great Basin Wildrye) | 26 |
| | | R047XB004UT | Semiwet Fresh Meadow | 39 |
| | | R047XB008UT | Wet Fresh Meadow | 6 |
| | | R047XB016UT | Interzonal Loamy Bottom (Basin Wildrye) | 18 |
| | | | | |
| **Desert** | | | | |
| | **Salt Desert Shrub** | | | |
| | | R035XY101UT | Desert Alkali Sandy Loam (Alkali Sacaton) | 5,330 |
| | | R035XY103UT | Desert Clay (Castle Valley Saltbush) | 20,372 |
| | | R035XY106UT | Desert Gypsum Loam (Torrey's Jointfir) | 18,046 |
| | | R035XY109UT | Desert Loam (Shadscale) | 838 |
| | | R035XY115UT | Desert Sand (Sand Sagebrush) | 64,766 |
| | | R035XY118UT | Desert Sandy Loam (Fourwing Saltbush) | 17,684 |
| | | R035XY122UT | Desert Shallow Loam (Shadscale) | 1,172 |
| | | R035XY124UT | Desert Shallow Clay (Mat Saltbush) | 60,791 |
| | | R035XY125UT | Desert Shallow Clay (Shadscale) | 2,468 |
| | | R035XY130UT | Desert Shallow Sandy Loam (Shadscale) | 52,900 |
| | | R035XY136UT | Desert Stony Loam (Shadscale-Bud Sagebrush) | 7,830 |
| | | R035XY142UT | Desert Very Shallow Gypsum (Torrey's Jointfir) | 23,770 |
| | | R035XY145UT | Desert Very Shallow Sandy Loam | 2,380 |
| | | R035XY146UT | Desert Very Steep Stony Loam (Shadscale) | 16,576 |
| | **Blackbrush** | | | |
| | | R035XY121UT | Desert Sandy Loam (Blackbrush) | 49,238 |
| | | R035XY133UT | Desert Shallow Sandy Loam (Blackbrush) | 10,665 |
| | | R035XY139UT | Desert Stony Loam (Blackbrush) | 2,895 |

| | | | | |
|---|---|---|---|---|
| **Semidesert** | | | | |
| | **Salt Desert Shrub** | | | |
| | | R035XY212UT | Semidesert Sand (Fourwing Saltbush) | 33,001 |
| | | R035XY215UT | Semidesert Sandy Loam (4-Wing Saltbush) | 66,042 |
| | | R035XY230UT | Semidesert Shallow Sandy Loam (Shadscale) | 21,375 |
| | | R035XY242UT | Semidesert Gravelly Loam (Shadscale) | 9,464 |
| | | R035XY260UT | Semidesert Very Steep Stony Loam (Salina Wildrye) | 33 |
| | **Blackbrush/Mormon Tea** | | | |
| | | R035XY210UT | Semidesert Sand (Blackbrush) | 1,312 |
| | | R035XY218UT | Semidesert Sandy Loam (Blackbrush) | 22,159 |
| | | R035XY233UT | Semidesert Shallow Sandy Loam (Blackbrush) | 15,781 |
| | | R035XY237UT | Semidesert Shallow Gypsum (Mormontea) | 4,945 |
| | | R035XY243UT | Semidesert Stony Loam (Blackbrush) | 2,106 |
| | | R035XY248UT | Semidesert Very Shallow Sandy Loam (Blackbrush) | 493 |
| | | R035XB255AZ | Sandstone Rockland 6-10" p.z. (Blackbrush) | 724 |
| | **Sagebrush** | | | |
| | | R028AB221UT | Semidesert Loam (Basin Big Sagebrush) | 2,306 |
| | | R047XB220UT | Semidesert Loam (Basin Big Sagebrush) | 892 |
| | | R035XY216UT | Semidesert Sandy Loam (Wyoming Big Sagebrush) | 860 |
| | | R028AF214UT | Semidesert Gravelly Loam (Wyoming Big Sagebrush) South | 3,727 |
| | | R028AY226UT | Semidesert Sandy Loam (Wyoming Big Sagebrush) | 922 |
| | | R047XB214UT | Semidesert Gravelly Loam (Wyoming Big Sagebrush) | 852 |
| | | R047XB222UT | Semidesert Loam (Wyoming Big Sagebrush) | 1,230 |
| | | R028AY252UT | Semidesert Stony Loam (Black Sagebrush) | 338 |
| | **Pinyon-Juniper** | | | |
| | | R035XY206UT | Semidesert Gravelly Loam (Utah Juniper-Pinyon) | 2,111 |
| | | R035XY221UT | Semidesert Shallow Loam (Utah Juniper-Pinyon) | 18,726 |
| | | R035XY227UT | Semidesert Shallow Sand (Utah Juniper-Pinyon) | 32,117 |
| | | R035XY234UT | Semidesert Shallow Shale (Utah Juniper-Pinyon) | 3,377 |
| | | R035XY235UT | Semidesert Very Shallow Gravelly Loam (Utah Juniper) | 830 |
| | | R035XY236UT | Semidesert Shallow Sandy Loam (Utah Juniper, Blackbrush) | 18,891 |
| | | R035XY239UT | Semidesert Shallow Clay (Shadscale-Utah Juniper) | 3,327 |
| | | R035XY240UT | Semidesert Steep Shallow Loam (Utah Juniper-Two-Needle Pinyon) | 3,580 |
| | | R035XY246UT | Semidesert Stony Loam (Utah Juniper-Pinyon) | 1,259 |
| | | R035XY263UT | Semidesert Very Steep Stony Loam (Two-Needle Pinyon, Utah Juniper) | 8,961 |
| **Upland** | | | | |
| | **Sagebrush** | | | |
| | | R035XY308UT | Upland Loam (Mountain Big Sagebrush) | 1,272 |
| | | R035XY318UT | Upland Stony Loam (Wyoming Big Sagebrush, Indian Ricegrass) | 907 |
| | **Pinyon-Juniper** | | | |
| | | R035XY303UT | Upland Gravelly Loam (Pinyon-Juniper) | 708 |
| | | R035XY307UT | Upland Sand (Mountain Big Sagebrush) | 555 |
| | | R035XY315UT | Upland Shallow Loam (Pinyon-Utah Juniper) | 5,226 |
| | | R035XY321UT | Upland Stony Loam (Pinyon-Utah Juniper) | 3,956 |
| | | R035XY324UT | Upland Sand (Utah Juniper-Pinyon) | 2,039 |
| | | R035XY325UT | Upland Very Steep Shallow Loam (Pinyon-Utah Juniper) | 3,387 |
| **Mountain** | | | | |
| | **Miscellaneous** | | | |
| | | R048AY415UT | Mountain Loam (Oak) | 55 |
| | | R048AY433UT | Mountain Shallow Loam (Black Sagebrush) | 45 |
| **Total** | | | | **705,052** |

Map 5-Land treatments applied by BLM in Wayne County.



### *3.1.15 Desired Future Rangeland Conditions and Range Management Guidelines*

Resource management plans should state objectives to be achieved and policies to be used to achieve those objectives. The objectives may cover a broad range including economic, social, legal, public safety, and environmental concerns. For rangeland management, these objectives are stated in terms of characteristics of soil, water, vegetation and animals which will realize the objectives for the area being planned. In the final analysis, the management objectives for soil, water, air and animals are largely determined by the kind, amount and patterns of vegetation present in the area. The kind and amount of vegetation are determined by the site (soil, topography, climate), present and past management (grazing, fire, etc), and weather.

Desired conditions can be specified at several different levels, including individual ranches or grazing allotments, land ownership categories, broad vegetation types, or other areas. The desired conditions, or mixture of desired conditions, will differ for each. For example, the management objectives for a national park may differ from that of a private ranch. Therefore, describing desired conditions for an entire county must, of necessity, be stated in general terms that are relevant to the management objectives for the county. They establish a framework for developing more specific objectives on smaller management units. The following statements describe the general objectives of the county governments and the general desired future conditions to achieve those objectives.

### *3.1.16 General Desired Future Conditions for Rangelands*

(Note: These desired conditions are only those related to the use and management of rangelands, not other resources or issues such as forestry, mining, public safety, etc).

The fundamental premise used here is: Desired future conditions are those which will result in a sustainable ecological system while providing products, values and services for the benefit of present and future inhabitants of the county. Although understanding historical changes in vegetation and other resources is useful, restoration of "natural" or "original" conditions is neither a realistic or desirable goal.

1. Range/Watershed Condition - Upland rangelands has vegetation cover and composition which will insure sustained productivity considering site potential and historical impacts. Range and watershed condition or "health" is determined based on best available science and experience without reference to intended uses. Assessment of range/watershed condition is based on establishing the kind and amount of vegetation that will furnish soil protection and useful vegetation production considering the potential of the site, not necessarily restoring "natural" conditions.
2. Water quality – Water quality meets State standards which reflect appropriate uses and local potential to meet standards.
3. Wildlife – A thriving wildlife population will be present representing management aimed at a range of species rather than focus on only one or a few.

4. Noxious Weeds – Noxious and invasive weed infestations are detected early and controlled by chemical, mechanical, or biological means.
5. Wild Horses and Burros – Wild horses and burros are restricted to the designated herd management areas and the numbers prescribed for each. Excess numbers are controlled by effective and cost effective means, including sale of marketable animals and humane disposal of unmarketable animals. Permitted livestock is not affected by increase of horse numbers above planned numbers.
6. Endangered Species – Livestock grazing, and other land uses, is not reduced or unnecessarily impacted due to the presence or potential presence of endangered species without solid scientific data showing that such action will in fact have positive effects on the survival of the endangered species. Private landowners impacted by endangered species will be compensated for any loss of productivity and/or property value.
7. Livestock – Livestock grazing will continue to be an important use of rangelands on both public and private lands and given full consideration under multiple use management.
8. Range Management Planning – Management plans for rangelands are based on close coordination among landowners (federal, state and private) and other interests (state and county agencies, other range users). Changes in management plans are supported by monitoring of soil, vegetation and other relevant resources done by qualified personnel using scientifically accepted methods.
9. Desert Shrub – Desert shrub types (greasewood, blackbrush, salt desert shrub, etc) are managed to maintain a dominance of shrubs with a good understory of perennial grasses and forbs (depending on site potential). Invasive annuals are absent or of minor extent. These objectives generally refer to black sagebrush and low sagebrush vegetation also.
10. Big Sagebrush – Big sagebrush (Basin, Wyoming and Mountain Big Sagebrush) are managed to maintain a good understory of perennial grasses and forbs with an overstory of big sagebrush and browse shrubs (on appropriate sites). Invasive annuals are absent or of minor importance. Prescribed grazing and periodic brush treatments are used to prevent loss of the perennial understory and complete dominance of mature sagebrush. Landscapes exhibit a diverse mix of sagebrush communities ranging from almost all perennial grass and forbs to moderately dense stands of sagebrush, depending on treatments applied and the time since treatment. Sites having the potential to support productive sagebrush/grass communities have pinyon- juniper completely removed or reduced to a minor component depending on site specific management objectives.
11. Pinyon-juniper – Pinyon and juniper is eliminated or reduced on any site that has the potential to support grassland, sagebrush grassland, or other vegetation types more useful in terms of watershed condition and resource outputs, unless it has been determined, on a site specific basis, that PJ does not jeopardize watershed condition and adds to the combined resource outputs and values on the site. On sites where pinyon-juniper occurs that do not have potential for good perennial grass and shrub cover, or where technology is lacking to establish such cover by reasonable efforts, pinyon-juniper stands are maintained in an open canopy state when possible to prevent catastrophic wildfire and stand replacement with invasive annuals. (see also report of Wildland Ecosystems Specialists Team LLC (WEST))

12. Aspen - Aspen stands have a good understory of forage plants for livestock and wildlife; encroachment of coniferous trees is controlled (see also James Long - Forestry Consultant's recommendations).
13. Ponderosa Pine – Ponderosa pine stands are maintained in an open condition which will support a good understory of perennial grasses and browse plants and periodic low intensity fire. Encroachment of shrubs or excessive density of pine reproduction that can support stand replacing crown fires is prevented. (see also report of James Long, Forestry Consultant).
14. Mixed Conifer – Mixed conifer stands are prevented from invading other forest types or mountain grasslands. (see also report of James Long, Forestry Consultant)
15. Riparian – Riparian areas are managed to prevent excessive erosion and deposition of sediment and impaired water quality that results, with recognition that these processes may have begun in the past due to natural and/or man caused factors and may continue far into the future regardless of the management applied. The desired vegetation varies from one riparian situation to another depending on temperature regime and on the amount, timing and reliability of stream flow, and the desired uses of the vegetation for wildlife, livestock, or recreational purposes.

*3.1.17 Management Guidelines*

The following sections summarize recommended management practices and approaches to be utilized to achieve desired rangeland conditions. The purpose of these sections is twofold:

1. The information, or portions of it, can be incorporated into county plans for range management.
2. The information can be used by the counties in their negotiations with federal and state agencies, landowners, and interest groups to coordinate county plans with others.

*3.1.18 Coordinated Resource Management Section*

<u>Every ranch with federal or state grazing leases or permits should have a coordinated resource management plan.</u>

Most ranches in Utah are based on federal and/or state leases and permits as well as private land. Each land managing agency has different regulations, terminology, and procedures, as well as different policies and goals. Each agency tends to consider only its own issues and problems in developing allotment management plans and guidelines. This situation may work for the agency but it can lead to real problems for the rancher who has to deal with several agencies. In addition to the land management agencies, there are other agencies or groups which have authority or legitimate concerns over some aspects of both government and private lands. Examples, are the U.S. Fish and Wildlife Service, Utah Division of Water Quality, Utah Division of Wildlife Resources, Conservation Districts, and county governments.

Unless all aspects of the ranching operation are considered in a plan, there will inevitably be problems that arise on one land ownership or resource interest because of decisions or restrictions made in isolation on only a portion of the operation or only one concern. Therefore, it is in the rancher's best interest to take the lead in developing a coordinated plan that considers all lands and issues and is agreed to by all legitimate interests. Conservation Districts or counties can often play a useful role in this process since they are unique in being government agencies with authority to work on all land ownerships and all kinds of resources.

Some ranchers are reluctant to become involved with coordinated planning because they do not wish to make public their personal business, or they do not want to have to deal with endless meetings and discussion with all sorts of interest groups, including those who are anti-grazing. However, there is no requirement that any personal or financial information be disclosed by entering into a coordinated planning exercise. Although cost sharing programs administered by the Natural Resource Conservation Service do require some financial disclosure, the NRCS has been careful about disclosing this information to the public. All of the information about the ranch in the state and federal agency files (acreage, stocking, range condition, etc) is already a matter of public record and obtainable by anyone.

There is no necessary requirement that anyone outside of landowners be involved. The smaller the group the better in most cases. It may be good to include wildlife agencies especially where hunting and endangered species are a major issue. If there are other issues that are likely to be contentious because of real or imagined problems, it may be prudent to involve some of these interests in the planning and try to get their cooperation rather than have to deal with them in appeals or litigation later on.

*3.1.19 Adaptive Management Section*

Adaptive management should be the guiding principle for managing livestock grazing, and other uses, on government rangelands.

Forest Service and BLM policy is to employ an adaptive management approach. In essence, this approach involves defining objectives, planning and implementing management designed to reach objectives, monitoring to see if progress is being made, and adjusting plans as required if not. This is the proper basis for public land management. However, the Forest Service and BLM too often subvert this approach by setting rigid guidelines or restrictions both in general land management plans and specific allotment management plans. Rigidly enforced guidelines on forage utilization, grazing dates, acceptable land treatments, and other practices restrict flexibility and case-by-case decision making which are fundamental to the concept of adaptive management. Management plans should concentrate on the desired results of the plan and provide for flexibility, innovation, and site-specific monitoring to achieve those objectives. County plans also should avoid setting rigid parameters or standards that restrict the application of adaptive management.

*3.1.20 Rangeland Classification and Mapping Section*

Completion and/or upgrading soil surveys in the 5-6 County Area and adoption of a uniform ecological site system for classifying and mapping should be a priority.

Classifying rangelands according to their productive potential is the most useful basis for mapping and management planning. Ecological sites are the most widely accepted basis for this and should be used as the basis for interpreting monitoring data and assessing range condition or rangeland health.

Soil surveys are very useful as a basis for identifying and mapping ecological sites, predicting erosion hazard, identifying adapted species for seedings, and many other aspects of resource management and planning. High priority should be placed on completion of soil surveys where lacking and for bringing soil surveys on national forest lands into compliance with the national soil survey so that data are comparable and readily available.
Existing mapping based on current vegetation types and "land cover" provide useful information but without being tied to soils and ecological site do not provide a satisfactory basis for range management planning (predictions) and assessment (interpretation).

Classification and mapping of soils, ecological sites and vegetation types were discussed in the report by CRC called "5-6 County Description and Ecology of Rangelands" and will not be repeated here. As has been pointed out in that document and elsewhere, lack of a consistent approach to rangeland classification and mapping makes it difficult to assess rangeland potential, management goals, and management practices across land ownerships on a county-wide basis. Existing soil surveys have concentrated on areas with private lands, especially agricultural areas. Large areas of BLM and state lands are not covered by published soil surveys. Ecological site descriptions for these areas are available but often not well developed. BLM has conducted range condition and rangeland health assessments based on identification of ecological sites, but maps of ecological sites are not generally available, except for some in allotment files. The Forest Service has not used ecological sites as a basis for inventory and assessment of rangelands in this area. Also, although soil surveys have been done on all or most of the national forest lands, the information does not adhere to standards of the national cooperative soil survey and the data are not readily available to the public.

The federal agencies are aware of the need for a uniform system and this need has been emphasized by the Society for Range Management and others for a number of years. An interagency handbook on ecological site classification (Caudle, et al 2013) states the following: *"This handbook provides a standardized method to be utilized by the BLM, FS, and NRCS to define, delineate, and describe terrestrial ecological sites on rangelands…The BLM, FS, and NRCS have a common objective of utilizing science-based technical processes to sustain and enhance natural resources and the environment. They have used different methods to stratify landscapes into units for planning, analysis, and decision making. Their jurisdictions are intermingled throughout much of the United States, including both private and public lands;*

*therefore, a standardized method to define, delineate, and describe terrestrial ecological sites is more efficient than each agency having their own method."*

*3.1.21 Rangeland Monitoring Section*

*Note: There are good monitoring manuals available; some of them are listed in the bibliography of the report. Much of the discussion presented here is based on Smith et al (2012) which describes in detail the principles involved in deciding the why, what, where, when, and who of monitoring.*

Rangeland monitoring is done at three general levels: 1. National or regional, 2. Administrative unit, or 3. Project or management unit. Each has different purposes.

The Forest Service (FIA) and NRCS (NRI) both collect data on vegetation and soils on statistical samples based on remote sensing and field sampling. These data provide information about conditions and trends broken down by vegetation types, land ownership and other categories for national or regional assessments. They are intended for broad level planning, budgeting, and policy changes primarily. BLM is developing a similar process called Assessment, Inventory and Monitoring (AIM). Data collected in these efforts has some application down to the level of a National Forest or BLM field office or county, but they do not generally serve to monitor conditions and trends at the project or grazing allotment level because there may be only a few plots (or none) within the allotment and they are not located in key areas.

Most of the range monitoring data (and much of the data on wildlife habitat or riparian conditions) is collected at "key areas" or "designated monitoring areas" chosen to represent the effects of a particular land use or management practice. For example, grazing effects are monitored on important ecological sites where grazing use is considered "typical" for a pasture or allotment. The locations are generally chosen using professional judgment and do not represent random points. Thus, the information cannot be extrapolated or aggregated to broader areas because the sample sites do not represent an objective sample of the whole area. Unfortunately, neither of the above types of monitoring is completely satisfactory for providing the kind of data needed for administrative unit purposes, e.g. planning at the forest or field office level, or at the county level. BLM expects its AIM program to serve this purpose on BLM lands. The data collected by FIA, NRI, and AIM are not the same, which makes comparison across land ownerships difficult in developing county or watershed scale planning. The agencies have made some progress in resolving some of these differences.

Monitoring trend in "range condition", especially at the project or allotment level, is the fundamental basis for adaptive management.

Resource management is not an exact science. Planning is based on the best available information obtained from inventories, monitoring, and scientific knowledge. Practices are

designed to achieve management objectives. But to determine whether the expected results are occurring requires monitoring of progress, or lack of it, toward objectives and establishing the causes for any failure to meet objectives. Therefore, monitoring should be designed to measure the characteristics of vegetation, soil and other resources that will provide the information to make changes in management if necessary.

There are three kinds of information that can be gained from monitoring at the project or allotment level based on the intended use: day to day decision making, administration, and resource condition.

Day to day decisions

This type of monitoring includes keeping track of actual use (numbers and class of stock), checking water supplies, observing use patterns, keeping fences up and gates closed, and the like. Usually it is done by the rancher who is the one who makes the day to day decisions.

Administrative

Sometimes this is called "compliance" monitoring. It is monitoring done to document compliance with terms and conditions of grazing permits, legal requirements, or best management practices. It generally occurs when the rancher has some contractual agreement with a government land management agency, technical assistance agency, regulatory agency, or the bank. A common type of compliance monitoring that is used, and misused, by agencies is utilization, i.e. setting utilization or stubble height standards that must be met as a condition of the permit. This is not resource monitoring – it is regulation.

Resource monitoring

Resource monitoring involves measuring changes in attributes of vegetation or soil that occur as a means of determining whether resource objectives are being met, and if not, why not. Usually it takes several years of monitoring to determine whether significant changes are occurring and to establish the reasons. Variation in weather and other factors may obscure the effects of management. Sometimes short term indicators can be used to help recognize potential problems before they become reality – so called "early warnings". For example, utilization or stubble height can be used as an indicator of grazing pressure and help determine whether an adjustment in livestock numbers or distribution is needed before actual permanent changes in the resource result.

Attributes measured must have a known relationship to desired conditions and management objectives and be capable of objective observation or measurement.

Reduced soil erosion might be a management objective. However, it is not usually possible to directly measure soil erosion without long term studies. Therefore, an attribute known to be related to the risk of soil erosion, e.g. ground cover, may be measured. Ground cover is preferable to some other indicator, such as evidence of soil deposition or rilling, because those attributes cannot be easily quantified in objective ways. In other words, they require some

kind of relative rating or "scorecard" approach which introduces the possibility of observer bias or lack of training. Attributes that can be directly observed and measured quantitatively are better than those which are subjective and depend on observer training and personal views.

Methods chosen should be appropriate to the type of vegetation to be measured, training requirements, time available, and the decision environment.

Appropriate measurement techniques vary depending on the density and life form of the vegetation. A method for measuring cover on grasses may not work for shrubs or trees. Methods adapted to desert vegetation may not work in wet meadows. Some methods require more observer training and calibration than others and some require more time in the field per sample obtained. Selection of methods may also be influenced by the anticipated use of the data, i.e. is it going to end up in court, or just be used to informally guide ranch management. Monitoring is a time consuming, and therefore expensive, activity so it should be planned for efficiency of effort given the expected uses.

The time of monitoring should be selected to fit the management situation and the attribute being measured.

Most vegetation monitoring is best done near the end of the growing season because that is when plants are best developed and easiest to identify. However, other factors may dictate a different season. For example, measuring plant height or cover for ground nesting birds needs to be done during the nesting period whether that is the peak of the growing season or not. Litter cover or soil infiltration rates can vary considerably during the year, so to obtain representative values it is desirable to measure at about the same time each year.

Unless some kind of random sampling is used, selection of where to conduct monitoring is dependent on professional judgment and should be agreed upon by all interested parties.

Although it is possible to make complete inventories of some attributes, most monitoring depends on sampling of a number of small areas to represent the whole area. The approach that has been used for pastures or allotments is to select "key areas" that area considered to be good indicators of the effects of livestock grazing (the same approach can be used to sample wildlife habitat). Key areas should not be areas that receive very little use (steep slopes) or those that get concentrated use (water points). The important point is that, although the monitoring in those key areas may result in very reliable and repeatable data, extrapolation of those results to an entire pasture or allotment is dependent on professional judgment, not statistical validity. This is why it is important to have all interested parties (rancher, agency professional, outside interests) agree beforehand where the key areas will be located and agree that they are representative of the allotment. The alternative is to select sampling points at random over the entire area, and this is the approach the BLM's AIM program is taking. This approach is desirable if the data are intended for broader level multi resource planning. However, for allotment management

decisions, this approach may not result in enough sample points in the areas important to livestock.

Monitoring, especially the design of monitoring systems and interpretation of data, should be done by people with adequate training and experience in the local area.

Designing a good monitoring system requires thorough knowledge of the many measurement techniques that can be used, the attributes related to management objectives, and sampling statistics. In addition, the design must be based on familiarity with the ranch or allotment being monitored, its ecological sites, its patterns of grazing, management objectives, and problem areas. Likewise, the interpretation of monitoring data requires technical knowledge of how to summarize data, account for variability in data and identify valid conclusions. However, to evaluate the reasons for observed change, or lack of change, realistically, requires local knowledge of how sites and vegetation respond to grazing, weather, insects, or other influences. The actual data collection (e.g. running transects or taking photos) mainly requires someone who can identify the plants, knows the protocols, and will record the information honestly following the monitoring plan which specifies what, how, where, and when the data are to be collected.

Monitoring data must be repeatable.

By definition, monitoring means to compare data collected at two or more times to detect changes or lack of change as a measure of the effects of management, weather, or other factors. Any change observed must be a real change and not just due to sampling error or differences in observer ability or procedures. Sampling error is a result of the variability in the attribute being measured and the size of the sample. If a statistical design is used, the variability is indicated by calculating a confidence interval (e.g. analogous to the "margin of error" reported in election polls). For example, it can be stated that there is a 90% chance that the true value lies within +/- 10% of the calculated value. These statistics can be used to identify statistically significant differences in two or more sampling dates. The more variable the vegetation or soil attribute, the larger the sample needs to be. For example, it would require more plots and/or larger plots to sample a big sagebrush community than to sample a pure stand of crested wheatgrass to the same level of confidence, because the sagebrush is much more variable in species, life forms and spatial characteristics. It is important to confine monitoring locations to a single ecological site to increase uniformity and facilitate interpretation of the data.

But statistical differences are based only on the variability among sampling units and cannot tell us if the differences are free from error or have any practical significance. Errors in data collection may result from lack of adherence to protocols, carelessness, or actual personal bias. For example, if observers at one date define the rules for measuring cover differently than at another date, then the difference measured may be due largely to lack of uniform measurement, not real trends. If a difference is found to be statistically significant, this does not mean it is necessarily of any practical significance. Likewise, a change may be found to be not statistically significant, because the sampling was insufficient, but the change may be real and of

practical significance. Statistics is only a tool and should be used with common sense. Statistics cannot identify errors due to faulty equipment (inaccurate scales), faulty procedures (different ways of deciding whether plants are in or out of a plot), or personal bias (collecting data to show a desired result, either deliberately or because of previous background).

Monitoring data should be analyzed, summarized and made available for use, or it is time wasted.

Too often, monitoring data are collected in the field and then stored away with no analysis or summarization until months later, or maybe never. It is essential that monitoring data be analyzed as soon as possible after collection, preferably the initial analysis should be done in the field immediately after collecting the data, so any errors can be identified and corrected, and the results discussed while the monitoring team is still on the spot. Waiting until months later eliminates the chance to correct errors and match the results with what is seen in the field. The development of field computers and programs that allow the data to be analyzed and summarized as it is collected have greatly improved the ability to do this and should be encouraged.

*3.1.22 Carrying Capacity Section*

Livestock carrying capacity (grazing capacity or proper stocking rate) is not a biological constant that can be directly measured because it is dependent not only on the kind and amount of vegetation produced but also on weather patterns, range improvements, management systems, competing uses, and other factors.

Carrying or grazing capacity is generally considered to be the average number of animals that a particular range will sustain over time (Holechek et al. 2000) Stocking rate is the number of animals per unit of land per unit of time (e.g. animal units/acre/year). Both carrying capacity and stocking rate can be expressed in terms of acres/AUM, AUMs per square mile per year, or similar terms. An animal unit is considered to be a 1000 pound cow with un-weaned calf or the equivalent in terms of forage intake. Stocking rates may be higher or lower than carrying capacity and may fluctuate from year to year depending on weather or other factors even on a "properly stocked" range. A properly stocked range will have stocking rates that average approximately the carrying capacity of the range over a period of years. The proper stocking rate may approach grazing capacity, depending upon management objectives, but is a subjective, moving target. (Smith, et al. 2012)

Adjusting stocking rates to achieve proper stocking should be based on monitoring of actual stocking, utilization, and trends in range vegetation and soil. This is called the "stock and monitor" approach and is synonymous with adaptive management.

When the federal government started to issue grazing permits and regulate rangeland grazing use, a first step was to establish estimated proper stocking rates and adjudicate permitted AUMS among prospective permittees. At that time accurate information on actual stocking (the

actual number of animals that have been on the range during a given period of time) was not available. Most of the rangeland was unfenced and often used by several operators. No data on range trends or utilization were available. Therefore, the agencies used range inventories to make point-in-time estimates of forage available, with adjustments for slope, distance from water, season of use, access and other factors. The net forage estimates were converted to AUMs using an estimated dry matter intake of about 26 pounds of dry matter per day per animal unit. These estimates were based on intensive field sampling by experienced people and did provide a basis for deciding on "initial" stocking rates to be permitted (although the ranges had long been grazed prior to this time). However, after 50 to 75 years of government regulation of grazing, this type of approach is no longer needed. Adjustments to stocking on current grazing allotments should not be based on the forage inventory approach.

It is widely accepted that the best way to make any needed adjustments in stocking rates is the "stock and monitor" approach using actual stocking rate records (actual use) combined with monitoring of utilization (in the short term) and/or trend (in the longer term). The quotes below support this:

*"True grazing capacity can be determined only by stocking with an estimated number of animals and watching the range trend." (Stoddart, Smith and Box. 1975)*

*Carrying capacity estimates based upon one-point-in-time rangeland inventories do not produce results of sufficient accuracy to be the sole basis for adjusting time of grazing or stocking rates on specific grazing units. Carrying capacity should instead be based on impacts of historical and current stocking rates, grazing management, and weather. Adjustments in carrying capacity should be made through monitoring over time to ensure progress toward desired resource conditions."* (excerpt from position statement of the Society for Range Management).

The "stock and monitor" approach is consistent with agency policy to use "adaptive management" as a basis for making management changes. Most grazing allotments are now stocked at levels approximating carrying capacity or below. Further temporary or longer term reductions in stocking rates are due mainly to excessive invasion of shrubs and/or annuals which reduce the quantity or reliability of forage, or to restrictions on livestock grazing use because of real or alleged conflicts with other uses (endangered species, recreation, etc). Problems of excessive grazing in riparian areas or other concentration areas will generally not be solved by reducing stocking rates; a change in season or length of grazing period is usually the solution. Utilization over a period of several years can be used to indicate the need for reduced stocking or changes in management before impacts to vegetation composition and productivity are evident. Utilization may also indicate the potential to increase stocking where grazing management and/or range improvements has increased forage production.

<u>Forage allocation (using estimated yearly vegetation production to divide the forage among various uses) is not an accurate or reliable way to establish proper stocking rates for livestock or wildlife.</u>

After the initial efforts to establish stocking rates using the range survey or ocular reconnaissance method, the BLM began to collect forage production data as a basis for further adjustments to livestock stocking rates (the FS has used a similar approach in some cases). They developed the concept of "forage allocation" which divided the total annual production among various uses. This process was based on the need to leave some production for the benefit of the plants and soil (i.e. it set a limit on utilization of key plants, a proper use factor). The plant production not needed for benefit of the vegetation and soil was then "allocated" to wildlife and livestock based on the relative diet preferences of the various animals. In practice, this usually meant estimating the amount of forage required for existing or planned populations of deer, elk, antelope and other wild grazers, and allocating what was left over to livestock. This practice was highly controversial and criticized by both ranchers and range scientists. It was de-emphasized in favor of a stock and monitor approach during the Reagan administration and since. However, the concept is not dead because it has been used to some extent in recent planning efforts, and has been resurrected as the "scientific" approach by some environmental interests. (for example see Catlin, Carter and Jones 2003).

The forage allocation approach cannot provide carrying capacity estimates that are of sufficient accuracy to be used in establishing permitted grazing. There are too many variables and too many assumptions involved for this purpose. For example, the process involves determining average annual production by species or life forms of vegetation, depends on the combination of ecological sites, their present production, and weather conditions. It also depends on estimated the effects of slope, distance from water and other factors on livestock distribution. Other factors include estimating the dry matter intake of grazing animals (which varies widely), and the amount of overlap in diet and grazing distribution of livestock with wildlife. All these factors have a substantial, but largely unmeasured, error of estimate. When the factors are multiplied together, the errors are compounded. The error associated with the final "allocation" is usually not specified but could approach +/- 50%, i.e. it is not much more than an educated guess (Smith, et al 2012). Van Dyne, et al. (1984) summarized the conclusions of a symposium convened by BLM on this topic, which involved, invited and reviewed papers, as follows:

*"The variety of vegetation allocation models available to BLM are currently useful, however, only as a conception. They probably do not even qualify as a best guess. The reason is the lack of site-specific information. A best guess of stocking rates should come from the experience of grazing an area for several years. This, combined with adequate monitoring and preliminary modelling should allow for adjustments during 5- to 10- year periods."*

<u>Forage inventories can provide useful information to predict increases or decreases in grazing capacity that would result from range improvements or restrictions on range use as a basis for analyzing alternatives or economic impacts.</u>

Where data on actual stocking, utilization or range trend are not feasible, forage production estimates can be useful, as they were for adjudicating competing claims for grazing permits in the early days. For example, if a plan calls for creating several new pastures of

approximately equal grazing capacity in an allotment, estimates of forage production could be used to analyze different possible fence locations. Or, if it is proposed to develop new water sources to grazing in previous unused areas, forage production data could be used to estimate the additional AUMs that would be provided as a basis for economic analysis. In these examples, the stock and monitor approach will obviously not work, and the forage estimates can provide at least relative values for each scenario since the assumptions and errors can be assumed constant.

*3.1.23 Range Suitability Section*

The concept of "range suitability" has not been consistently used by the federal agencies. "Suitability" implies that an area is not appropriate for grazing, when the intent is to identify areas that will not contribute to the forage supply under the existing management on an allotment.

Policy and regulations have required both FS and BLM to determine those areas "suitable for livestock grazing", but the agencies have not employed this concept in a consistent or sound basis. Some background will help explain the problem.

The Range Survey (or Ocular Reconnaissance) Method of forage inventory adjusted the available forage supply for such factors as distance from water, slope, or difficulty of access. These were called "utilization adjustments" and recognized that the forage produced on some areas could not be fully utilized without overusing other areas. In some cases, the utilization adjustment was 100%, i.e. no capacity was given to that area because livestock would not be able to graze it under the current conditions (amount of water development, fences, etc). This reduction did not mean the area could not be grazed in the future if additional water or fencing were developed, the kind of livestock or season of use changed, etc. The term "suitability" was not used.

In later forage inventories, both BLM and FS continued to exclude areas that would not be grazed from their estimates of capacity. At some point, the term "suitability" was introduced by both agencies. Other terms were also used, such as primary vs secondary range. Obviously, areas that are too steep, too far from water sources, or inaccessible to livestock cannot be included in an estimate of carrying capacity based on forage inventories, even if these areas might receive some incidental use by livestock under certain conditions (a wet year for example). This has been recognized, for example, by Holechek et at (2000) in describing the forage inventory approach to estimating carrying capacity, but the term suitability was not used.
The procedures used to determine suitability have not been exactly the same in each agency or in different areas. BLM described criteria used to determine suitable range in Utah in the period when forage inventories were the basis for estimating grazing capacity (e.g. BLM. 1980). Reductions in forage supply were made based on slope, distance from water, and/or forage production, with slopes over 60%, areas more than 3 miles from water, or areas producing less than 50 pounds of forage/acre/year being considered "unsuitable" and given no capacity.

"Suitable" means "appropriate," therefore, the use of suitability as described above is not a good description for the purpose of the determination. As described above, "unsuitable" means that an area is not usable by livestock because of topography, lack of water, barriers to access, or lack of forage. It does not imply that the area cannot tolerate grazing or that it could not be made "suitable" if water or access were provided, or if forage production was increased by brush control or seeding.

There is a difference between areas that cannot currently be grazed or have no forage production and an areas that should not be grazed because of resource concerns or management objectives.

Unfortunately, the BLM (and the FS in some areas) also added in a rating of soil erosion to the suitability criteria. BLM use a rating of risk of soil erosion called the "soil surface factor" to assess the degree of surface soil protection and evidence of soil erosion. When this rating indicated there was an erosion problem or elevated risk of erosion, the area was considered "unsuitable for grazing" and no carrying capacity was assigned to it. Although this may seem reasonable at first glance, it confounded the reason for assessing suitability in the first place - to identify areas that would not be grazed under current management as opposed to those areas that should not be grazed. If there are areas of soil where grazing should be reduced or eliminated due to risk of erosion, then just assigning no carrying capacity to them will not solve the problem. In other words, the overall stocking rate may be reduced but that does not mean the area of concern will not be grazed, or even that it will be grazed less intensely. That could only be accomplished by fencing, changing season or timing of grazing, or complete destocking of the allotment.

An analogous situation would be where grazing conflicted with another activity. For example, livestock grazing may not be desired in a camp ground, but just declaring the camp ground "unsuitable" and giving it no grazing capacity will not achieve that objective. The only ways to reach that objective would be to: 1. Fence the campground, 2. Destock the whole allotment or pasture, or 3. Only graze the pasture after all the tourists have left for the year.

Classifying rangeland as suitable or non-suitable, as it has been used by both the FS and the BLM, is not needed using the stock and monitor approach to livestock grazing adjustments.

The purpose of classifying range suitability, as described at the top of this paper, was part of the effort to quantify the total forage resource to estimate a carrying capacity based on forage consumed per AUM. That is not a reliable or needed method of adjusting livestock numbers, as has been explained elsewhere (see section on Carrying Capacity). Under the stock and monitor approach to adjusting livestock numbers to reach a proper grazing capacity, no determination of "suitability" is required because forage production estimates are not used. The term "suitability" should be abandoned.

*3.1.24 Range Readiness – On/Off Dates Section*

Federal land management agencies often specify in grazing permits, annual operating instructions, or even in land management plans dates when livestock can go on an allotment and/or must be taken off an allotment. They may also indicate starting and ending dates for grazing each pasture in a rotation grazing plan. Inflexible use of such time limits is contrary to adaptive management.

Turnout dates on seasonal ranges should be flexible and determined as part of a year round plan to meet the needs of the rangeland, livestock and other uses, not rigid range readiness requirements.

The Society for Range Management defines range readiness as "the defined stage of plant growth at which grazing may begin under a specific management plan without permanent damage to vegetation or soil." The definition also explicitly suggests that range readiness is "usually applied to seasonal range."

Range readiness is a concept that developed where livestock were moved from lower elevation fall-winter-spring ranges to summer ranges at higher elevation. Federal agencies managing summer allotments would not allow livestock to be turned out on the summer range until "range readiness" had been determined. The range was ready to be grazed when key forage plants had reached a designated stage of growth, usually defined as a certain leaf height. It was thought that grasses were most susceptible to damage from grazing when grazed early in the growing season when carbohydrate reserves in the roots had been depleted to support new growth. Therefore, the grasses should not be grazed until they had time to produce enough top growth to replenish carbohydrate reserves and allow root growth. This concept was consistent with the prevailing view of range plant physiologists in the mid-1900s. It may have also made sense because most grazing was season long, not rotational, so that grasses might be repeatedly grazed throughout the growing season. Bawtree (1989) states that leaf length and utilization guidelines did result in range improvement under season long grazing.

More recent research has shown that depletion of carbohydrate reserves is less important to grass growth and regrowth than formerly believed (Perryman et al 2005). Grazing effects are more related to remaining leaf area for photosynthesis and effects of grazing on the ability of the plant to produce new tillers (stems). Research indicates that the most critical time for grazing is during the boot stage, not in the early growth stage or in later stages of maturity. This is just about the time that agency range readiness guidelines allowed grazing to start, i.e. at the most damaging time. Grazing during the early growth stages is not detrimental to grasses so long as the duration of the grazing period is restricted to allow grasses to regrow after grazing. In some cases, early grazed pastures can even be re-grazed later in the year if sufficient regrowth has occurred. Burkhardt (1996) points out that native animals used a similar strategy of "following the green" as they migrated up into summer ranges.

Originally range readiness guidelines were based only on plant growth stage. At some point, agencies also included criteria related to soil moisture. These guidelines generally stated that grazing should not be allowed when soils were saturated from snow melt to reduce trampling and compaction by animals. Some have questioned these guidelines also on the grounds that many soils do not reach saturated conditions for any appreciable time (Perryman et al 2005) and that wet soil conditions can occur at any time during the spring and summer due to rainfall.

Restrictions on turnout dates due to range readiness requirement required that stock be held on winter or spring ranges longer, and this contributed to heavy spring grazing which caused damage to lower elevation salt desert and sagebrush rangelands, as well as increased expenses for feeding hay in some situations. Range readiness restrictions also could not be applied to elk, deer and feral horses.

Range readiness guidelines are not useful when the timing of livestock grazing can be controlled by rotational grazing management. Some point out that where grazing of riparian areas is a concern it would be better to turn livestock out early and remove them early. This is because livestock tend to use riparian areas more when upland forage starts to dry out (Perryman, et al 2005).

Pasture moves in rotational grazing management should be approximate and flexible to allow for adaptation to changes in availability of water and forage, and other factors which occur on the entire year round grazing operation.

Dates for going on and off an allotment or for moving livestock from one pasture to another are sometimes written into management plans or annual operating instructions as rigid dates for compliance with the terms and conditions of the grazing permit. This practice is contrary to the principles of adaptive management and of coordinated management.

Grazing dates for each pasture can only be approximated when planning grazing for the coming grazing season or year. No one can accurately predict when or where it will rain, where and how much stock water will be available, or where fire or insects may affect forage supply. Therefore, turnout and move dates should be only general guidelines, not rigid dates for compliance with permits. Planning grazing management for the year should consider all land ownerships, not just that of one agency. Likewise, adjustments to the plan during the year should involve consideration of conditions on the whole grazing management operation, not just one land ownership.

Some annual operating instructions state that move dates will not be exceeded, but may be earlier if utilization limits are reached. Apparently the assumption is that exceeding the date or utilization level will result in irreparable resource damage. There is no scientific basis for that assumption – it is based on administrative convenience of the agency, not range management (Cleary et al 2008). A more productive approach would be for the agency to set out guidelines

for multiple use considerations (e.g. bird nesting cover), end of season short term indicators and long term desired future conditions, then let the permittee have flexibility in how those conditions are met, with some help from agency professionals as needed.

*3.1.25 Biological Soil Crusts Section*

There is not sufficient knowledge or consensus on the role of these crusts to incorporate them as major factors in evaluating rangeland condition and trends or prescribing grazing management.

In recent years, there has been increasing interest and research on the role of biological soil crusts on rangelands – southern Utah is a major focus of that effort. As a result, some of the agencies have started to incorporate evaluation of biological soil crusts into management plans, environmental impact statements, and range assessments such as rangeland health. While the recent and current research has increased our knowledge of how these crusts function, most of it has been based on comparative studies, small plot experiments, or laboratory research which must be extrapolated with caution to landscape scale ecosystems. Knowledge of the function and importance of biological crusts is insufficient to incorporate them as important indicators into routine range assessments at this time.
*Note: The statement above represents my opinion and will not be agreed upon by many, including some scientists. Therefore, the following discussion outlines my analysis of the topic. This paper is not an exhaustive review of all the extensive literature on this topic. I have included some pertinent references and, I hope, a good measure of common sense. I have a PhD in soil science and over 40 years of experience in teaching, research, extension, consulting in range management, primarily in Arizona, but also in Colorado, Utah, Nevada, Idaho, South Dakota, Australia, Spain, Ecuador, Brazil and Mexico. BSC have not been my primary research interest but I have observed them in many locations. I was perhaps one of the first to try to use BSC in trying to evaluate soil surface condition (Tongway and Smith 1989) and directed a MS thesis on BSC (Sylla 1987).*

Conclusions

Does good science support the present emphasis on the importance of BSC and the need to protect and enhance them even at the expense of grazing and other land uses? The evidence I have seen does not seem to indicate that it does. This is not to say that BSC should not be studied further to gain more understanding or that management should necessarily completely ignore their possible role. West (1990) stated: “Therefore, I agree with Smith (1986) that while microphytes can potentially indicate some aspects of stability, condition and their rate of recovery, we need a more complete understanding of the interactions before we incorporate them in our routine assessments. Generalities are being eagerly sought by land managers who want to know how to regard microphytes as indicators of ecosystem productivity, fragility and stability. Ecologists should avoid strongly worded pronouncements until many more results from well-

designed field experiments are available". That statement was made in 1990, but I have not seen convincing evidence that the conditions stipulated by West have been met.

The complete written section on this subject can be read in the report in the appendix by Lamar Smith.

*3.1.26 Forage Utilization and Stubble Height Standards for Grazing Allotments Section*

Utilization and stubble height guidelines are management tools useful for grazing management, analyzing grazing patterns, and helping interpret monitoring data. They should not be used as management objectives or as rigid limits to grazing use on an annual basis. Utilization and stubble height guidelines should be adapted to each local situation and management objective and should not be written into land management plans. Utilization and stubble height guidelines are meaningless unless the time, place, method and species to be measured are specified.

*Note: The use of utilization and stubble height standards as rigid management objectives continues to be a problem on both FS and BLM grazing allotments in spite of overwhelming opposition from the range science community, and even within some agency personnel. Therefore, this topic has been discussed in detail to provide understanding for county personnel.*

The complete written discussion of this topic by Lamar Smith can be found in the section report in the appendix.

Introduction

Rating the degree of use on the forage resource is a useful tool in range management to assess grazing distribution, interpret range trend data, and to aid in adjusting livestock numbers or season of use. *Utilization is the proportion or degree of current year's forage production that is consumed or destroyed by animals (including insects). Utilization may refer either to a single plant species, a group of species, or the vegetation as a whole.* (BLM 1999). Stubble height refers to measuring the average height of forage plants remaining after grazing. It probably should be called residual height since measurements are made on both grazed and ungrazed plants (Smith et al. 2012).

Although recognized as useful tools, both utilization and stubble height measurements have been, and still are, improperly used by government agencies and others. This misuse has resulted in a number of publications defining the procedures for proper use of these measurements. It also prompted the Society for Range Management to adopt a position statement on the subject (see SRM website):

Use of Forage Utilization and Residue Measurements

The Society for Range Management recognizes and endorses forage utilization and residue measurements as useful tools in rangeland monitoring and acknowledges their value in land management. When used with other monitoring information, utilization can be employed to design and evaluate management decisions. These measurements, when properly timed and conducted using appropriate methods and sampling procedures, can be used as an aid in:
1. Analyzing distribution of animal use on a management unit.
2. Interpreting cause and effect relationships for observed changes in resource attributes such as soil cover, species composition, residual cover, etc.
3. Adjusting stocking rates and/or timing of grazing when used in conjunction with other monitoring information including: long term vegetation or habitat data, current and historical stocking records, precipitation records, etc.
Utilization and residue measurements are not management objectives. They are tools to be used with other information in evaluating whether desired resource conditions are being achieved.

*3.1.27 Rangeland Condition Section*

Range condition should relate to the present vegetation and soil condition in relation to a potential for the site, but not necessarily the historic climax or potential natural communities.

Prior to WWII, range examiners referred to "range condition" in general terms without really defining it. They were looking at the kind and amount of vegetation and indicators of erosion mainly. Later, range condition was based on estimates of plant species composition. "Livestock forage condition" was rated based on the proportions of good, fair or poor forage plants for livestock. The FS developed the Parker 3 step method in the late 1940s which was based on plant composition, ground cover, and plant vigor. BLM used plant composition and a "soil surface factor" rating. Neither agency directly considered site potential at first, which meant that a range in fair condition might be producing less than its potential, or it might just be a site with low potential and not capable of producing more. The NRCS developed the concepts of ecological sites and range condition based on successional status of the vegetation toward a "climax" or potential plant community for each site. Range condition was rated according to an index of similarity in plant composition to the potential for the site. BLM adopted this approach in the 1970s. Condition was rated as excellent (76-100% similar), good (51-75 %), fair (26-50%), or poor (0-25%). Later these classes were called climax (or potential natural), late seral, mid seral, and early seral, respectively, because it was recognized that the rating applied to successional status and not to any desired use. In the past several years there has been a shift toward use of a "desired plant community" as a basis for rating range condition, recognizing that several plant communities can exist on a site and could be more desirable for management objectives than the climax or historic community. This view has been widely accepted in theory, but in practices, the historic or natural potential is still most often used as the standard for range condition.

Range trend should be quantitatively measured on attributes that relate to management objectives.

Trend means a change over time, thus measuring trend requires at least two observations at different times, and preferably more. Trend measurements should be based on quantitative, repeatable methods (see discussion on monitoring). In some cases, observations of "apparent trend" are made which are based only on a point-in-time observation of various indicators (such as plant vigor or reproduction, soil movement). Although a well trained and experienced person can sometimes make valid interpretation of trend, actual change is not observed and the evaluation is only a matter of professional opinion. Trend can be measured on many attributes (frequency, cover or production by species, ground cover, etc). The attributes chosen should be related to the management objectives for the area.

Rangeland health and proper functioning condition are qualitative point in time assessments of upland and riparian rangelands based on multiple indicators.

A qualitative procedure was developed in the 1990s for assessing "proper functioning condition" of riparian areas (Prichard et al 1998, 1999). PFC is based on rating a number of attributes of a riparian system in relation to how they should be to produce a "properly functioning" riparian system. Some attributes rated are bank stabilizing vegetation, stream morphology, erosion and sedimentation, and other factors related to hydrologic processes. A stream is said to be properly functioning when conditions in the channel are in balance with the size of the watershed, the type of channel materials, and runoff events. It is rated as properly functioning, functioning at risk, or non-functioning. The rating is usually done by an interdisciplinary team. It does not refer to any particular use of the riparian area, i.e. it does not rate wildlife or fishery habitat. It is not a monitoring technique since it does not involve measurements. Selected attributes related to PFC could be monitoring however. It is mainly done to identify areas requiring management attention and/or monitoring and additional study. A similar approach was developed for assessing rangeland health on upland rangelands (Pellant et al. 2005). This procedure also involves qualitative point in time assessment of 17 indicators related to either the soil condition, hydrologic condition or biotic condition on a particular ecological sites. Each factor is rated, usually by a team of observers, according to its departure from "reference conditions". Reference condition are described for each ecological site, and are made a part of each site description. This reference sheet describes what each attribute should potentially look like if the site were in a "healthy" condition. For example, the reference sheet would indicate about how much bare soil would be present on the site – an increased over that amount would be rated as a slight, moderate or high departure from the reference. Each attribute is rated separately and an overall rating is obtained by using a preponderance of evidence approach. In other words, based on all the ratings the observer or team would decide what the overall rating should be. There is no "score" used based on adding or multiplying ratings of each attribute. The rating of rangeland health using this check sheet does not relate to any particular use of the site, i.e. it does not necessarily relate to forage production or wildlife habitat, but only relates to the general stability, productivity and diversity of the site in relation to its potential. It

is not a monitoring technique. Quantitative measures related to some of the attributes can be selected for monitoring.

BLM's regulations require that range management objectives are to meet Utah standards of rangeland health and guidelines for grazing management.

The "range reform" grazing regulations adopted in 1996 require BLM to evaluate "rangeland health" on all public lands using standards for rangeland health developed by BLM with the aid of the Resource Advisory Council (RAC) based on "fallback" standards included in the regulations. It also required development of a set of guidelines for grazing management for all grazing allotments. If an allotment is found to be not meeting range health standards, or making significant progress towards meeting them, and current livestock grazing is determined to be the reason for such non-attainment, the BLM is required to take corrective action prior to the next grazing season. Although included in the grazing regulations, the standards of rangeland health are meant to be applied for all uses of rangelands, not just grazing.

The following statement by BLM describes the procedure:

"The purpose of a Rangeland Health Assessment and subsequent Allotment Evaluation is to summarize, analyze and interpret monitoring information that has been collected throughout the assessment/evaluation period to determine if rangeland conditions are achieving the Land Use Plan objectives and Utah's Rangeland Health Standards and Guidelines. The Indicators of Rangeland Health (TR 1734-6), actual use, utilization, use pattern maps, ecological status, rangeland trend studies, and professional judgement are used to evaluate conditions in accordance with BLM's Handbook 4180. The evaluation will also identify if livestock grazing is in conformance with Utah's Guidelines for Grazing Management and if changes to grazing permits and/or livestock management id deemed necessary to ensure attainment or maintenance of the Rangeland Health Standards. Necessary changes are implemented through the issuance of a proposed and final decision." (www.blm.gov › BLM › Utah).

Utah adopted 4 standards of rangeland health: Standard 1 addresses soil and site productivity, Standard 2 addresses proper functioning condition of riparian areas (if present), Standard 3 relates mainly to plant and animal species and their habitat, especially TES, and Standard 4 is to meet Utah's state water quality standards. While Standards 1 and 2 are directed mainly toward ecosystem function, Standard 3 and 4 are more related to legal mandates to manage for endangered species and water quality, and are therefore more use oriented.

Assessment of rangeland health and PFC requires expert knowledge and substantial experience with local rangelands.

All aspects of assessing range health and PFC require a good understanding of soils, ecological processes, plant identification, hydrologic processes, and effects of grazing, fire, weather and other factors. People doing rangeland health assessment must be familiar with the

ecological sites in the area and how they respond to different influences. The breadth of knowledge required makes interdisciplinary teams highly desirable. In addition, at least some of the team members should have first-hand knowledge of the historical and present management of the grazing allotment (or other unit) in order to be able to determine the causes for lack of attaining standards. Monitoring data and actual use are needed to assess trends. In some cases, determining causes and trends may require additional studies or monitoring. This is an exercise that should only be done by experienced people.

It appears that BLM still must have some inconsistencies in the way rangeland health evaluations are carried out. For example, of the 5 BLM field offices for which range health results were available, 3 found over 90% of allotments meeting standards, while 1 found 75% and the other only 25%. It does not seem likely that these differences are due entirely to differences in ecological sites, historical factors, or current management. These differences could also be due to variable expertise among observers (Miller 2008).

Rangeland health assessments should be reported based on the number of allotments examined, not on total acres meeting or not meeting standards.

Rangeland health is generally assessed on selected areas within an allotment. The areas selected may be "key areas" where monitoring has occurred or other areas which are selected to represent different ecological sites or possible problem areas. Thus the locations assessed are selected to represent the whole allotment but do not constitute a statistical sample or complete inventory of every acre on the allotment. (Miller 2008). Selection of the locations, and extrapolation of the results to the whole allotment, is based on professional judgement primarily. Almost any allotment, or other unit of land, will have some areas that will not meet these standards. Determination that an allotment does or does not meet the standards does not mean that every acre in the allotment meets or does not meet the standards, and it should not be reported to give that impression. Some outside groups have interpreted BLM's data in this way, however.

Phase III (closed canopy) stands of pinyon-juniper and, possibly, mature, decadent stands of big sagebrush will probably not meet standards of rangeland health.

It is difficult to see how these stands could meet the standards relating to species composition, stand structure, life forms, soil cover, and similar factors. BLM classification of Desired Wildfire Condition Class (see BLM planning documents) indicate that much of the BLM land in the 11 County Area is presently rated as unhealthy and requiring treatment to reduce risk of "loss of ecosystem components" due to wildfire. It is hard to see how these stands can be rated as meeting range health standards if they are rated as being at risk of severe damage by fire.

*3.1.28 Grazing Management Section*

The BLM has a set of Guidelines for Grazing Management which were adopted as practices to be applied to meet the Standards for Rangeland Health (www.blm.gov › BLM › Utah). BLM is required to follow these guidelines. The FS is not bound by these guidelines but has its own guidelines that are similar, but usually spelled out in various management plans. Most of these guidelines are reasonable and supported by range professionals to the extent that they are applied with common sense and sufficient flexibility to adapt them to specific situations.

Livestock grazing management refers to control over the intensity, season, frequency and distribution of utilization by livestock.

The same principles apply to wildlife grazing, but control is mostly limited to intensity and distribution. A grazing management plan outlines the objectives to be achieved, and the stocking rates, season of use, guidelines for pasture rotations, and other considerations for a particular allotment or ranch. It should include considerations for other uses, such as wildlife, e.g. need to avoid grazing during certain seasons, or cover requirements. Finally, it should include a description of how livestock grazing will be monitored and who will do it. The grazing management plan should provide guidelines to be considered, but the permittee must have the flexibility to stay in some pastures longer or to move quicker than planned to accommodate the weather and other factors. To make this work, the permittee should keep good records of numbers and dates when each pasture was stocked and notes on conditions when the pasture was grazed. Before the next grazing year, the permittee and range specialist should agree on a plan for the coming year based on those records and any other monitoring data collected. For example, if a pasture is grazed heavier or earlier than planned in one year, it could be grazed lighter or deferred the next. The grazing management plan should therefore be a framework laying out guidelines for making grazing management decisions, not an inflexible schedule.

Conservative to moderate stocking (grazing intensity) has been shown to benefit the rangeland and profitability of a livestock operation.

Holechek, et al. (2006) reviewed a number of grazing studies around the West and documented that conservative to moderate grazing can benefit range condition, productivity, diversity, and response to drought. In general, grazing intensity should be more conservative on arid and semi-arid ranges than on range with higher and more dependable rainfall because conditions for regrowth are more limited and less predictable. Numerous studies have also shown that conservative to moderate stocking is the most profitable practice for livestock production. Lighter stocking levels result in higher calving/lambing percentages, higher weaning weights, less need for supplemental feed and medicine, and lower costs for some other inputs. The goal is not maximum livestock production but maximum profit from livestock production. Forage production varies widely on arid and semiarid rangelands making it difficult to balance stocking with forage supply from year to year. A more conservative level of stocking makes it easier to adapt numbers to fluctuating forage supplies.

Some kind of rotational grazing is desirable for most ranches to control the timing of grazing.

Although some researchers claim that rotational grazing systems have not been proven scientifically to be superior to moderate continuous grazing (grazing throughout the grazing season in one pasture) (Briske et al 2011), most range managers and the land management agencies recommend or require some form of rotational grazing. Hughes (1980,1983) did not find any consistent benefit to species composition and range trend due to grazing systems in the Arizona strip. Grazing research has generally not shown any advantage to productivity of either livestock or rangelands. However, these studies have generally been carried out on relatively small pastures, on uniform upland rangeland in good condition with adequate water distribution, and without regard to competing multiple uses. Most ranches and grazing allotments do not match these conditions. Wayne Hickey, USFS Range Staff in Region III, reviewed the literature on grazing systems about 40 years ago and also concluded that research did not show a consistent benefit for grazing systems, although he observed that ranchers and agency range managers generally thought that these systems worked. He concluded that the positive results for rotational grazing generally came from an overall improved management that resulted in closer attention to all aspects of the ranching operation including both the effects of grazing and livestock management. In other words, ranchers that had some sort of planned grazing rotation just did a better job of all aspects the operation than those that did not. Some kind of rotational grazing plan may help address the following:

1. Repeated grazing of preferred forage plants and/or foraging areas. On ranges with plant species that vary in palatability, livestock tend to concentrate on the most preferred species and may overgraze these plants even though there is an adequate supply of forage in the pasture. Likewise, livestock tend to concentrate in preferred areas (e.g. riparian areas) and may overgraze them even though the pasture as a whole is not overstocked. Reduced stocking will usually not solve these problems at any economically viable level. Therefore, limiting the time that livestock are in a pasture to allow these favored species to regrow and recuperate is necessary.
2. Plant growth stage (season) affects how they respond to grazing. Periodically removing grazing during the critical times may benefit growth and reproduction of desirable plants. In some cases, the aim may be to discourage some plants (e.g. heavy grazing of cheatgrass before it heads out). In either case, the ability to rotate pastures (fences and water) is needed to control the timing of grazing.
3. Where multiple use is practiced, it may be desired or required to avoid or reduce grazing in certain areas at certain times of year, e.g. for antelope fawning, bird nesting, or recreational users.
4. Although rotational grazing requires additional moving of livestock and additional fences and water, having the animals more concentrated makes it easier to check on them and gather.

Grazing management systems must be flexible, not rigidly scheduled "grazing systems."

A number of "grazing systems" have been suggested in various parts of the country and, in some cases adopted more or less as policy by some agencies, e.g. rest-rotation. Grazing systems typically specify the use of "rest" (no grazing for at least one full year), "deferment" (delaying grazing until some specific time, e.g. seed set), and rotation of these treatments among pastures in different years. These "grazing systems" were suggested as strategies to maintain or improve range conditions in different vegetation types based on experience and/or research. However, they should not be used as formulas for grazing management. A grazing management plan should incorporate some guidelines on grazing seasons and deferment or rest periods to achieve desired objectives, but these should be tailored to a specific allotment and allow flexibility in adapting to weather and other conditions.

Grazing management plans generally provide for periodic short term deferment or rest from grazing for key forage species.

Grazing not only removes leaves and stems from plants, which reduces the ability of the plant to capture energy for growth (photosynthesis), but also can reduce root growth, reduce or prevent seed production, reduce the development of new stems (tillers in grasses), and otherwise temporarily reduce the growth or reproduction of plants. How much reduction occurs depends on the growth form of the plants, their method of reproduction, the stage of growth of the plants, the growing conditions at the time of grazing and other factors. Above all it depends on the intensity of grazing (utilization) and the frequency of grazing (i.e. how much time the plant has to recover before being grazed again). Therefore, in addition to a moderate grazing intensity it is also useful in most cases to provide a period of grazing rest during critical growth periods for the more preferred plant species to allow them to maintain their ability to compete with less desirable species. Most grazing systems or plans provide for periodic short term rest during part of the year and controlling the length of the grazing period to reduce excessive re grazing of preferred species. The specific timing of grazing rest should be tailored to the types of plants involved and their growth cycles (shrubs vs grasses, cool season vs warm season, etc). Animal diet preferences change over the grazing season so there is some natural "deferment" that occurs even when grazing is continuous. On most ranges, however, some rotational deferment for all or part of the growing season for key species is beneficial. This "rest" may be for a few weeks or a few months, but usually does not extend to an entire year.

Although some people advocate intermediate to long-term "rest" from grazing as a means of "rehabilitation" of range condition, there is little evidence that this provides greater or more rapid response than planned grazing.

Environmental impact statements and proposed land use plans often contain a "no grazing" or a "conservation" alternative that calls for complete rest from grazing either permanently or for periods of 5, 10, or more years. Almost without fail, these alternatives are touted as resulting in greater and faster "recovery" of poor condition rangelands than the

alternatives calling for managed livestock grazing. These claims are based on "scientific literature" which, when examined, often turn out to be based on conditions that are irrelevant to the situation at hand or just opinions expressed by anti-grazing interests (see the section on Endangered Species and Livestock Grazing). Some research related to effects of intermediate or long-term rest from grazing on vegetation is presented below.

Davies, et al. (2016) compared composition of understory species and ground cover in dense stands of Wyoming big sagebrush in Oregon with depleted understory in grazed areas vs areas rested for 5-10 years (which they called intermediate term rest). They found no difference in density, diversity or richness of understory species and no difference in bare ground, litter, and biological crusts. They concluded that these communities have passed a threshold and are not likely to benefit from intermediate term grazing rest.

Davies et al. (2014) reviewed the literature on the benefits of longer term rest in the sagebrush steppe and stated the following: "Longer term grazing rest has occurred or been proposed in large portions of the sagebrush steppe based on the assumption that it will improve ecosystem properties. However, information regarding the influence of longer term rest from grazing is limited and has not been summarized. We synthesized the scientific literature on long-term rest in the sagebrush steppe to evaluate the potential ecosystem effects and identify factors that influence those effects. Longer term rest is clearly advantageous compared to detrimental grazing practices (i.e. repeated defoliation during the growing season without periodic deferment or short-term rest). Changing grazing management from detrimental use to modern recommended grazing practices or dormant season use will likely convey the same benefits as long-term grazing rest in most situations. In general, long-term rest and modern properly managed grazing produce few significant differences. However, some topic areas have not been adequately studied to accurately predict the influence of long-term rest compared to managed grazing. In some situations, long-term rest may cause negative ecological effects. Not grazing can cause an accumulation of fine fuels that increase fire risk and severity and, subsequently, the probability of sagebrush steppe rangeland converting to exotic annual grasslands. One common theme we found was that shifts in plant communities (i.e. exotic annual grass invasion and western juniper encroachment), caused in part from historical improper grazing, cannot be reversed by long-term rest. This synthesis suggests that land managers should carefully consider if long-term rest will actually achieve their management goals and if a change in grazing management would achieve similar results."

Hughes (1980) compared vegetation in both desert shrub and sagebrush types inside and outside 25-year-old grazing exclosures in the Arizona Strip. He found that in desert shrub communities shadscale increased more with grazing than without. In the sagebrush areas sagebrush increased and grass decreased at about the same rate both inside and outside exclosures both in areas that had been treated (railing) and untreated. He concluded that periodic treatment of sagebrush would be necessary and planned grazing systems would not prevent sagebrush re invasion. He did another study of long-term exclosures in the Arizona Strip. In the desert grassland he found slightly more cool season grass and shrubs in the exclosures and

slightly more warm season grass in the grazed areas regardless of the length of time grazing was excluded or the type of grazing applied. In the pinyon-juniper areas he studies 8 exclosures, 6 of which had been chained and seeded before exclusion. In both the treated and untreated areas cool-season grasses were more frequent in the grazed area than in the exclosures, with browse plants more frequent inside the exclosures on treated areas, but less frequent on untreated areas. There was very little warm season grass anywhere. Litter cover was generally somewhat higher in ungrazed areas but not always. He concluded that neither long-term grazing exclusion or grazing systems always produced a positive result – it varied from one area to another.

West et al (1984) studied the effects of grazing exclusion and stated: "Range managers often assume that release of vegetation from livestock grazing pressure will automatically result in a trend toward the pristine condition. The pathways and time scales for recovery are also sometimes assumed to be the same as for retrogression. These assumptions were examined via monitoring of plant community composition and forage production in five large paddocks of sagebrush semi-desert vegetation in west central Utah over a 13-year interval. No significant increases in native perennial grasses were noted over this period despite a trend toward more favorable precipitation in recent years. Thus, the present brush-dominated plant community is probably successionally stable. A return to vegetation similar to the original sagebrush-native grass mixture is unlikely. The possibility of a successional deflection via fire is enhanced by the increase of annual grass. Improvement of forage production in this vegetation will not necessarily follow after livestock exclusion. Direct manipulations are mandatory if rapid returns to perennial grass dominants are desired in such environments. Regardless of the explanation, which can only be defined with further basic research, the practical importance of our findings is to dissuade the manager from the misconception that livestock exclusion will necessarily result in rapid improvement of the grass component of sites dominated by brush and trees. Hull (1976) indicated that the first significant loss of grass on these kinds of rangelands took only l0-12 years. We have shown that the change cannot be reversed on such a time scale. Rather than improving itself with 13 years of rest from livestock grazing, our vegetation has deteriorated toward more profound dominance by woody species. Only annual grasses have apparently increased during the 13 years. This increases the likelihood of firestorms that may destroy everything. We concur with Sneva et al. (1980), who studied these phenomena over a longer time span on more mesic sites, that direct manipulations are mandatory if rapid return to grass dominance is desired in such environments." (the literature cited is in their article).

Whether intermediate or long term rest from grazing is beneficial or not depends on the specific conditions of vegetation, soil, etc. and also on the benefits desired or expected. However, there is very little evidence that the general vegetation composition, ground cover or ecological processes are consistently favored by intermediate or long term rest from grazing compared to managed grazing. Thus, the claims put forth in environmental impact statements and proposed land use plans that no grazing will result in faster and more complete improvement of "range health" are usually not based on sound science and should be challenged where they are not.

*3.1.29 Brush Control and Seeding Section*

Increased shrub density and cover have resulted in loss of livestock forage and wildlife habitat, reduced soil protection, loss of biodiversity, and increased risk of catastrophic wildfires and property damage over a large part of the 11 County Area. Reduction of these adverse effects will require land treatments and continued maintenance.

Major changes have occurred in the distribution of range plant communities over the past 100-150 years, particularly in pinyon-juniper and sagebrush types. Scientists estimate that pinyon-juniper has increased in area by 5-10 times over this period, much of it at the expense of sagebrush, but some also in other types. Sagebrush has been reduced by invasion of pinyon-juniper, agricultural development, seeding to crested wheatgrass and other grasses, and intense wildfires. (These changes have been discussed in more detail in the report called "5-6 County Description and Ecology of Rangelands") Both pinyon-juniper and sagebrush stands have increased in density and cover of shrubs at the expense of native perennial grass understory. Salt desert shrub, blackbrush, creosotebush and other arid shrublands have experienced some decrease in grass cover and increased shrubs, but the extent of these types has remained relatively stable. These changes are generally attributed to heavy historic livestock grazing and lack of fire which historically prevented excessive amounts of shrubs and resulted in varying mixtures of shrubs and perennial grasses and forbs.

Increased dominance of shrubs has resulted in changes in resource values and ecological condition. Bybee et al. (2016) found that the effects of increased juniper cover and the results of shrub control were similar on "juniper" sites and on "sagebrush" sites where juniper had invaded. Reduction of perennial grasses and browse plants has led to reduced livestock carrying capacity and habitat value for many species of wildlife. (Wildlife includes many species with differing requirements; some prefer straight grassland, some dense shrubs, and some a mixture). Shrub dominated vegetation tends to have more bare soil and more connectivity in bare areas, thus increasing the risk of soil erosion by both wind and water. Many ranchers, range professionals and scientists believe that increased shrubs have also led to drying up of creeks and springs, and to increased flood intensity. Research results on these effects are mixed depending on time and amount of precipitation, soil type, and other factors. (Archer et al. 2011). However, there is general agreement that excessive cover of pinyon-juniper and mature sagebrush significantly alters ecological processes related to hydrology, biotic diversity and productivity, and value of resource outputs. It is doubtful that either mature, decadent stands of sagebrush or dense (Phase III) canopy cover of pinyon-juniper will meet the Utah Standards of Rangeland Health.

Another significant change that has occurred concurrently with the invasion and infilling of shrubs, is the invasion of non-native plants, including cool season annual grasses (cheatgrass, red brome and medusa head), annual forbs (Russian thistle, halogeton, mustards), and noxious weeds (starthistles, knapweeds, etc). These plants, especially cheatgrass, spread rapidly and are highly competitive with native plants due their high seed production, early germination, ability to

outcompete natives for moisture, etc. Some can invade good stands of native perennials, especially in wet years following drought. Others usually invade where vegetation is damaged or soil is disturbed (along roads, pipelines, around water holes, etc.). But the greatest risk is when wildfire or land treatments remove dense stands of shrubs (sagebrush and PJ) where little or no residual perennial understory exists. Not only will the annuals dominate these situations, but the increased fine fuel, which dries off early in the season, contributes to increased risk and frequency of wildfire that can effectively prevent re-establishment of natives. This risk is highest in the drier portions of the sagebrush type and moister parts of the salt desert shrub, as well as in large parts of the pinyon-juniper type, which often has invaded the sagebrush type. The risk is also present in the blackbrush, greasewood, and creosotebush types when wetter years increase the amount of fuel to carry fire.

The choice of brush control methods depends on site conditions (soil, slope), brush species (size, resprouting), amount of desirable residual understory, susceptibility of invasion by annuals, management objectives (thinning vs complete removal), multiple uses (livestock, wildlife, recreation), and other factors (such as cultural resources, legal restrictions, liability, etc).

The brush control programs carried out in the 1950s-60s were often based on the idea that the brush invasion was caused by overgrazing, so if the brush were controlled (and reseeded if necessary) it would not need further treatment under controlled grazing. We have learned that the brush will re invade with or without controlled grazing and that a maintenance program will be required if desired density of shrubs is to be achieved. Brush treatments that increase the time before maintenance is needed should be preferred from an economic standpoint.
Although uncontrolled livestock grazing and lack of fire are considered major factors in the expansion and increased density of shrubs, neither controlled grazing, including total exclusion of grazing, or prescribed burning are effective tools to rehabilitate these excessively dense stands of shrubs, particularly in the drier zones. These dense stands have crossed a "threshold" that results in a stable plant community without intervention (Briske et al 2011). Although fire was part of the historic environment, decreased fine fuels and increased total biomass have changed the situation completely. Most of these stands will not burn except under "red flag" conditions, dry, low humidity, high winds, etc. The result is much higher intensity and duration of fire than occurred in historic times, which kills not only the dense shrubs but may also kill understory perennial grasses and browse plants, which can withstand low intensity grass fires. In addition, the intense fires may destroy soil organic matter, biological crusts, and threaten human life and property. Therefore, initial brush control in dense stands generally involves high energy inputs such as mechanical, manual, or chemical treatment. Brush stands with lower shrub density and more desirable understory can be managed by these methods, and with managed grazing and prescribed burning.

Selection of the appropriate brush control method must be made on a case by case basis to fit local resource conditions, management objectives, and economics. General prohibition or limitation of particular methods should not be included in general land use plans. Specific

guidelines on how and where each type of treatment should be made are beyond the scope of this paper, but some general observations can be made.
Prescribed burning is often the least expensive method of control and is adaptable to many kinds of soils and terrain. It is best applied where residual perennial grass cover is good and brush density is not too high. Under such conditions excessively hot fires are avoided, the fires are easier to control, and they will have less damaging effects on desirable species and soils. Burning may increase the composition of sprouting, fire resistant species such as rabbitbrush. Prescribed fire is best used as a maintenance tool.

Chemical herbicide treatments, either foliar spraying or soil-applied, are also more economical than most other methods and can be applied over a wide range of soil and topographic conditions. Broadcast treatments can be used on moderate to dense stands of shrubs and individual tree application for maintenance treatments. Chemicals are more selective of species affected than other methods (other than hand treatments) and can be very precisely applied to avoid areas that should not be treated (water bodies, riparian areas, etc). Impacts to soil are less than any other type of treatment, and this may include damage to biological soil crusts, although there is not much research on that effect. Aerial application of herbicides also minimizes human activity on the ground in both scope and duration compared to mechanical, manual or burning methods. Chemical treatments can be applied to achieve total or near total control of target species, or with lower rates to only thin the stands. Unfortunately, segments of the public oppose herbicides due to alleged harmful effects that are mainly not supported by scientific research. Since herbicides do not disturb the soil and leave target plants intact, additional treatment (e.g. chaining) is usually necessary if seeding is required to cover seed.
A variety of mechanical methods are available ranging from chaining to mastication. Most of these methods are effective in the right situations. Most are limited by soil texture, depth, rockiness, slope and other site factors. Most result in some soil disturbance that may temporarily increase the risk of soil erosion, but also often increase moisture infiltration due to increased roughness of the soil. Soil disturbance is usually desirable when seeding is done either before or after applying the brush treatment. Some mechanical methods have significant effects on any residual desirable species (plowing, grubbing) while others may have minimal impacts (chaining, mastication). Although mechanical (and chemical) brush treatments in the past were often applied in large, rectangular blocks without much regard to ecological sites or landscape diversity, which is not the case today. Both mechanical and chemical treatments are planned to target the most appropriate sites (soils) and leave a diverse pattern on the landscape. Some mechanical treatments leave a lot of debris on the land (juniper especially takes a long time to decay) which is unsightly. In areas where the visual effect is important, mastication, or piling and burning may reduce the visual impact.

Manual treatment is expensive and best used for maintenance treatments or where firewood, fence posts, or other wood products can be harvested as a byproduct of the treatment.

Seeding is usually required after brush control treatments or wildfires where desirable residual understory species are lacking or inadequate to prevent risk of erosion and dominance of invasive annuals. Species seeded should be those which meet management objectives, have the highest probability of success, and are most cost-effective.

Pellant and Lisne (2005) reviewed the history and present use of crested wheatgrass for range seeding. They stated that an estimated 12.4 million acres were seeded to crested wheatgrass during the 1950-1970 period. This practices was made feasible by development of equipment such as the rangeland drill and brushland plow that made such treatments in depleted sagebrush stands effective. These seedings were made to restore a perennial grass component to increase livestock forage and to stabilize eroding soils. Increased forage production on seedings helped to reduce grazing pressure on other native ranges, and especially to provide more spring and fall grazing to balance year round forage supplies. Most of these treatments were applied in large blocks with little consideration given to effect on landscape diversity or visual impact. Although criticized at the time for reducing diversity of habitat for wildlife, and more recently as "monocultures of non-native species" by environmentalists, these seedings undoubtedly had significant benefits. Not only did they help maintain viable livestock operations, they stabilized soils and reduced the invasion of cheatgrass and other annuals, and the high risk of fire that results from that invasion. Most of the seedings have been re colonized by sagebrush to different extents and represent a much "healthier" and more productive landscape, even for sage grouse, than the large unseeded areas that have burned off and converted to annual dominance.

After some years of lower activity, there is now a general realization by range scientists and range professionals in the land management agencies that proactive management is needed to prevent dense stands of sagebrush and pinyon-juniper from burning and being taken over by invasive annuals, especially cheatgrass. This is also true in some areas of salt desert shrub, blackbrush and creosotebush. Swanson et al (2016) summed it up: "Fires will occur in sagebrush, the only question is where and how big." The consensus among range managers and ecologists is that if dense brush stands are not treated and seeded, or seeded after wildfires, a large part of the intermountain rangelands will be converted more or less permanently to annual grasses. That is considered to be undesirable from many standpoints, but it is not unprecedented. Much of the interior portion of California has been converted from a cool season perennial bunchgrass type to a cool season annual grass/forb type since the Spanish accidentally introduced these Mediterranean species into California. These rangelands are now managed as annual grassland and are quite productive. Species diversity has been enhanced by introduced species (Johnson and Mayeux, 1992).

Pellant (1996) described some of the more positive characeristics of cheatgrass as follows. Cheatgrass is especially competitive with perennial plants after a wildfire when additional, nitrogen is released by the burning of standing biomass and litter. Net primary production of cheatgrass varies considerably from year to year. Although cheatgrass has a short growing season it can produce more biomass in some years than native vegetation and seeded wheatgrasses (Hull and Pehanec 1947). They found a tenfold difference in cheatgrass production

between a wet and dry year (3,461 and 361 lbs/ac, respectively), while an introduced wheatgrass seeding produced 2,472 and 1,285 lbs/ac during the same wet and dry years." "Cheatgrass normally provides adequate cover for watershed protection. Stewart and Hull (1949) reported that cheatgrass litter effectively reduces raindrop energy and promotes infiltration. However in drought years and after a wildfire this protection is reduced and the potential for erosion is increased. The advantages of cheatgrass for site protection can be offset by the uncertainty of its presence especially on sites with erodible soils and moderate to steep slopes."
"Cheatgrass has certainly had a positive impact on the livestock industry of the region. Hull and Pechanec (1947) stated that cheatgrass was the most important forage plant in Idaho providing more than half of the forage on spring ranges in the southern part of the state. Cheatgrass probably provides more forage for livestock in Nevada than any other species (Swanson and others 1987). As discussed earlier, annual forage production of cheatgrass is highly variable (Stewart and Young 1939; Klemmedson and Smith (1964,) requiring variable livestock stocking rates. Carrying capacities for cheatgrass dominated rangelands have been estimated at 1.5 to 3.0 acres per Animal Unit Month (AUM) on "good" cheatgrass range (Hull and Pehanec 1947) to 5-8 acres per AUM on other Idaho rangelands (Klemmedson and Smith 1964)."
Pellant did not intend these comments as an argument for promoting cheatgrass (it doesn't need any help), and neither does this analysis. The statements are included to show that there are some positive values for cheatgrass, at least in terms of watershed protection and livestock production.

As pointed out above there is little question that brush stands with a good residual grass cover must be managed to prevent them from moving toward shrub cover so dense that understory is severely reduced or eliminated, and that shrub stands which have already reached that stage should be treated and seeded, or seeded after accidental "treatment" by wildfire. This raise the question of what should be seeded, and this is a very controversial topic.
"Prior to 1984, the Bureau of Land Management's guidance on post wildfire seeding encouraged the use of introduced grass species given their cost, ease of establishment, and erosion prevention capability (USDI BLM 1981). More recently, Presidential Executive Order 13112 on Invasive Species (Clinton 1999) directs Federal agencies to use native species when feasible to restore ecosystems where invasive species are a problem. Finally, the BLM's Great Basin Restoration Initiative (GBRI) gives preference to the use of native species in seeding projects, "pending seed availability, cost and chance for success." (USDI BLM 2000)." (Pellant and Lisne 2005). The policy of using native species for "restoring" or "rehabilitating" rangelands in preference to non-natives is more or less universal in the federal agencies and is written into land use plans, agency policy and even the Utah BLM's Guidelines for Grazing Management. This viewpoint has even been extended to efforts to "rehabilitate" seedings of non-native grasses such as crested wheat to return them to their "natural" sagebrush/grass composition.

Fortunately, both the BLM Guidelines for Grazing Management and most of the land use plans of both the FS and BLM have statements that allow the use of non-native species in certain conditions, for example the Utah BLM Guidelines for Grazing Management state:

"The use and perpetuation of native species will be emphasized. However, when restoring or rehabilitating disturbed or degraded rangelands nonintrusive, nonnative plant species are appropriate for use where native species:
a) are not available
b) are not economically feasible
c) cannot achieve ecological objectives as well as normative species,
d) cannot compete with already established native species."

That is a reasonable statement, and the agencies in general have used it to justify including proven non-native species in the seeding mixes used for brush treatments and fire rehabilitation. There has been renewed emphasis on research aimed at developing seed sources and techniques for seeding native grasses, forbs and shrubs as a result of the current emphasis on "restoring the natural system." However, the following is still true:

1. Crested wheatgrass and some other non-native grasses have a better chance of seedling establishment and are likely to persist longer than most natives.
2. Crested wheatgrass is more competitive with cheatgrass and sagebrush than most natives.
3. Crested wheatgrass is more tolerant of grazing and, if managed properly, is drought tolerant.
4. Crested wheatgrass has not spread significantly into areas where it was not seeded, in other words it has not become an "invasive species".
5. Crested wheatgrass can act as an ecological equivalent to native cool season grasses in terms of wildlife habitat, including nesting cover for sage grouse.
6. Crested wheatgrass results in reduced risk of wildfire compared to invasive annuals.
7. Crested wheatgrass seed is available, relatively inexpensive, and well -suited to existing seeding methods.

These statements should not be interpreted to mean that native species are not a desirable goal and some seedings of native have been highly successful, but that, if the objective is to prevent an annual grass/fire system on literally millions of acres of western rangeland, the most effective and economical means should be used. The emphasis on economics does not relate to increased livestock production or other economic uses. The cost of implementing these treatments is great given the large acreages involved, therefore, any measure which can reduce the risk of failure and reduce the cost per acre will result in more acres treated successfully for the same taxpayer dollar. Inflating the costs and risk of failure due to adherence to a "return to nature" policy does not seem a rational approach.

<u>Grazing is a tool that can be used to manage seedings to reach multiple use objectives.</u>

Pellant and Lisne (2005) point out that crested wheatgrass can be used as a "bridge community" between complete shrub dominance and a balanced community of grasses and shrubs by management. This concept recognizes that crested wheatgrass, or some other non-native species, may be the best bet to seed areas to prevent dominance of annual invasives, i.e. using one non-native species to prevent the takeover by another. Crested wheatgrass seedings

can be managed to encourage the re colonization or increase of residual sagebrush and other species by grazing management. Pellant and Lisne (2005) reviewed studies that showed that heavy grazing in spring resulted in increased sagebrush establishment in crested wheatgrass seedings. Nafus et al (2016) studied a number of crested wheatgrass seedings in sagebrush types and found that the amount of native species and sagebrush in those stands was related to the conditions that occurred at time of seeding and grazing management had a significant effect on the diversity and composition of seeded stands. The bottom line is that seeding of crested wheatgrass or other non-natives may provide long lasting protection from invasion by annuals and result in healthy rangelands that meet resource objectives as well or nearly as well as natives. They are almost certainly preferable to the annual/fire ecosystem that appears to be the alternative.

Sanders (1994) stated it succinctly:

"The question is-under what condition is it reasonable to expect to convert an annual grassland to a perennial grassland in southern Idaho? There is no magic formula to answer the question, but I will make the following suggestions.
First, get as many knowledgeable people together as you can, including the livestock permittee(s), get out on the site to be discussed and make a group decision. In the 14-inch and above precipitation zones, you might consider trying to convert to a perennial grassland through grazing management alone, such as a rest-rotation grazing system, if the following conditions are met: (1) an adequate seed source of the desired perennial(s); (2) no large populations of rabbits, grasshoppers, or Mormon crickets; and (3) no extended drought. Do not expect the conversion to occur in just a few years. Below the 12-inch precipitation zone, either (1) manage as an annual rangeland and quit worrying about using only 50 percent of the current year's growth; or (2) burn, spray, or disk in the fall, reseed with Hycrest crested wheatgrass (don't waste money on anything else) and hope for a wet spring."

*3.1.30 Fire Section*

Fire had an important role in shaping pre-settlement vegetation. Widespread changes in vegetation are due in large part to lack of fire since settlement.

Formerly viewed mainly as a destructive force in forests and rangelands, fire has come to be accepted as a major factor that shaped the species and life form composition of vegetation ranging from semi-arid grass/shrub rangelands to eastern deciduous forests. Fires were caused by lightning, and also, either deliberately or accidentally, by the Indians. It is known that Indians used fire to aid in hunting, and they may have set fires to improve wildlife habitat, keep forests open, or help clear land for farming. Fire was also used against enemies to temporarily destroy their hunting territory or deprive them of forage for their horses. And no doubt many fires were started by campfires left burning or other accidents. Probably the only vegetation types that did not have periodic fires were the desert shrub types (salt desert shrub, blackbrush, creosotebush,

etc) because there was not enough fuel to carry a fire most of the time. Alpine grass/shrublands also have little or no record of fire.

The effects of fire were mainly determined by the intensity, frequency, and extent of burning. Intensity is related to the amount and type of fuel. For example, grass fires are usually much less intense than forest fires because the amount of fuel is lower which results in shorter duration of high heat. Grasses are well adapted to withstand fire (as they are adapted to grazing) if it is not too intense. Some shrubs and trees are adapted to fire because they re-sprout or have thick bark to withstand the heat. Frequency of burning generally increased from the lower precipitation types (e.g. Wyoming big sagebrush) to higher precipitation zones (Mountain big sagebrush, ponderosa pine), probably due to increased fuel and increased lightning, and maybe more Indian activity. The extent of burning (size of fires) was affected partly by topography; more dissected topography has more natural fire breaks than rolling or smooth topography, and this is why the Colorado Plateau region was probably less affected by fire than the Great Basin. European settlers viewed fire as a threat to human life, property, and resources (timber, grass, crops) and therefore tried to prevent or control fires. Prairie fires were greatly feared by early homesteaders, and large forest fires related to early logging practices in the lake states and northwest burned a number of towns in the late 1800s, with considerable loss of life. When the Forest Service was created shortly after, it adopted a zero-tolerance policy for forest fires. This policy has been generally followed by other agencies and local residents. Livestock grazing on rangelands and forestlands also reduced fine fuels needed to carry ground fires. The result has been that woody plants have increased in density and/or extent and the danger of high intensity fires has increased due to closing of tree or shrub canopies, providing a "ladder" for fire to reach into the crowns of trees, and increased fuel loadings.

Re-establishing a "natural" fire regime is not necessarily desirable and probably not feasible in most vegetation types.

Although there were early advocates for the role of fire and its use in range management, prescribed burning had limited use in most of the West until recently (it has been widely used for many years in the tallgrass prairies and southern U.S.). Increasing size and intensity of wildfires all over the West in the past few decades due to increased fuel loadings and drought have focused attention on the problem and how to deal with it. Agency policies have shifted from complete suppression to attempts to reduce wildlife risk (by thinning, greenstripping, etc) and trying to use prescribed fire as a tool to manipulate vegetation and fuel to prevent catastrophic fires.

Considerable research has been oriented toward understanding the historical occurrence of fire in different vegetation types. This information has formed the basis for the stated goal in some land use planning to "restore" the natural role and frequency of fire in the ecosystem. This goal is based on the concept that the "historical" vegetation represented a naturally and properly functioning ecosystem, and that the goal of resource management should be to restore that system to the extent possible to achieve ecosystem "health." While it is interesting and useful to

understand historical fire regimes, restoring those regimes is not necessarily a desirable or feasible goal for several reasons.

First, the vegetation has changed considerably over the past 100-150 years due to lack of fire. In most cases, it is not possible to have a fire that approximates the intensity and frequency of historical fires because the species composition, canopy closure, fuel type and other features have changed. In many, if not most, situations vegetation treatments (brush clearing, thinning, seeding, etc) will be required to create conditions that will support the types of fires that burned naturally. For example, ground fires historically burned in ponderosa pine forest with little effect on open stands of trees, but that situation cannot be restored without thinning out the undergrowth of pine, juniper and other shrubs and re-establishing a good grass understory. Second, a return to "natural" fire regimes may be impossible even if vegetation treatments are used to reduce fire danger. The climate that prevailed during the formation of historical vegetation patterns has changed and probably will continue to change (especially if the global climate change alarmists are correct). The end of the "Little Ice Age" about 150 years ago has been followed by a general warming trend, which probably would have increased fire frequency except it coincided with European settlement in the West (Miller and Tausch, 2001). In addition, there have been introductions of a number of non-native annual plants, e.g. cheatgrass, red brome, annual forbs, noxious weeds, which were not part of the "natural" system and which now are a permanent component of the vegetation. The dream of returning the public lands, including the national parks, to their natural and pristine condition, or something like it, is simply not a realistic goal. Miller and Tausch (2001) summed it up very well (the references cited are in their publication): "Each combination of species, environment, and topography is in some way unique in both space and time. There is no "natural vegetation" in the common usage or interpretation of the term based on equilibrium conditions. Many ecological principles and concepts, and the ecosystem paradigms derived from them will need revision to incorporate the past, present, and future spatial and temporal variation. Today, no area is without some level of human impact (West1993). Future communities can never be exactly what they were (Box 1992). Our current knowledge is still insufficient to fully grasp, much less predict, the interactions between future climate change and terrestrial ecosystems (Mooney 1991). Overall, the history of climate change; our land use impacts; our alteration of atmospheric chemistry and the potential effects of such alteration on current plant growth (Bazzaz and Garbut 1988) and future climate; the introduction of exotic species; and other human alteration of environmental conditions make present and future conditions unique and the long-term consequences unknown. Because every community is influenced by many spatial and temporal factors, nonmanagement is impossible. A hands-off approach is also management, and will usually result in community dynamics that are new and possibly undesirable (Box 1992, Diamond 1992, West 1993). Management principles need revision to address nonequilibrium theories (Johnson and Mayeux 1992). This will involve an ongoing interaction with nature (Botkin 1990) through continuous management and monitoring of the direction and rates of vegetation change (West 1991)."

Finally, even if we could restore the "natural range of variability" in forest and rangeland ecosystems, there is no necessary reason to think that this would meet current and future desired

conditions for resource values and outputs. The concept that ecosystem productivity can only be sustained by mimicking the "natural" functioning of the system assumes that we know the "historical" system was in fact being maintained and that no other vegetation/animal community is capable of sustainability. The concept of finely balanced ecosystems that must have all the pieces in place to function properly (e.g. keystone species, management indicator species, etc) does not seem borne out by experience (see Johnson and Mayeux 1992).

Reducing or eliminating dense shrub cover that supports high intensity wildfires and increasing perennial grass understory can reduce severity of fire effects.

The effects of fire on vegetation, soil organic matter, biological soil crusts, small animals, and other ecological factors depends on the intensity and duration of the fire. Dense stands of shrubs (e.g. sagebrush, pinyon-juniper) may have a lower risk of burning than grasslands but the intensity of fires is increased due to higher amounts of fuel that increase temperature and duration of the fires. Although most grasses and many shrubs are adapted to periodic fire, extreme fire intensity can kill even these plants, leaving the burned site barren and subject to invasion by annual weeds and grasses that can spread rapidly into unoccupied land. Therefore, reducing shrub cover in dense stands or maintaining open stands of shrubs with a good understory of perennial grasses, forbs and low shrubs can reduce the damaging effects of wildfire, make wildfire control more effective, and help reduce invasion of weeds and annual grasses (Bybee, et al 2016).

Livestock grazing can be a tool to help control the intensity, frequency and extent of both prescribed fire and wildfire.

Historic livestock grazing was no doubt a factor in reducing the incidence of wildfire and thereby contributing to the increases in shrub cover. However, the fact that livestock grazing can reduce the risk and intensity of wildfires means that it is an effective tool that can be used to manage fire. Although the use of livestock as a tool in fire control has long been recognized, there has been relatively little research on this topic and it has not been widely used by land management agencies. Some recent research is discussed below.

Davies, et al. (2015) stated: "Wildfire in Wyoming big sagebrush communities increases the risk of exotic annual grass invasion, results in short-term loss of forage, and decreases habitat for sage-grouse and other sagebrush-associated wildlife species for decades. Fuel treatments are needed to reduced wildfire risk and increase plant community resilience to fire and resistance to post-fire exotic annual grass invasion. Considering the expanse of the Wyoming big sagebrush ecosystem, grazing is probably the only logistically feasible treatment." They studied the effects of moderate grazing by cattle during the growing season on fuel characteristics and post-fire recovery. In another study they investigated the effects of winter grazing by cattle on fuel characteristics and fire behavior. Grazing reduced fine fuel height, accumulation and continuity. Winter grazed areas were unlikely to burn until late August because grazing increased fine fuel moisture content. Ungrazed areas were dry enough to burn in late June to early July. Moderate

grazing also increased the resilience of native herbaceous vegetation to fire and decreased exotic annual grass invasion. They concluded that properly applied grazing can be an effective tool to reduce wildfire risk and severity and decrease the risk of post-fire exotic annual grass dominance.

Davies et al (2016) studied effects of winter grazing in Oregon on Wyoming big sagebrush rangeland. Winter grazing at 40-60% utilization for several years reduced fine fuels but did not negatively impact species composition. This level of grazing might reduce cover for some types of wildlife but should help reduce fire danger and/or the adverse effects of fire. Historical grazing that reduced wildfire occurrence in the past often was very heavy compared to current concepts of conservative or moderate grazing. That heavy grazing not only reduced fire occurrence it often had other adverse impacts on vegetation composition and soils. Some may question whether grazing at levels compatible with maintaining a desirable soil and vegetation condition can effectively reduce fire risk or effects. Decker and Thacker (2015) reported on research on the effects of utilization rate on fire characteristics. They stated: "Wildfires in the Western United States have increased in size and frequency in recent years. Land managers have sought tools to reduce fuels and thus reduce wildfire risk. Fuel reductions increase the ability of wildland fire fighters to suppress wildfires and protect wildland-urban interfaces. Grazing has been identified as a tool to reduce fine fuel and thus decrease flame lengths and rate of spread. Often fine fuel treatments rely on high levels of grazing utilization (> 80%). However high levels of utilization can lead to ecological degradation by reducing or eliminating native bunchgrasses." They simulated grazing at 30%, 50% and 80% utilization by clipping and modelling expected fire behavior based on residual fuel. They concluded that moderate grazing can provide fuel reductions that are sustainable and maintain "ecological integrity."

The studies above refer to use of grazing on a pasture basis, i.e. as part of an overall grazing plan. Effective use of livestock grazing for reducing fire risk and/or intensity would require that that the overall grazing plan include this objective as well as the usual objectives of sustainable range condition, livestock production and multiple use concerns. These plans might include intensities of use or seasons of use that were different from the typical patterns for a given area. For example, pasture rotations might be planned to produce a mosaic of grazed/ungrazed pastures intended to aid in control of the spread of wildfires.

It would be expected this kind of use of livestock as a "tool" to aid in fuel reduction or fire control might have adverse effects on livestock production. For example, a shift to winter grazing might lower animal performance. When the use of livestock to reduce fires on government lands results in adverse effects on livestock production or increased expenses for livestock operators without increased benefits to the operation, the livestock operator should be compensated in some way to offset his financial loss. This concept has been recognized in cases where livestock contractors have been employed to graze firebreaks or other right of ways to clear brush or reduce fire dangers. Mostly this type of grazing has been done with goats to produce heavy grazing on limited areas. The main objective in this situation is the effects on vegetation, not profitable livestock production, so the contractors are paid to apply the treatments

and returns to the livestock are incidental. This practice has been employed by BLM in the St. George Field Office to clear fire breaks near St George, for example.

*3.1.31 Feral Horses and Burros Section*

Feral horses and burros should be maintained at numbers not to exceed the established Appropriate Management Levels to avoid resource damage and competition with wildlife and livestock.

"Wild horses and burros" are feral animals, which are defined as those having escaped from domestication and gone wild. They are supposed to be confined to "herd management areas" (HMAs), which are areas where they existed at the time of passage of the Wild Horse and Burro Act, and at levels which will protect the range resource and the well -being of the animals (Appropriate Management Levels or AMLs). This requirement has not been met consistently on either FS or BLM lands as is indicated in land management plans, environmental impact statements, and other documents produced by those agencies in the 11 County Area. BLM's 2016 data show almost three times the AML of horses and burros present on public lands in Utah. The result has been resource damage, loss of livestock forage, and competition with wildlife, e.g. some allotments have failed to meet range health standards due to wild horses. (see Hall et al.2016)

Feral horses and burro numbers should be controlled by the most cost effective humane methods available.

Horses and burros increase rapidly because they have few natural enemies, therefore, there is a continuing need to reduce their numbers to the carrying capacity of the range by removal or killing. "Birth control" approaches advocated by some have not proven effective. However, control efforts have been hampered by policies of the agencies which restrict the sale and/or slaughter of excess animals as would be done for any other kind of livestock and most wildlife. These methods are not prohibited under the Wild Horse and Burro Act. Most of BLM's appropriations for the wild horse and burro program are spent on caring for surplus animals that cannot be disposed of rather than managing the herds and ranges where they occur.

Utah's standards of rangeland health should be applied on HMAs and where they are not met due to wild horse and burro grazing, action should be taken to reduce numbers or take other management action, as is required on grazing allotments.

The Utah standards for rangeland health are intended to be applied to all BLM lands and all uses of BLM lands, not just livestock grazing.

*3.1.32 Endangered Species and Livestock Grazing Section*

Adaptation of livestock grazing management to meet management objectives for threatened or endangered species (TES) must be based on sound scientific information and relevant to the local situation.

Government agencies are required by law to protect endangered species and their habitats, and to use the best available science in doing so. Unfortunately, because these species are often relatively rare, there may not be a large amount of solid scientific information available on their requirements or population trends. Government land use plans, environmental statements, and biological opinions often allege that current livestock grazing is the cause, or one of the causes, for reducing the habitat of or directly affecting the population of endangered species. Extensive references to published or unpublished literature are used to back up those statements, and reduction or elimination of grazing is proposed. However, the literature cited in these documents does not always support the position being taken.
A team of scientists from the University of California reviewed the scientific basis for the FS Sierra Nevada Ecosystem Project, at the request of the FS (Allen-Diaz, et al. 1999). Some of their conclusions were:

1. Statements about livestock grazing effects often did not distinguish whether grazing was managed or not, i.e. stocking rates, season of use, etc.
2. Statements often did not distinguish between historical and present grazing effects.
3. Many of the citations of "science" were in fact based on observations, case studies, speculations, or hypotheses rather than controlled experiments.
4. Broad generalizations based on review of literature were applied to specific situations without verification.

These issues can be seen in many of the documents relating to endangered species, and other topics such as water quality. This does not represent the "best available science". There is no doubt that livestock grazing CAN be detrimental to some endangered species (or other species for that matter) but that is meaningless unless it is specified under what conditions the effects result. A comparison would be to say that hunting can be detrimental to wildlife, which is true, but has little relevance to hunting conducted with controlled seasons and bag limits.

There is very little scientific basis for claims that managed livestock grazing is incompatible with endangered fish species.

Rinne (1999), fishery biologist with the FS Rocky Mt. Experiment Station, concluded the following: "Information on the relationships or linkages between livestock grazing and fishes in the western and southwestern United States is sparse. Although much information in the literature demonstrates the direct impact of livestock grazing (herbivory) on vegetation and less on streambanks (trampling, compaction), limited information on the indirect effects of grazing on fishes and their habitats (e.g. channel morphology, streambanks, cover, instream substrates, water column characteristics) exists. Further, most available information is not scientifically

derived and/or addresses salmonids and domestic livestock only. In the southwestern United States, cypriniform species of fishes and large, wild ungulates, especially elk, must be considered critical components of the "fish-grazing" management and research paradigm. Future management and research must address these two components within the context of linkages to watersheds, riparian areas, riparian habitats, fish habitat, and fish communities (native versus introduced species). Efforts must embrace adaptive management, intra- and interagency management-research partnerships, and data collection rather than opinions, summarizations, and promotion of the litany of information on fish-grazing relationships that often has been adopted as fact."

There is very little scientific basis for claims that livestock grazing is the reason for population declines of the desert tortoise or that grazing is incompatible with tortoise conservation.

Boarman (2002), a wildlife biologist with the U.S. Geological Survey, reviewed all the studies available on the effects of livestock grazing on the Mojave Desert tortoise, including direct effects (such as trampling) and indirect (such as modification of vegetation), and concluded there was no convincing scientific evidence that implicated grazing, especially cattle grazing, with the decline of desert tortoise populations.

There appears to be very little evidence linking the decline of sage grouse populations or sage grouse habitat with current livestock grazing practices.

Most of the decline in sage grouse population seems to be attributed to a reduction in the extent of sagebrush vegetation, although the effects of drought and predators are also mentioned. Livestock grazing is usually listed as one of the causes for decline in sagebrush. This statement is somewhat misleading. If anything, heavy historic livestock grazing tended to increase sagebrush cover due to reduced competition from perennial grasses and other shrubs. However, heavy livestock grazing was also a factor in the reduced occurrence of fires which has led to invasion of juniper into sagebrush stands and reduced sagebrush cover. These dense stands are now subject to increased risk of intense fires and replacement of shrubs by invasive annuals due to lack of perennial grass understory. Although the extent of sagebrush stands was reduced by brush control and seeding to crested wheatgrass to improve forage for livestock, these stands of perennial grasses have been and are being re-invaded by sagebrush and are less susceptible to dominance by annuals, due to competition from perennials and lower susceptibility to wildfire, than areas with heavy shrub cover and no perennial understory. There does not seem to be any real evidence that current livestock grazing has much, if any, adverse impact on sage-grouse populations or habitat, and may actually be a useful tool in helping to reduce damage from wildfires and encourage re invasion of sagebrush into areas rehabilitated by seeding.

The Endangered Species Act (Sect 4 (b)(2) states: ) "The Secretary shall designate critical habitat, and make revisions thereto, under subsection (a)(3) on the basis of the best scientific data available and after taking into consideration the economic impact, and any other relevant impact, of specifying any particular area as critical habitat."

This language seems to indicate that conservation of endangered species must take into account effects on other resources and values rather than taking precedence over all other considerations. The law has often not been applied in that manner.

*3.2 Objectives*

Desired future conditions of rangelands are those which will result in a sustainable ecological system while providing products, values and services for the benefit of present and future inhabitants of the county. Although understanding historical changes in vegetation and other resources is useful, restoration of "natural" or "original" conditions is neither a realistic or desirable goal.

Wayne County's objectives are to manage with the goal of restoring and maintaining maximum forage for livestock at originally permitted livestock AUM levels for all BLM and Forest allotments as the health and sustainability of each allotment allows.

Agricultural and grazing lands in Wayne County should continue to produce the food and fiber needed by the citizens of the county, state and nation, and the rural character and open landscape of Wayne County should be preserved through a healthy and active agricultural and grazing industry, consistent with private property rights and state fiduciary duties.

Active AUMs on public lands grazing allotments in Wayne County should return to their originally permitted levels, as the health and sustainability of each allotment will allow through active management. In the interim, the amount of domestic livestock forage expressed in animal unit months for permitted active use as well as the wildlife forage imputed in that amount, should be no less than the maximum number of animal unit months sustainable by range conditions in grazing allotments and districts, based on an on-the-ground and scientific analysis.

When practices described in the preceding paragraph increase a grazing allotment's forage beyond the total permitted forage use that was allocated to that allotment in the last federal land use plan or allotment management plan still in existence as of January 1, 2005, a reasonable and fair portion of the increase in forage beyond the previously allocated total permitted use should be allocated to wildlife as recommended by a joint, evenly balanced committee of livestock and wildlife representatives that is appointed and constituted by the governor for that purpose.

Wayne County opposes grazing buyouts, and any other scheme to retire grazing AUMs and keep them from proper public use by qualified grazers. When grazing AUM's are given up by a public lands livestock grazer, those AUMs need to go back on the market for other qualified grazers to acquire and utilize.

Wayne County supports determining to what extent overgrazing by elk and other wildlife is taking place in months off season to domestic grazing.

Wayne County supports more accurate wildlife counts.

*3.3 Policy Statements*

1. Wayne County's plan, policy and target for active AUMs in each of these allotments, is to restore active AUMs to the original permitted AUMs for each allotment and pasture when these were first established under the Taylor Grazing Act. All rangeland management practices and vegetation treatment practices and livestock management practices should be geared toward this goal of restoring active AUMs to original permitted levels.

2. Wayne County opposes the relinquishment, retirement, phasing out, or other elimination or reduction of AUMs in favor of conservation, wildlife, and other uses.

3. Transferring grazing AUMs to wildlife for supposed reasons of rangeland health is a false concept. The only scientifically valid and proven way to improve wildlife counts is to restore grazing to originally permitted levels as rangeland conditions allow. Wildlife numbers improve as livestock grazing conditions improve. Any policy that fails to recognize this important principle is misguided and destined to fail.

4. Reductions in domestic livestock animal unit months must be temporary and scientifically based upon rangeland conditions. Any grazing animal unit months that are placed in a suspended use category should be returned to active use as soon as range conditions improve.

5. Upland rangelands has vegetation cover and composition which will insure sustained productivity considering site potential and historical impacts. Range and watershed condition or "health" is determined based on best available science and experience without reference to intended uses. Assessment of range/watershed condition is based on establishing the kind and amount of vegetation that will furnish soil protection and useful vegetation production considering the potential of the site, not necessarily restoring "natural" conditions.

6. Water quality meets State standards which reflect appropriate uses and local potential to meet standards.

7. A thriving wildlife population will be present representing management aimed at a range of species rather than focus on only one or a few.

8. Noxious and invasive weed infestations are detected early and controlled by chemical, mechanical, or biological means.

9. Feral horses and burros be maintained at numbers not to exceed the established Appropriate Management Levels to avoid resource damage and competition with wildlife and livestock and restricted to the designated herd management areas. Excess numbers controlled by effective and cost effective means, including sale of marketable animals and humane disposal of unmarketable animals. Permitted livestock is not affected by increase of horse numbers above planned numbers.

10. Livestock grazing, and other land uses, is not reduced or unnecessarily impacted due to the presence or potential presence of endangered species without solid scientific data showing that such action will in fact have positive effects on the survival of the endangered species. Private landowners impacted by endangered species will be compensated for any loss of productivity and/or property value.

11. Livestock grazing will continue to be an important use of rangelands on both public and private lands and given full consideration under multiple use management.

12. Livestock trailing through Capitol Reef National Park should be allowed to continue in perpetuity.

13. Management plans for rangelands are based on close coordination among landowners (federal, state and private) and other interests (state and county agencies, other range users). Changes in management plans are supported by monitoring of soil, vegetation and other relevant resources done by qualified personnel using scientifically accepted methods.

14. Desert shrub types (greasewood, blackbrush, salt desert shrub, etc) are managed to maintain a dominance of shrubs with a good understory of perennial grasses and forbs (depending on site potential). Invasive annuals are absent or of minor extent. These objectives generally refer to black sagebrush and low sagebrush vegetation also.

15. Big sagebrush (Basin, Wyoming and Mountain Big Sagebrush) are managed to maintain a good understory of perennial grasses and forbs with an overstory of big sagebrush and browse shrubs (on appropriate sites). Invasive annuals are absent or of minor importance. Prescribed grazing and periodic brush treatments are used to prevent loss of the perennial understory and complete dominance of mature sagebrush. Landscapes exhibit a diverse mix of sagebrush communities ranging from almost all perennial grass and forbs to moderately dense stands of sagebrush, depending on treatments applied and the time since treatment. Sites having the potential to support productive sagebrush/grass communities have pinyon- juniper completely removed or reduced to a minor component depending on site specific management objectives.

16. Pinyon and juniper is eliminated or reduced on any site that has the potential to support grassland, sagebrush grassland, or other vegetation types more useful in terms of watershed condition and resource outputs, unless it has been determined, on a site specific basis, that PJ does not jeopardize watershed condition and adds to the combined resource outputs and values on the site. On sites where pinyon-juniper occurs that do not have potential for good perennial grass and shrub cover, or where technology is lacking to establish such cover by reasonable efforts, pinyon-juniper stands are maintained in an open canopy state when possible to prevent catastrophic wildfire and stand replacement with invasive annuals.

17. Aspen stands have a good understory of forage plants for livestock and wildlife; encroachment of coniferous trees is controlled.

18. Ponderosa pine stands are maintained in an open condition which will support a good understory of perennial grasses and browse plants and periodic low intensity fire. Encroachment of shrubs or excessive density of pine reproduction that can support stand replacing crown fires is prevented.

19. Mixed conifer stands are prevented from invading other forest types or mountain grasslands.

20. Riparian areas are managed to prevent excessive erosion and deposition of sediment and impaired water quality that results, with recognition that these processes may have begun in the past due to natural and/or man caused factors and may continue far into the future regardless of the management applied. The desired vegetation varies from one riparian situation to another depending on temperature regime and on the amount, timing and reliability of stream flow, and the desired uses of the vegetation for wildlife, livestock, or recreational purposes.

21. Encourage and support public land agencies along with private resources to develop and maintain three part exclosures to determine the animal(s) responsible for off season overgrazing.

22. The DWR determine a more equitable compensation for domestic grazers negatively impacted by wildlife over-grazing and private landowners negatively impacted by trespassing wildlife.

23. A third party contractor acceptable to all parties be obtained by the State to obtain wildlife counts and also support exploring other methodology published in scientific literature to obtain better accuracy.

Chapter 4
# Geological and Paleontological Resources

## *4.1 Resource Findings*

Wayne County is a treasure chest of geological wonders and paleontological finds. The beauty of the County's geology is not only the varied colors and structure, but also the exposure which allows one to read it almost as a book. From the High Plateaus area in the western part of the County to the Waterpocket Fold in the center to the Henry Mountains, Green River Desert, and Inner Canyonlands areas on the east Wayne County is full of great geology to explore. Most of the geological formations exposed are sedimentary in origin with a few igneous rocks in some parts of the County. Paleontological resources are integrally associated with the rock formations in which they are located. The geographic extent of the lands within the County contains many sedimentary geologic formations at the surface, most containing paleontological resources.

### *4.1.1 Geologic Tour - West to East*

Starting on the west side of the County on the Awapa Plateau standing on late-Tertiary volcanic rocks and traveling east into Rabbit Valley on the down thrown side of the Thousand Lake fault then crossing the fault at Red Gate. A narrow gap southeast of Bicknell where highway 24 and the Fremont River come together. This is where you first encounter the red cliffs of the Wingate Formation. Traveling east towards Torrey the Wingate forms the beautiful red cliff on your left. Soon you can see the Cocks Comb Monocline on your right. This is a ridge of whitish Navajo Sandstone which marks the Teasdale fault. Traveling on through Torrey you begin to see Miner's Mountain or Teasdale Anticline on your right jutting out eastward then dropping of abruptly. As you exit Torrey you soon start to descend and can begin to see the Waterpocket Fold or Capitol Reef in the distance eastward. Making your way down and over the Moenkopi hills and drainages as you head toward the reef. Named the reef because it acted as a barrier to early travelers moving east or west through the area. Only a few drainages could be followed through it. As you enter Capitol Reef National Park you begin moving up the geologic section through younger and younger sedimentary rocks. You are soon following the Fremont River and surrounded by Navajo Sandstone with its numerous small rounded hollows or tafoni. Larger cavities in the Navajo are "waterpockets" that give the fold its name (Chronic, 1990).

Breaking out of the canyon you begin to see the gypsiferous Carmel Formation with the evaporate minerals evident in the cliff to your right. You soon enter the Painted Desert area with Morrison Formation redish purplish clays in a valley just before you go through the gate of the Dakota Sandstone and enter the Mancos Shale flats near Caineville. Passing through the Mancos you cross a syncline edge and start again into older rocks starting with the Dakota. You are soon back into the Morrison and the Summerville Formation with thin bedded reddish brown bluffs then into Hanksville.

Leaving on highway 24 heading north from Hanksville you see windblown sand and buttes of Entrada Formation. You can soon turn east and head into the San Rafael Desert towards Horseshoe Canyon and Hans Flatt. Past the Hans Flat ranger station the road goes south through Gordon Flats along the edge of the Orange Cliffs which mark the end of the Wingate cliff former and the beginning of what old timers called the area Under the Ledge. The Flint Trail drops off this Wingate ledge. Before dropping of this ledge you can look east across Inner Canyonlands rugged dissected country towards the Green River. This country rises slightly to the east as you are on the western flank of the Monument Upwarp and the light colored rocks of the Permian Cedar Mesa Formation are visible near the river. The Green River and Colorado River south of the confluence marks the eastern boundary of Wayne County.

*4.1.2 Paleontology*

With the exception of Cenozoic volcanic rocks that occur on the Awapa Plateau, Wayne County is composed almost entirely of Mesozoic sedimentary rocks. Agate and petrified wood are relatively common and spectacular large crystals of gypsum have been mined from private claims. Fossils are abundant in some of the Mesozoic rocks (Wilson, 1995).

Some of the most popular and best known paleontological resources in the county are; dinosaur bones found in the Morrison Formation, oyster shells and shark teeth found in the Mancos Shale Formation, and petrified wood found in the Chinle Formation.

The following lists the formations, depositional environments, and fossil types that can be found in these geologic formations.

| Formation Name | Depositional Environment | Fossils Present |
|---|---|---|
| Surficial Alluvium and Colluvium | Several | Vertebrate |
| Surficial Older Alluvium and Colluvium | Several | Vertebrate |
| Volcanic Rocks,Undivided | Volcanic with some Fluvial | Invertebrate |
| Dipping Vat Formation | Fluvial | Plant |
| Sevier River Formation | Fluvial, Lacustrine | Vertebrate; Invertebrate |
| Mancos Shale | Marine | Vertebrate; Trace vertebrate; Invertebrate; Trace invertebrate;Plant |
| Dakota Sandstone | Beach to Marginal Marine (Deltaic) | Vertebrate; Invertebrate; Plant; Trace |
| Cedar Mountain Formation | Fluvial | Vertebrate; Trace vertebrate; Plant |
| Morrison Formation | Fluvial | Vertebrate; Trace vertebrate; Invertebrate; Plant |
| Summerville Formation | Tidal Flat | Trace vertebrate |
| Entrada Sandstone | Nearshore Eolian | Trace vertebrate; Plant |
| Carmel Formation | Shallow Marine | Trace vertebrate; Invertebrate, Plant |
| Navajo Sandstone | Eolian | Trace vertebrate; Plant |
| Kayenta Formation | Fluvial | Trace vertebrate; Plant |
| Wingate Sandstone | Eolian | Trace vertebrate |
| Chinle Formation | Fluvial | Vertebrate; Trace vertebrate; Invertebrate; Plant (wood) |
| Moenkopi Formation | Marine/Tidal Flat | Vertebrate; Trace vertebrate; Invertebrate; Trace invertebrate; Plant |

*4.2 Objectives*

Wayne County's objectives as to geological and paleontological resources are to apply multiple use and sustained-yield management principles. To keep land accessible and to maintain and keep open roads to and across federal land, including all rights-of-way vested under R.S. 2477, to allow the public enjoyment and use of these resources, while preserving the natural beauty and character of them.

*4.3 Policy Statements*

1. Multiple use and sustained-yield management principles shall be applied in public land use and natural resource planning and management in Wayne County. This is how the citizens of Wayne County are best served. Multiple-use and sustained-yield management means that land owners and land management agencies should develop and implement management plans and make other resource-use decisions that support these statements.

2. To achieve and maintain in perpetuity a high-level annual or regular periodic output of mineral, energy development and various other resources from public lands in Wayne County.

3. To support valid existing transportation, mineral and energy development, privileges in Wayne County at the highest reasonably sustainable levels.

4. Support management plans that are designed to produce and provide the desired energy and minerals development that are necessary to meet present needs and future economic growth and community expansion in Wayne County without permanent impairment of the productivity of the land.

5. To meet the recreational needs and the personal and business-related transportation needs of the citizens of Wayne County by providing access throughout the county.

6. To meet the needs of economic development.

7. To meet the needs of community development.

8. To support the keeping of significant paleontological finds in the county in a public museum.

Chapter 5
# Irrigation, Water Rights, Ditches and Canals

## *5.1 Resource Findings*

### *5.1.2 Water, the First Necessity (Murphy, 1999 & UDWR, 2000)*

A book could be written entirely about the history of water in Wayne County. Water dictated the location of towns and sometimes led to their abandonment; it fostered numerous cooperative enterprises yet also created conflict and occasionally led to court cases. Every family needed water for culinary use and to irrigate field and garden crops and to water livestock. Indeed, the first white settlers crossed the High Plateaus because there appeared to be abundant water in Fremont or Rabbit Valley as well as land for grazing and farming.

Since the first settlers in Rabbit Valley lived on scattered homesteads, they took irrigation and culinary water from the Fremont River or smaller streams like Road Creek or Spring Creek as best they could.

As settlers began to move into the area, they immediately dug ditches and build small storage facilities to irrigate their crops. As settlements grew, they collected spring water and dug wells for their culinary water needs. These early developments, although small, still provide a portions of water supply in the county.

### *5.1.3 Irrigation*

Farmers around Teasdale built several small reservoirs on Donkey Creek and Bullberry Creek. In 1950 the dam on Bullberry Creek washed out and it was never rebuilt. Farmers around Grover began irrigating lands in 1893 and built outlet structures on Fish Creek Lake to draw more water out of this small natural lake.

Between 1955 and 1985, the U.S. Agriculture Stabilization and Conservation Service and the Utah Board of Water Resources provided funding for the conversion of flood irrigation practices to sprinkler irrigation. Western Wayne County is one of the first areas of the state where all of the farmland was completely converted to sprinkler irrigation.

A number of irrigation and canal companies have been formed in Wayne County over the years. Water user groups include the Fremont, Road Creek, Torrey, Sand Creek, Teasdale, Grover, Hanksville, Chadburn/Leavitt/Hickman, Jensen & Hiskey, Maxfield/Blackburn/Black, and Pine Creek, irrigation companies and the Hanksville and Caineville Canal Companies.

All the irrigated land in Wayne County is within the Dirty Devil sub-basin. The sub-basin has approximately 27,700 acres of irrigable land. The total diversions for agricultural purposes are 83,400 acre-feet of water annually, with depletions of 43,600 acre-feet (UDWR, 2000). Irrigation diversions for Wayne County are from the Fremont River and on average total approximately 60,000 acre-feet of water per year. Reservoirs in the Upper Fremont area provide adequate storage for users in Rabbit Valley. However, there is no storage reservoir in Lower

Fremont area, causing shortages during the late irrigation season for agricultural users in the Caineville/Hanksville area (Wayne County Water Conservancy District, 2014).

Water, Irrigation, Ditches and Canals are all important to the agriculture industry and to communities and to any energy development that could come into play and is very important to the economy, recreation, and general life style of residents of Wayne County. The County has a good system of water conveyance for irrigation and ample water rights. The system could be improved by piping some canal sections and adding reservoir storage capacity.

*5.1.4 Water Rights*

Water rights in Utah, as in other Western states are founded on the doctrine of "prior appropriation" and are administered by the State Engineer. All waters are public property in Utah (UT Water Rights, 2005). The State Engineer's office also directs the adjudication or re-adjudication of water rights, along with licensing of well drillers, dam safety, stream alteration, and water rights enforcement.

A ***water right*** is a right to the use of water based upon 1) quantity, 2) source, 3) priority date, 4) nature of use, 5) point of diversion and 6) physically putting water to beneficial use (http://www.waterrights.utah.gov). The "right" to use water is obtained through an application and permit issue process through the State Engineers office, **if** the basin in which your property is located is open to appropriation.

The right to use water from a surface source, which is delivered through a canal, ditch, or pipeline by an irrigation company, is held by the company. Some irrigation companies also own water rights in ground water wells in order to augment surface water supplies in times of shortage. The individual "shareholders" in an irrigation company do not own the water right in a legal sense. This right is allocated to the shareholders proportional to the number of shares owned by the individual shareholder. The value or quantity of water allocated to a "share" of water is not constant throughout the state and varies considerably from one irrigation company to another. In some canal companies a share of water is allocated per acre, whereas in others, three or four shares may be needed to provide sufficient irrigation water for one acre of alfalfa.

All waters in Wayne County are owned exclusively by the State of Utah in trust for Wayne County's citizens, are subject to appropriation for beneficial use, and are essential to the present future prosperity and quality of life within the Wayne County. The State of Utah and Wayne County have the right to develop and use its entitlement to interstate rivers, including some of the Colorado River drainage that flows through Wayne County. All water rights desired by the federal government must be obtained through the state water appropriation system.

The Wayne County Water Conservancy District was created on June 2, 1975 for the purpose of developing water supplies for municipal, agricultural, industrial, commercial, recreational and other uses to benefit the citizens of Wayne County. The Utah Water and Power Board filed an application (A32509) to appropriate water with the Utah State Engineer on November 29, 1960 and Water Right Number 95-434 was approved on June 20, 1963. The Utah Water and Power Board assigned the application to the District on August 1, 1975. The

application was filed to appropriate 97,803 cubic feet per second (cfs) or 49,660 acre-feet of water for stock watering, irrigation and municipal purposes. The original application has been modified by approved Change Application Number a31113 which added additional points of diversion, additional places of use additional uses and additional storage mostly in the Green River area (Wayne County Conservation District, 2013).

Overall water quality and quantity are not an issue for Wayne County except in years of draught. As noted some shortages occur in the lower county due to lack of storage or flooding. Flooding also results in sediment issues which must be addressed both after large events and also on a regular maintenance basis.

*5.1.5 Ditches and Canals*

In the late 1800's many ditches and canals were built for irrigation in the vicinities of Fremont, Loa, and Bicknell. The Fremont Irrigation Company was formed in 1889 to promote good feelings among the water users of Fish Lake and the Fremont River, and to manage such waters. Fish Lake water was purchased in 1889 by the irrigation company from the Paiute Indians. The Fremont Irrigation Company first built the Thurber Canal (now the Highline Canal) and them in 1890 negotiated with Johnson Valley ranchers for the purchase of their land to construct Johnson Valley Reservoir, which was completed in 1899. A controversy over water rights between stockholders and non-stockholders began. The McCarthy Court Decree of 1902 and the construction of Forsyth Reservoir in 1917 were the solutions to the dispute. Forsyth Dam washed out in 1921, but was rebuilt in 1925. Mill Meadow Dam was built in 1955 for the irrigation company and financed by the Utah Water and Power Board.

*5.2 Objectives*

Wayne County wants to keep all of its water rights and reduce water loss and increase storage. The lack of storage in the lower Hanksville/Caineville area makes it susceptible to shortages late in the season and flooding.

Wayne County supports carrying out a project to raise the spillway 10 feet on the Mill Meadow Reservoir in order to increase water storage capacity.

Wayne County supports the proposed pipeline and hydro plant on the Fremont River 2 miles below the Mill Meadow Reservoir.

Wayne County supports the Caineville Wash site as a site for the next dam and reservoir on the Fremont River in Wayne County. This site was studied and compared to approximately a dozen other sites in a comprehensive study and report issued in March, 2009, by the State of Utah Division of Water Resources. The Caineville Wash dam and reservoir site was one of three sites found feasible by the Division of Water Resources. A copy of the Division of Water Resources report is available on request at the Wayne County Clerk's office.

*5.3 Policy Statements*

1. Oppose placing water rights in the name of any state or federal agency when the water right is applied for and proved upon by a private individual or corporation, or as the condition of any permit.

2. All water rights in the County must be maintained and plans put in place and followed to keep those rights and develop projects as necessary and desired by county residents.

3. Water development and environmental protection are not mutually exclusive.

4. It is technically feasible to permit appropriate water storage facilities while preserving non-water and recreational resources.

5. Water efficiency and minimizing water loss is encouraged.

6. Ensure that any recovery plan, habitat management plan, critical habitat designation, or any other plan proposing an "instream flow" requirement adequately considers local existing and anticipated future water uses, local custom and culture, and local economic and individual needs.

7. Additional water storage facilities in the County that assures present and future growth and protection of Water Rights should be considered.

8. Privately-held water rights should be protected from federal encroachment and/or coerced acquisition.

9. Analyze federal land management decisions for their potential impact on water quality, yields and timing of those yields; impacts on facilities such as dams, reservoirs, delivery systems, or monitoring facilities; and any other water-related proposal.

10. Oppose "wild", "scenic," and "recreational" designations on rivers and their tributaries in the County, and oppose management of water resources as "wild", "scenic," and "recreational" designations on rivers and their tributaries in Wayne County, or those designations that affect the County, prior to such designation by Congress.

11. Land use improvements and practices should be implemented which promote healthy drainages and watersheds.

12. Support management areas affected by native and non-native plant and animal species (e.g., pine beetle, tamarisk), which have a negative impact on water quality and quantity. For example, "hot" fires leave blackened earth, reducing infiltration and increasing soil temperature, increase stream TMDL loading and turbidity.

13. The County shall participate in all Clean Water Act 303(d) listing/designation processes for impaired waters.

Chapter 6
# Mining, Mineral & Energy Resources

## *6.1 Resource Findings*

The development of solid, fluid, and gaseous mineral resources on public lands is an important potential source of economic activity in Wayne County. Wayne County has a history of mining and energy resource exploration. There has been some mining of various resources including coal, copper, uranium and vanadium, at various locations in the county (refer to map appendix). Due mostly to changes in federal law, policy and administration, mining in the County has almost disappeared. The only active mines are stone quarries near Torrey and a cinder project on the Awapa Plateau. There has been exploration for oil and gas resources at various locations in the County (refer to map appendix). This activity took place mostly in the 1950's, 60's, and early 70's. Federal management changes which began changing at that time resulted in the end of almost all leasing which then led to the end of exploratory drilling in the County.

### *6.1.1 Resources*

Coal

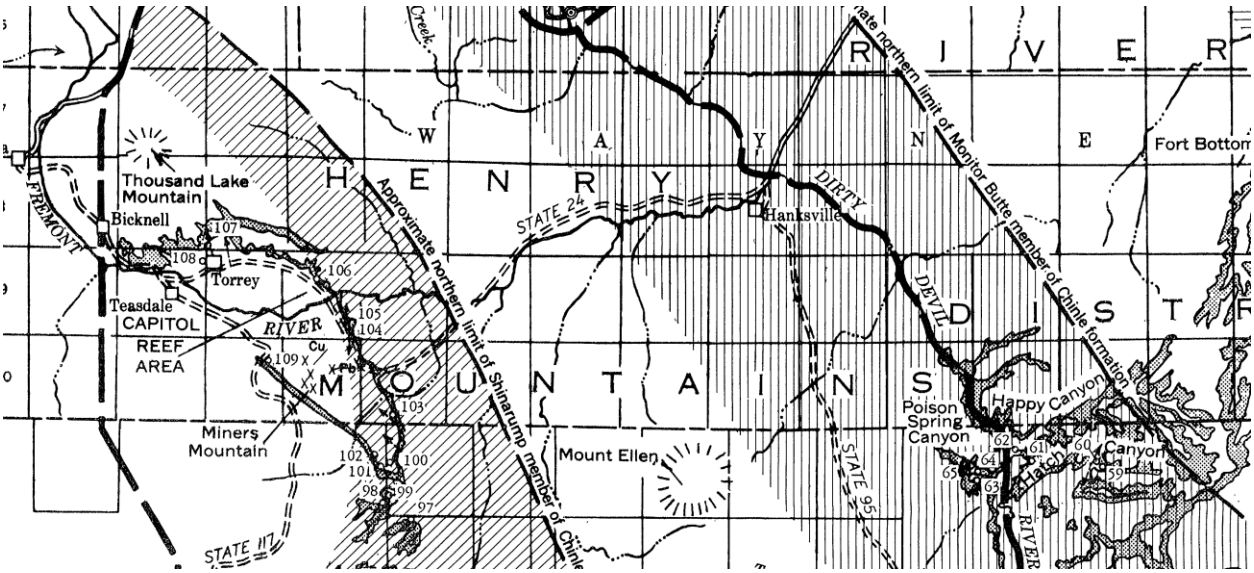
There is estimated to be 16.2 million short tons of recoverable coal in Wayne County (UGS). The Henry Mountains coal field covers parts of Wayne and Garfield Counties the majority is located in Garfield. The Factory Butte and a small portion of the King Ranch coal areas are located in Wayne County (Doelling, 1972). Most of the mineable coal in Wayne County is Ferron coal found in the Ferron Sandstone Member of the Mancos Shale Formation. There is about a 4 square mile mineable area located in the Factory Butte coal area. Most of the mineable reserves of the Emery Sandstone Member of the Mancos lies within Garfield County with only a small portion spilling into Wayne.

Uranium & Vanadium & Copper

Epigenetic uranium deposits in sandstone and related rocks are formed by the precipitation of uranium minerals from solutions. These deposits are widespread in the United States; they have yielded most of the uranium ore produced in this country and contain nearly all the domestic ore reserves. Vanadium, chromium, and copper are commonly associated with uranium in deposits in sandstone, where they behave geochemically somewhat like uranium (Finch, 1967).

The Triassic Shinarump and Monitor Butte Members of the Chinle Formation and the Jurassic Salt Wash Member of the Morrison Formation are known to contain uranium in southern Utah including Wayne County. Although the most productive mines were located just outside the county borders the town of Hanksville was known as a hub of uranium exploration and mining during boom times.

The historic Green River and Henry Mountain Mining Districts covered almost all of Wayne County (see figure 9 below, Johnson, 1959). Plates from this same USGS report showed swaths of potential Chinle Formation uranium resources.




Potential resources for the Green River and Henry Mountains districts are thought to be many times the combined production and indicated and inferred reserves. Primary sedimentary features such as regional pinch outs, trunk channel systems (traces of large streams that meandered on fan deposits), individual channels, and sandstone lenses that are thicker than average are thought to be the principal ore controls. Significant uranium deposits are most likely to be found in the following places:

1. In the Shinarump member of the Chinle formation on the flanks of channels in the Circle Cliffs and Capitol Reef areas, and in a belt of relatively favorable ground 10 to 20 miles wide, related to and paralleling the northwestward- trending line of regional pinchout of this member in the Henry Mountains district.

2. In the Monitor Butte member of the Chinle formation in sandstone lenses having a thickness of 30 feet or more in a belt of relatively favorable ground 25 miles wide, parallel to and bounded by the northeastern line of pinchout of the member (Johnson, 1959).

Oil & Gas:

Almost the entire county is part of some recognized oil and gas play with potential for oil and gas discovery and production. The county has been sparsely drilled to test for oil and gas resources with only 90 wells of record drilled to date (UDOGM, 2017). These exploratory wells are scattered throughout the county with most of them located in the eastern half of the county.

Below is a list of wells drilled by decade: (see map in appendix of oil & gas exploratory wells)

| Decade | #Wells Drilled |
|---|---|
| 1990's - | 3 |
| 1980's - | 10 |
| 1970's - | 16 |
| 1960's - | 35 |
| 1950's - | 20 |
| 1940's - | 1 |
| 1930's - | 0 |
| 1920's - | 4 |
| 1910's - | 1 |
| Total = | 90 |

Geology, technology, economics, and regulation will ultimately control future hydrocarbon exploration and development in Wayne County. This discussion will consider the various geological plays within the county that could be considered by companies looking for oil and gas resources. The basic units considered will be the individual oil and gas "play" (Gautier, *et. al., 1996)* and "assessment unit" (Schenk, *et.al.*, 2003) as these terms are used by the United States Geological Survey (USGS) in their national assessments of oil and gas resources.

The U.S. Geological Survey (USGS) recently completed a geology-based assessment of the undiscovered, technically recoverable oil and gas resources in the Paradox Basin, which extends into parts of Utah, Colorado, Arizona, and New Mexico (fig. 1). Figure 1 shows the Paradox Basin Province boundary, as defined by Gautier and others (1996), as part of the 1995 USGS National Assessment. The assessment was based on the geologic elements that define a total petroleum system (TPS), which include petroleum source rocks (source rock maturation, petroleum generation and migration), reservoir description (reservoir presence and quality), and petroleum traps (trap type, timing of trap formation, and timing of seal deposition). Using this framework, seven TPSs were identified in the Paradox Basin. Four conventional assessment units (AU), four continuous AUs, and one coalbed gas AU were quantitatively assessed.

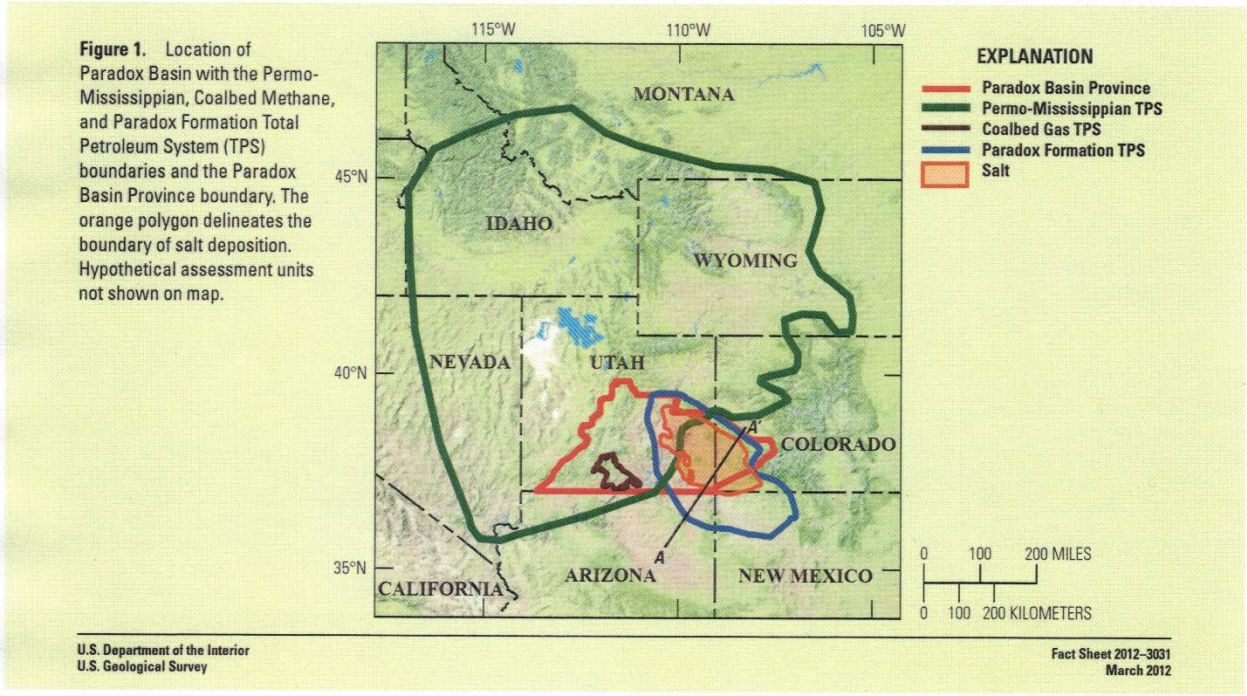



**Figure 1.** Location of Paradox Basin with the Permo-Mississippian, Coalbed Methane, and Paradox Formation Total Petroleum System (TPS) boundaries and the Paradox Basin Province boundary. The orange polygon delineates the boundary of salt deposition. Hypothetical assessment units not shown on map.

Four classic Paradox Basin plays underlie some of the eastern part of the county, the area generally east of Range 12 East. The plays are identified as Buried Fault Blocks (USGS-2101), Porous Carbonate Buildup (USGS-2102), Fractured Interbed (USGS-2103) and Salt Anticline Flank (USGS-2105) (Huffman, 1996). Play 2101 is exemplified by the prolific Lisbon Field in northern San Juan County where oil and gas are produced from Devonian and Mississippian age carbonate rocks and sandstones in a faulted anticline (Smouse, 1993).

Play 2102 is primarily an oil play characterized by hydrocarbon accumulations in porous algal mounds and related rocks in the Paradox Formation of the Hermosa Group (Pennsylvanian age). Traps are largely stratigraphic in nature involving porosity and permeability differences in carbonate and evaporitic rocks and organic-rich dolomitic shales. Structures of Pennsylvanian age may have influenced the locations of the algal buildups. The Giant Aneth Field in San Juan County is the largest field in this play but many other smaller isolated buildups have produced (Huffman, 1996).

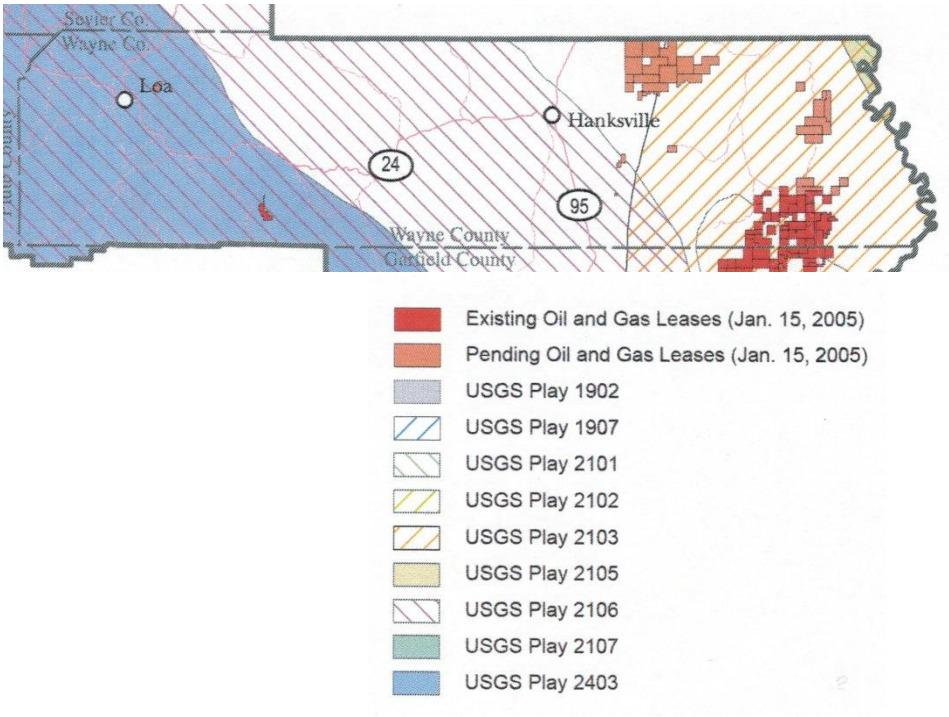
Play 2103 is a continuous oil and gas play with organic rich dolomitic shales serving as both source and reservoir rocks. Fracturing of the otherwise tight rocks is necessary if it is to be productive. Dolomitic shales are interbedded with salt in a cyclical sequence where the salt provides a seal for the fractured reservoirs (Huffman, 1996). This play is productive in southwestern Grand County where current development involves horizontal wells designed to intersect vertical fractures in areas where structures have enhanced fracturing. Play 2105 involves Pennsylvanian and Permian age carbonate and sandstone reservoirs along the flanks of northwest-trending salt anticlines and could be present in the very northeastern part of the county.

The Permo-Triassic Unconformity Play (USGS-2106) was included in the 1995 USGS Assessment of greater Paradox Basin resources even though it is outside the Paradox Basin proper. It includes a large part about the western two thirds of the county. Known occurrences and shows are in upper Permian and lower Triassic carbonate and sandstone formations. The Upper Valley Oil Field south of Wayne County located in Garfield County near Escalante produces from this play and oil and gas shows have been reported over a large area in southern and central Utah. The trapping mechanism at Upper Valley is anticlinal but the oil is offset from the crest by a strong hydrodynamic drive. Huffman (1996) described the play as lightly explored and emphasizes unanswered questions about source rock and timing.

The geologically oldest play in the county is the Late Proterozoic and Cambrian Play (USGS-2403) which was described in the Northern Arizona Province but includes a large portion of southern and central Utah including about the western one third of the county. The play is based on the recognition of carbonaceous shale in the Upper Proterozoic Chuar Group in the Grand Canyon and the projection of these units in the subsurface of northern Arizona and southern and central Utah (Rauzi, 1990). Given this potential source rock, hydrocarbons are possible in uppermost Protrozoic and lower Cambrian reservoirs. The play received a great deal of attention in the 1990s and several test wells were drilled in southern Utah. Some of the wells encountered carbon dioxide gas but no hydrocarbons were reported and interest in the play waned.

Two hypothetical Eastern Great Basin Province plays include western Sevier and Sanpete Counties. These are the Late Paleozoic Play (USGS-1902) and the Sevier Frontal Zone Play (USGS-1907). Both of these plays were nonproductive and hypothetical when first described (Peterson and Grow, 1996) but recent drilling has since confirmed the Sevier Frontal Zone play. Play 1902 is based on the possibility of early-formed traps in middle and upper Paleozoic carbonates and sandstones. Potential source rocks include organic rich marine shales in Mississippian, Pennsylvanian and Permian age formations which may have favorable maturity levels in some areas of the play. A variety of structural and stratigraphic traps may be present but the play remains hypothetical at this time. Play 1907 was also hypothetical and based in large part on similarities in lithology and structural style between this area and productive segments of the Overthrust Belt in northeastern Utah and southwestern Wyoming. Potential traps exist in structures formed along and near the leading edge of Sevier thrust plates and favorable reservoir rock are present in several formations. Recent drilling has confirmed the presence of oil at one location along this zone and additional exploration is in progress.

Figure 2 USGS Plays and Oil & Gas Leases (BLM, 2005)




The Awapa Plateau is an area of approximately 400 square miles much of it is in Wayne County and penetrated by two oil and gas exploration wells. Utah Trust Lands owns a large block of land on the plateau which is mostly located in Wayne County. The area is covered by volcanic rocks, principally associated with the Oligocence-aged Marysvale volcanic center, which range in thickness from a few hundred feet to almost 6000 feet. The volcanic cover makes exploration challenging and facts about the subsurface geology limited. Several wells to the north and south of the state land block in western Wayne County indicate little if any Cretaceous-aged rocks lie beneath the volcanics. The plateau and surrounding area records dramatic erosion/non-deposition(?) of rocks from Middle Triassic to Upper Cretaceous prior to the extrusion of Oligocene-aged volcanics. Production is found both north and south of the area (Covenant and Upper Valley fields, respectively). The area is likely underlain by good quality reservoir rocks including Cambrian, Permian, and Jurassic sandstones, mixed with Mississippian-Pennsylvanian-Permian carbonates. Mississippian to Permian-aged source rocks have supplied oil to the region based on producing fields and numerous oil and/or gas shows in several wells surrounding the area. Evidence for compressive tectonics to the north in the Hingeline and to the south and west by many Larimide structures, indicates potential for structural traps. The area has a moderate amount of available seismic coverage, particularly in the southern half, but this method of exploration has its limitations in the volcanic covered terrain. The area offers a challenging and high-risk, high-reward area for future exploration (Anderson, 2011).

Wayne County has potential for oil and gas discovery especially with technology that has developed since active leasing and drilling has phased out with tightening of restrictions on leasing by federal agencies. The eastern part of the county Paradox Formation has never been tested with directional, horizontal drilling and fracturing technology which has proven successful in the same formation farther east. Much of the western part of the county is covered by volcanic rocks which historically has discouraged exploration because of the difficulty of shooting and interpreting seismic and drilling through. The potential is there however, and as technology and knowledge increases it should become a more attractive prospect. The extreme restrictions on leasing that has been implemented over the last decade must be relaxed. The ability to drill directionally offers flexibility that didn't exist decades ago when most of the wells in the county were drilled. A drive through the Covenant Field near Sigurd is a good example of how low impact a field can be with multiple wells drilled from just a few pads resulting in one of the State's most prolific fields pumping tax, royalty, and fees into the coffers of the county, state, federal treasury, and private owners.

Building Stone:

There are four active stone quarries in the county. The Moenkopi Formation is valuable for its reddish flagstone and other decorative and building stone. This formation exists south and east of Torrey and in the very eastern and southeastern part of the county. All of the existing quarries are located south and east of and within a few miles of Torrey.

Sand, Gravel & Cinders:

Sand and gravel deposits in the county exist in alluvium and older alluvium along the valley fringes and eolian sand dunes are found in the eastern part of the county around Hanksville and in the San Rafael Desert. Several gravel pits have been used in the western part of the county all west of Torrey. The younger alluvial deposits make the best gravel as the older deposits have more boulders and other debris flow material not conducive to gravel operations. These deposits were mapped recently by the UGS (Biek, 2016). Cinders are found on the Awapa Plateau where one active operation is located.

Evaporite Minerals:

Evaporite minerals, primarily gypsum, exists in the Carmel and Summerville Formations. The thicker more minable deposits are found in the Carmel in Wayne County. This formation is at the surface in many locals across the county (refer to map appendix).

Tar Sands:

The Tar Sand Triangle is the major deposit located partly in Wayne County, although there are other minor shows of tar sands in the county. The Tar Sand Triangle is located in the triangular shaped area between the Dirty Devil River and the Colorado River in southeastern

Utah. The tar sand deposit covers an area approximately 10 by 20 miles with an aerial extent of about 200 square miles. The majority of the area is shown in the southeast corner of the Salina 1° x 2 topographic sheet in the eastern portions of Garfield and Wayne Counties (Figure 3). Much of the deposit underlies Federal lands. A few hundred acres in the northeastern part are within Canyonlands National Park and about half of the area is within the Glen Canyon Recreation Area. The Triangle can be reached from the south by State Highway 95 which runs from Blanding to Hanksville, Utah. Access from the north is by all-weather gravel roads (Dana, 1984).

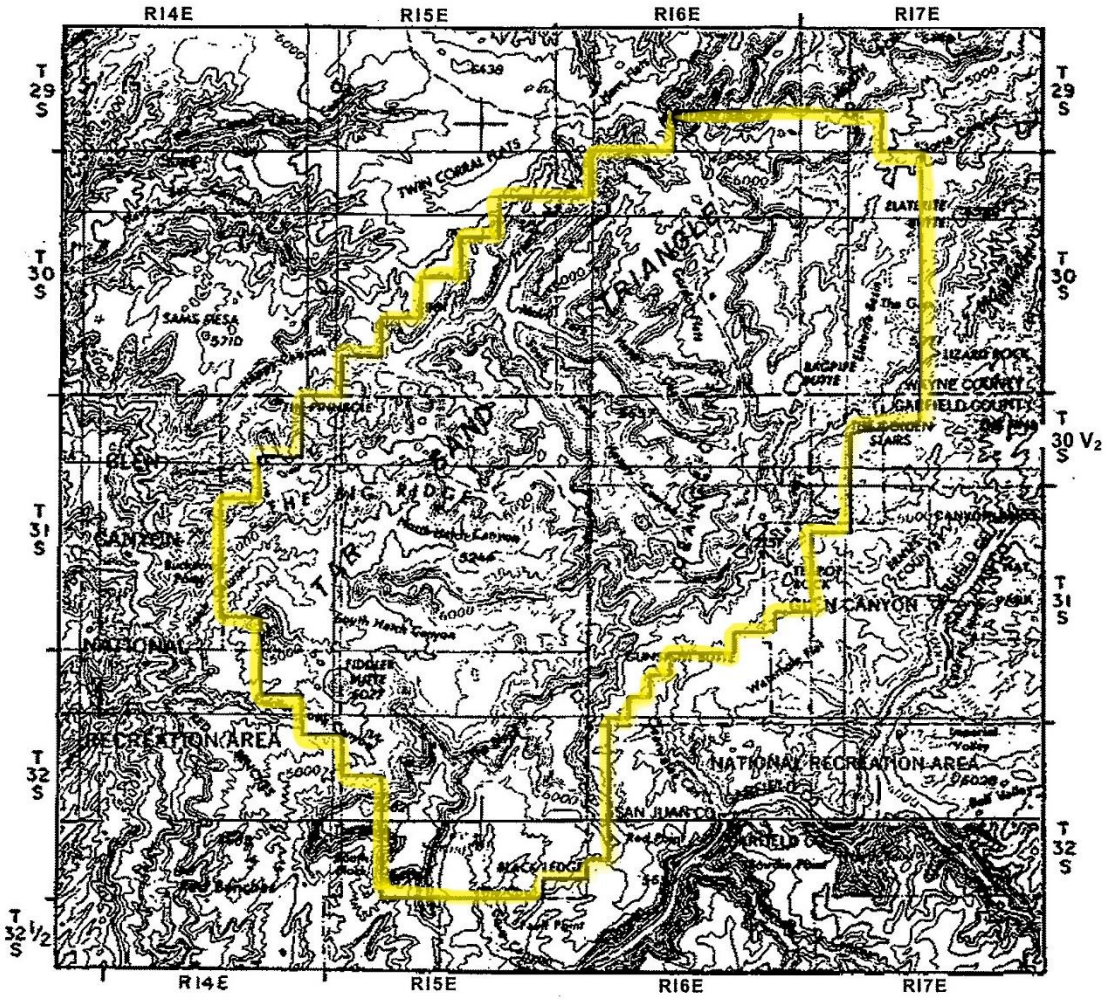



Figure 3. Yellow highlighted area approximate boundary of deposit.

The Tar Sand Triangle may be the largest tar sand deposit in the United States. Previous estimates for the deposit range from 2.9 to 16 billion barrels of oil in-place. The major cause of the large diversity of estimates is the selected areal extent of the deposit. The necessity of extrapolating sparse porosity and saturation data is also a major factor. This paper estimates 6.3

billion barrels which, if correct, would make it (the Tar Sand Triangle) the largest single deposit in the United States. More core data is required before a more accurate resource determination can be made. Development of the deposit is aided by the uncomplex geologic nature of the area and the relatively shallow depth of the deposit (0 to 2000 feet) (Dana, 1984).

*Objectives*

Wayne County's objectives as to mining, mineral and energy resources is to allow and encourage leasing, exploration and development of these resources wherever it is not absolutely prohibited such as in National Parks and Wilderness Study Areas. The County does not accept buffer zones around such areas which prohibits these activities. Also, if applicable and technologically feasible, horizontal drilling and production from under these areas should be allowed.

*Policy Statements*

1. Mineral and energy production and environmental protection are not mutually exclusive.

2. It is technically feasible to permit appropriate access to mineral and energy resources while preserving non-mineral and non-energy resources.

3. Responsible development of solid, fluid, and gaseous mineral resources of the county is encouraged. Federal management agencies should not develop specific plans beyond general management plans that require additional conditions, stipulations, and practices that discourage development of mineral resources.

4. The waste of fluid and gaseous minerals is prohibited.

5. Requirements to delay or prevent mineral development projects are unacceptable unless based on credible evidence of significant impacts which are not mitigatable and agreed upon by the county commission.

6. Any lands that are too sensitive to allow surface occupancy for drilling and mining activities should still be open to exploration and development utilizing directional drilling technology.

7. The development of mineral resources in the county could be a substantial revenue source and job provider which is in the best interest of the county and its citizens.

Chapter 7
# Forest and Fire Management

## *7.1 Resource Findings*

We are now seeing the consequences from the failure of the U.S. Forest Service to actively manage the forests in Wayne County. The failure to actively thin the forests and clear out the understory has produced a hazard for catastrophic fire which threatens Wayne County's watersheds, its livestock industry and the safety of its towns and private agricultural lands, not to mention the safety of the public who work and recreate on and around these forested lands. In addition, this failure of the U.S. Forest Service to actively thin the forest and clear out the understory has produced the widespread bark beetle epidemic. Historically small local timber operators used to harvest the dry trees for lumber keeping fire hazards and bark beetle infestations reduced.

This chapter includes an overview of forest resources in Wayne County. The value of these forests includes much more than just wood. The majority of this region's water comes from high-elevation forests and it can be argued that water, which plays a central role in the economy, politics and culture of the semi-arid West, is the most important forest resource. Recreation, quality wildlife habitat, and forage for domestic livestock are also exceedingly important forest resources.

An overarching theme for any discussion of vegetation, particularly forest vegetation, in the Interior Western United States is disturbance. Forests in this region are fundamentally shaped by disturbances, both natural and those associated with human use. The long history of use, and in some cases abuse, of these forest resources have in many cases resulted in unwanted consequences that are a major challenge to resources managers (Long 2003).

Forest restoration treatments cost approximately $200 per acre. If the post treatment average yield over the 20 years of livestock grazing after a 2 year recovery period is 367 pounds per acre. For each 100 acres treated 36,700 pounds of forage is produced annually. If livestock harvest 33.33% then 12,232 pounds is harvested by livestock. At 790 pounds per AUM 15.48 AUMs were harvested. At $56.95 per AUM, the average value per AUM for the past 5 years using Cedar City Livestock Auction November prices for cattle, yields $881.90 in revenue to ranchers and another $444.87 in economic activity in Wayne County. Each increased AUM is worth $85.71 in economic output to Wayne County.

U.S. taxpayers typically experience 10 to 50 times more costs and losses to wildfire each year than just the $1 billion to $2 billion in suppression costs commonly reported by USFS representatives and the media — that is, US taxpayers are losing $20 billion to $100 billion (or more) a year in such wildfire related damages as escalating fire management costs, human deaths, long-term public health problems, air pollution, soil degradation, wildlife habitat destruction, structural damage, water pollution, etc. (Miller, 2017).

### *7.1.1 Analysis*

The focus of this analysis is the forests of Wayne County. The objective is characterization of the major forest types including: 1) existing condition; 2) challenges to sustainability; and 3) general strategies for effective management.

### *7.1.2 Data Sources*

USDA Forest Service Forest Inventory and Analysis (FIA)

Data used in this analysis were taken from USDA Forest Service Forest Inventory and Analysis (FIA) surveys (Woudenberg et al. 2010) conducted between 2005 and 2014. FIA plots are established on a systematic grid and the data, therefore, represent an unbiased sample of forest resources. From these surveys we identified 49 FIA plots within Wayne County. FIA plots measured since 2000 follow a mapped-plot design, meaning that a plot footprint can sample forest and non-forest, or stands of differing composition. Characteristics normally attributed to stands in other inventories, such as forest type or stand density, are assigned to FIA conditions. Among condition-level variables is the proportion of the plot footprint that the condition occupies, and the sum of all condition proportions on a plot equals 1.0.

In this analysis the collective attributes associated with a condition (e.g., *Aspen forest type*) at a given sample location will be treated as reflecting an individual stand. The stand is the basic unit of forest vegetation assessment and management. A stand is relatively homogeneous forest which, for the purposes of management, is treated as a single unit (Reynolds et al. 2013). While silvicultural prescriptions are written and implemented on a stand by stand basis, effective resource management must also be undertaken in a broader context (i.e., multiple stands within a watershed or a landscape). One of the important advantages of the FIA database is that it will support county-level monitoring of forest condition, e.g., trends in the risk of high-severity fire and insect outbreaks.

LANDFIRE Raster Data

Species distribution maps were created using the 30m resolution Existing Vegetation Type (EVT) layer from LANDFIRE.gov (acquired 4/7/2016). EVT is mapped using decision tree models, field data, Landsat imagery, elevation, and biophysical gradient data. Decision tree models are developed separately for each of the three lifeforms, tree, shrub, and herbaceous and are then used to generate lifeform specific EVT layers. (from website: http://www.landfire.gov/NationalProductDescriptions21.php).

The EVT SAF_SRM field was filtered in ArcGIS to extract the following species of interest:

SAF 206: Engelmann Spruce-Subalpine Fir
SAF 208: Whitebark Pine
SAF 209: Bristlecone Pine
SAF 210: Interior Douglas-Fir
SAF 211: White Fir
SAF 217: Aspen
SAF 219: Limber Pine
SAF 237: Interior Ponderosa Pine
*SAF 238: Western Juniper
*SRM 412: Juniper-Pinyon Woodland
SRM 413: Gambel Oak
SRM 415: Curlleaf Mountain-Mahogany
SRM 418: Bigtooth Maple
SRM 421: Chokecherry-Serviceberry-Rose
*SRM 504: Juniper-Pinyon Pine Woodland

*combined.

LANDSAT8 Raster Data

The basemap layer for the species distribution maps was mosaicked in ArcGIS using LANDSAT 8 data acquired 4/8/2016 from http://earthexplorer.usgs.gov/. More information about Landsat 8 can be found at http://landsat.usgs.gov/landsat8.php.

*7.2 Current Setting*

Wayne County has a great diversity of natural vegetation which is reflective of a broad range of environmental conditions. Different types of vegetation are associated with differences in elevation. Increasing elevation is associated with increasing precipitation and decreasing temperatures (both summer and winter). These strong environmental gradients result in zones of vegetation types ranging from hot/dry low elevation desert to cold/wet high elevation alpine communities. Southern Utah, like the rest of the Middle and Southern Rocky Mountain Region, has both lower and upper treelines (Long 1994). Below the lower treeline, conditions are generally too dry for trees to survive; above the upper treeline, conditions are generally too cold. The montane forest and woodland vegetation occurring between the upper limit of the pinyon-juniper woodlands and upper treeline is the subject of this assessment (Figure 1).

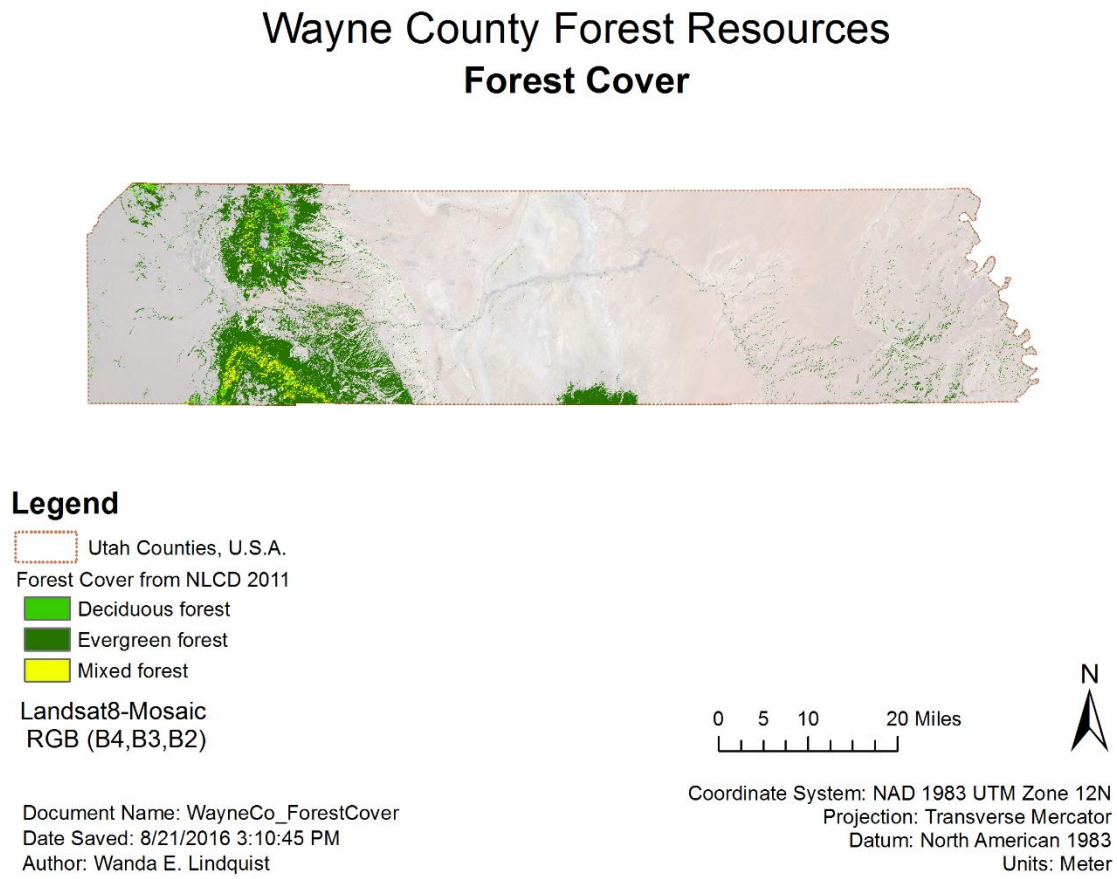



*Figure 1. Forest cover in Wayne County from the National Land Cover Database 2011 (NLCD 2011, Homer, C.G., Dewitz, J.A., Yang, L., Jin, S., Danielson, P., Xian, G., Coulston, J., Herold, N.D., Wickham, J.D., and Megown, K., 2015, Completion of the 2011 National Land Cover Database for the conterminous United States-Representing a decade of land cover change information. Photogrammetric Engineering and Remote Sensing, v. 81, no. 5, p. 345-354).*

### *7.2.1 Area Estimates*

The total area of Wayne County is about 1.58 million acres. About 18.1% of this area is forested (i.e., vegetation dominated or potentially dominated by trees), with pinyon-juniper woodlands representing the largest proportion (Appendix X) (Figure 2). Montane forests and woodlands (i.e. excluding P-J) occupy about 0.05 million acres in the County. Of this area, 86.3% of forest land is further classified as higher productivity timberland with the potential to produce at least 20 cubic feet per acre per year. Nearly 5.2% of the total forest land within the County is in some form of reserve (e.g., parks).

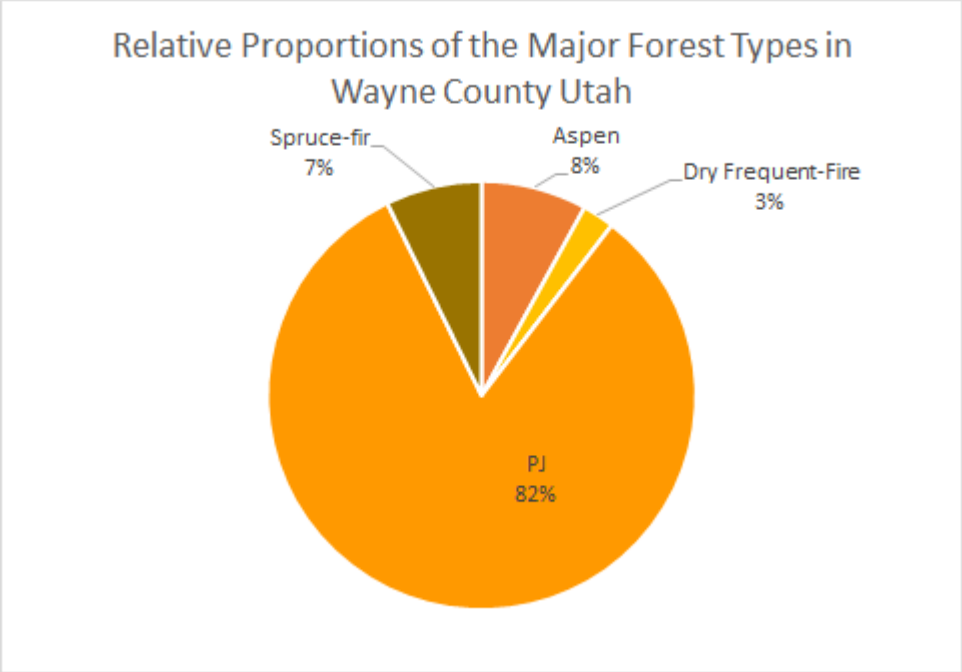



*Figure 2. Relative proportions of the major forest types in Wayne County (FIA 2000-2014).*

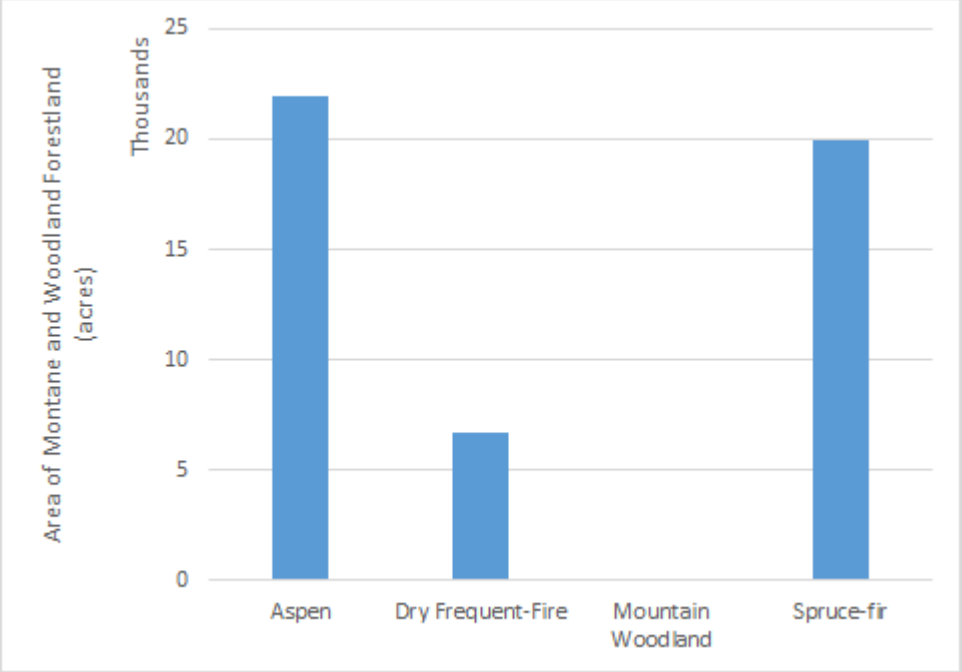



*Figure 3. Acres of the major forest types in Wayne County (FIA 2000-2014).*

Ownership and management of forests (including Pinyon-Juniper) in the County are dominated by the federal government (91.1% of total and 62.2% of the unreserved forest).

*Figure 4. Distribution maps of the important montane and woodland species in Wayne County.*

*7.3 Forest Types*

Within Southwestern Utah there are 12 specifically recognized montane forest and woodland types (Table 1 includes the common and scientific names of the important tree species). Three types are pooled under the characterization *Dry frequent-fire type* (this includes ponderosa pine, Douglas-fir, white fir, and mixtures of these three species) (Figure 4a). Two types representing various combinations of subalpine fir and Engelmann spruce are combined as the *Spruce-fir forest type* (Figure 4b). The remaining types are the *Aspen forest type* (Figure 4c) and the *Mountain woodland type* (Gambel oak, mountain mahogany and intermountain maple) (Figure 4d).

*Table 1. Common and scientific names of important tree species occurring in Wayne County (Little 1971; Van Buren et al. 2011)*

| COMMON_NAME | *GENUS_SPECIES* |
|---|---|
| subalpine fir | *Abies lasiocarpa* |
| curlleaf mountain-mahogany | *Cercocarpus ledifolius* |
| Utah juniper | *Juniperus osteosperma* |
| Rocky Mountain juniper | *Juniperus scopulorum* |
| Engelmann spruce | *Picea engelmannii* |
| blue spruce | *Picea pungens* |
| common or two-needle pinyon | *Pinus edulis* |
| Great Basin bristlecone pine | *Pinus longaeva* |
| ponderosa pine | *Pinus ponderosa* |
| Fremont cottonwood | *Populus fremontii* |
| quaking aspen | *Populus tremuloides* |
| Douglas-fir | *Pseudotsuga menziesii* |

Pinyon-juniper woodlands occur at lower treeline between shrub-steppe and montane forests (Brown et al. 2008; Long 1994); this broad and important type is covered elsewhere (Appendix X). Gambel oak can form pure woodland stands at lower elevations; it can also be a component of conifer-dominated (e.g., ponderosa pine) forests up to mid-elevations. Mountain mahogany and intermountain maple are less common than Gambel oak and for the purposes of this analysis, are included in the *Mountain woodland type*. The *Dry frequent-fire type* can include various combinations of ponderosa pine, Douglas-fir and white fir. Ponderosa pine tends to dominate at lower elevations; Douglas-fir and white fir tend to increase in importance on relatively cooler and more mesic sites (e.g., north aspects). Within the broad *Dry frequent-fire type* individual mixed-conifer stands can, depending on specific environmental conditions and disturbance history, include any of the conifer species as well as Gambel oak and aspen. In addition to being a component of mixed-conifer stands, aspen can form large (>200 ac) stands at middle and upper elevations. The upper elevation *Spruce-fir forest type* includes stands with various proportions of Engelmann spruce and subalpine fir. Limber pine, though never abundant, is often a minor component of mixed-conifer forests across a broad range of elevations. Bristlecone pine is a very long-lived, high-elevation tree typically found on dry or rocky sites (Youngblood and Mauk 1985).

*7.3.1 Natural Disturbance Regimes*

The species composition and structure of forests and woodlands are to a considerable extent reflections of disturbance history. There is, for example, broad consensus among scientists and forest managers that for many forests in the Southwest, changes in natural fire regimes, coupled with extended drought are responsible for increased size and severity of both wildfires and insect outbreaks (Swetnam and Lynch 1993; Shaw et al. 2005). An understanding of natural disturbance regimes, such as the frequency and severity of wildfire, is fundamental to the creation of effective management strategies. This management approach is not about mimicking the disturbances *per se*. Rather, the focus is on the legacies, e.g., species composition and stand structure, associated with the natural disturbance regimes (Perera and Buse 2004; Long 2009).

Natural disturbances in forests almost invariably involve some combination of biotic (e.g., insects and disease) and abiotic (e.g., fire, wind) agents. Of these, fire and insects are the most important for the forests of Wayne County. A natural disturbance regime for a particular forest type is typically characterized by the dominant type of disturbance (e.g., frequent/low severity fire in the *Dry frequent-fire forest type* in contrast to infrequent/high severity fire in the *Spruce-fir forest type*). Regardless of the dominant disturbance type, there is the potential for important interactions between different types of disturbances (e.g., DeRose and Long 2009; Jenkins et al. 2008; Jenkins et al. 2014). For example, a fire that weakens, but does not actually kill a tree, may make it susceptible to attack by bark beetles.

Natural fire regimes in the Southwest were arrayed from hot dry environments at low elevations to cool wet environments at high elevations (Figure 5). Reference regimes can be categorized along a gradient from 'fuel-limited' to 'climate-limited'. In deserts and other non-forested vegetation types with very low productivity, the frequency of return fires is limited by the long period of time necessary for fuels to accumulate. The resulting 'fuel-limited' fire regime would be characterized by very infrequent but high severity fires. At the opposite environmental extreme are high elevation forests where relatively high productivity results in fairly rapid accumulation of fuels, but weather conditions conducive to wildfire may be rare. The resulting 'climate-limited' fire regime would also be characterized by very infrequent but high severity fires. Most of the forests in Wayne County have natural fire regimes intermediate between these wo extremes (Brown et al. 2008; Swetnam and Baison 1996). For this assessment, the emphasis

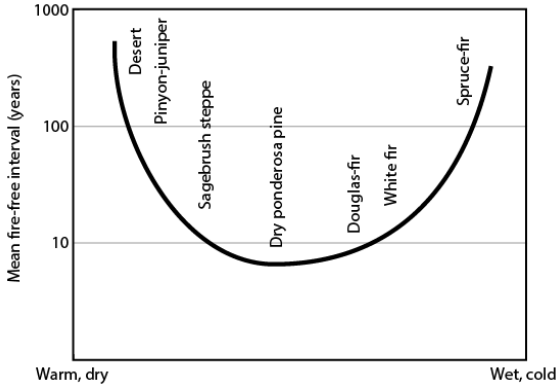



*Figure 5. Infrequent/high severity natural fire regimes were characteristic of vegetation types that were either fuel-limited (e.g., deserts with low productivity) or climate-limited (e.g., high elevation spruce-fir forests with cool/wet summers). Frequent/low severity natural fire regimes were characteristic of forests that were neither fuel- nor climate-limited (e.g., ponderosa pine) (after Martin and Sapsis 1991).*

will be on the potential for 'uncharacteristic' disturbance. For example, we rely on the fire regime paradigm in a relative sense to help assess how 'characteristic' or 'uncharacteristic' a fire (or potential fire) might be (Hardy 2005). Fire hazard refers to the state of the fuels (e.g., presence or absence of fuel ladders), independent of the weather on a given day. Fire severity refers to the effect a fire has on wildland systems. Severity is not a characterization of the fire itself, but rather the fire's effect (Hardy 2005). For example, a 'high severity' fire results in the death of most overstory trees. In contrast, a 'low severity' fire might burn understory litter, grass, shrubs, and small trees, but leave most or all of the mature trees unburned.

Insects, particularly bark beetles and defoliators, can cause considerable damage in Southwestern forests. Each of the forest types represented in Wayne County can have insect outbreaks but it is the conifer-dominated forests that are most likely to have substantial mortality during insect outbreaks. Currently all of the insect species causing substantial mortality of mature trees in Southwestern forests are native to the region. Under normal conditions these insects exist as endemic populations and the associated damage is limited in extent.

Occasionally, during a prolonged drought for example, the population of a particular insect might transition to outbreak levels and mortality of the host tree species increases in both amount and extent. The impacts of these native insects, at both endemic and outbreak population levels, were natural parts of these forest ecosystems.

There are, however, region-wide changes in the frequency, extent, and severity of insect outbreaks (Swetnam and Lynch 1993; DeRose and Long 2009). Some of these changes in insect populations are certainly related to at least short-term changes in climate (e.g., the increased survival of high-elevation spruce beetle with increased winter temperatures and the increased success of pinyon Ips in drought-stressed host trees). Changes in insect impacts are also associated with changes in the various host forest types. Important stand and landscape changes include shifts in tree species composition, increases in stand density, and decreases in age-class diversity.

### *7.3.2 Mountain woodland type*

This type, which is not common in Wayne County,represents a combination of Gambel oak, mountain mahogany and intermountain maple, with Gambel oak by far the most common. Based on research done in this type in northern Utah (Wadleigh et al. 1998), the following is a likely characterization of changes in the natural fire regime of Gambel oak woodlands in Wayne County. Prior to the introduction of domestic livestock and effective fire suppression, a frequent/low-severity fire would have limited the extent of, and the continuity of fuels within, Gambel oak woodlands. With fire exclusion have come fundamental changes in the fuel profile and the increased likelihood of high-severity fires (Bradley et al. 1992; Wadleigh et al. 1998). Changes in the natural fire regime (i.e., decreased frequency and increased severity) has not only altered the structure of oak woodlands, but has resulted in an increase in the abundance of Gambel oak in mixed-conifer stands of the *Dry frequent-fire forest type*.

### *7.3.3 Dry frequent-fire forest type*

The natural fire regime in this forest type is best characterized as frequent/low-severity. Across the range of environmental conditions associated with this important type would have been a range in fire frequency and severity (e.g., Korb et al. 2013; Reynolds et al. 2013). Under the warmest and driest conditions (i.e., sites where ponderosa pine is the dominant species), fires would have been very frequent (< 10 years) and low severity. Under cooler and more mesic conditions (i.e., sites where, in addition to ponderosa pine, Douglas-fir and/or white fir are potentially important stand components) fires were somewhat less frequent (e.g., <35 years) and would have included a combination of low- and mixed-severity.

An overarching theme in the Southwest and Intermountain West is the implication of long-term fire exclusion. Reasons for fire exclusion can include historic overgrazing near the turn of the last century, elimination of burning by Native Americans, and especially effective fire-suppression starting in the middle of the last century. Fire exclusion is primarily an issue in the frequent-fire forest types, as exemplified by the *Dry frequent-fire forest type* in Wayne County.

Long-term fire exclusion in the *Dry frequent-fire forest type* has had a substantial impact on stands and landscapes. Changes include shifts in species composition, increases in stand density, increases in the amount and continuity of fuels (both canopy fuels and fuel ladders) resulting in fundamental changes in fire behavior, and the nature of insect outbreaks. Changes in tree species composition have resulted where the elimination of low-severity fires has allowed the establishment of shade-tolerant Douglas-fir and white fir in stands that under the natural fire regime were almost entirely dominated by ponderosa pine.

Whereas the natural fire regime limited stand density, fire exclusion has allowed many stands to achieve relative densities associated with high competitive stress and continuity of canopy fuels. As a consequence, these stands are more susceptible to a range of insects (Fettig et al. 2007) as well as to high-severity fire (Graham et al. 2004). Changes in vertical structure, for example with the establishment of shade-tolerant Douglas-fir and white fir, represent fuel ladders via which a surface fire can transition to the upper canopy. Changes in composition and vertical structure can also make these stands more susceptible to western spruce budworm, an important defoliator of Douglas-fir and white fir (but not, ironically, spruce) (Long 1994).

### *7.3.4 Aspen forest type*

Commonly, aspen is more intolerant of shade than any of the conifer species with which it may be associated. In most cases, this means if aspen-dominated stands are not to be eventually successionally displaced by conifers, there must be periodic disturbance (e.g., natural high-severity fire, prescribed fire, or mechanical treatment). Aspen has some ability to regenerate from seed (Long and Mock 2012) and tremendous ability to regenerate from root suckers (Long 1994), but this regeneration capacity decreases as stand vigor declines with age. It is, therefore, important that regeneration-initiating disturbance be timely (Shepperd et al. 2015).

### *7.3.5 Spruce-fir forest type*

The natural fire regime in these high-elevation, cool, moist forests is characterized by very infrequent (200+ years) high severity fires. Fire frequency is not limited by fuels, but rather by the infrequent combination of ignition (i.e., 'dry' lightning) and extreme fire weather (i.e., low fuel moisture, high temperature and high wind speed). This is an example of a 'climate-limited' fire regime. Because of the very long average fire return interval compared to the length of the fire suppression era, fire exclusion has had limited impact on composition and structure of individual stands in the *Spruce-fir forest type.* It is likely, however, that fire suppression has resulted in a shift in age-class distribution among spruce-fir stands within large landscapes. Even a modest reduction in the number of young stands could negatively affect landscape resilience following a spruce beetle outbreak (DeRose and Long 2014).

Under normal conditions, spruce beetle (*Dentroctonus rufipennis*) numbers occur at endemic levels. To complete their typical two-year life cycle, the beetles must find and successfully overcome the defenses of a green host tree. They do this by mass-attacking a large living, or very recently wind-thrown, tree. Under endemic conditions spruce mortality within a stand is modest and restricted to a few scattered trees or small groups of trees. The transition from endemic to epidemic population levels can result from a combination of factors including: large numbers of suitable host trees; high stand density and/or prolonged drought (both of which stress trees and weaken their defenses); large scale blowdown of mature spruce; and high temperatures (DeRose et al. 2013; Hart et al. 2014). Increases in winter and summer temperatures are particularly conducive to transition of spruce beetle populations from endemic to epidemic levels. Higher winter temperatures increase over-winter survival. Higher summer temperatures can allow larvae to mature faster resulting in a shift to a one-year from a two-year life cycle. Such a shift allows for much more rapid buildup of spruce beetles and the transition to an outbreak.

## *7.4 Existing and desired future conditions*

A characteristic of many stands in Wayne County is that they are dense, and high relative densities are associated with high competitive stress and density-related mortality (Long et al. 2004). In the *Dry frequent-fire forest type* (ponderosa pine, Douglas-fir, and white fir) high relative densities potentially makes these stands susceptible to insect attack (e.g., Kolb et al. 1998; Fettig et al. 2007). It is not possible to predict with certainty when or even if a given stand will be attacked; however, once beetles enter a stand, denser stands can be expected to have greater beetle attack (Chojnack et al. 2000). All of the stands in this important forest type have a risk rating for mountain pine beetle of moderate or higher.

*Table 2. Volume of live and dead greater than 5 inches DBH (diameter at breast height) by Forest Type Group.*

| Forest Type Group | Volume of all live on forestland (greater than 5" dbh, cubic feet) | Volume of standing dead on forestland (greater than 5" dbh, cubic feet) |
|---|---|---|
| Aspen | 15,158,265 | 9,128,864 |
| Dry Frequent-fire | 9,369,654 | 475,749 |
| Spruce-fir | 20,337,018 | 7,287,110 |

Currently many, if not most, stands in the *Spruce-fir forest type* in the county have neither resistance nor resilience to attack by the spruce beetle (*Dendroctonus rufipennis*). Limited resistance is indicated by the fact that more than 100. % of stands in this important forest type have a risk rating for spruce beetle on Engelmann spruce moderate or higher (calculation of the spruce beetle risk rating is based on the system developed by Schmid and Frye (1976)). Unfortunately, many of these stands also have limited resilience. In the event of what is probably the inevitable spruce beetle outbreak, the result would be the death of virtually all of the mature Engelmann spruce and conversion of the stand to subalpine fir or even non-forest (DeRose and Long 2010; Windmuller-Campione and Long 2015) (Figure 6).

*Figure 6. The spruce beetle (Dendroctonus rufipennis) outbreak on the Markagunt Plateau in Iron County resulted in the effective elimination of Engelmann spruce stands across an entire landscape and is indicative of the sort of damage insect outbreaks can cause in forests lacking either resistance or resilience (DeRose and Long 2014).*

An appropriate management strategy would be to drastically reduce relative density. This would, at least to some extent, increase resistance (Fettig et al. 2007). The reduction in stand density would also create understory condition suitable for the regeneration (natural or by planting) of Engelmann spruce seedlings (as well as other tree species). Time is of the essence for this strategy to succeed – timely treatment to enhance age- and species-diversity will result in stands and watersheds that are much more resilient to a spruce beetle outbreak (Figure 7).

*Figure 7. This Engelmann spruce stand on the boundary of Piute and Beaver Counties has high relative density and limited tree species diversity. Because of its structure and composition the stand is neither resistant nor resilient to attack by spruce beetle.*

In addition, many stands currently have canopy fuel profiles (i.e., canopy bulk density and canopy base height) which make them prone to crown fires. For example, nearly 100. % of stands in the *Dry frequent-fire forest type* currently have low torching and/or crowning indexes indicating that fire entering these stands, even under less than extreme wind speeds, can be a crown fire.

Proactive management can be used to create and maintain species composition and structure in *Dry frequent-fire forest type* stands resistance to, and resilience from, disturbance (DeRose and Long 2014). The following example illustrates the potential for active management to create stand conditions where high severity fire would be unlikely. Figure 8a is a representative mixed-conifer stand from the FIA database. This stand is typical in that fire exclusion has resulted in moderate to high relative density and the development of fuel ladders. With this canopy fuels profile, fire entering the stand in extreme fire weather would be

exceedingly destructive (Figure 8b). The Forest Vegetation Simulator and Fire and Fuels Extension (Dixon 2002; Rebain 2010) were used to simulate a thinning and fuels treatment in the stand and to model pre- and post-treatment fire behavior under severe weather conditions.

Thinning can be used to fundamentally alter stand structure and species composition (Figure 8c). Thinning can eliminate fuel ladders and favor the retention of large fire-resistant ponderosa pine and Douglas-fir. With this altered canopy fuels profile fire entering the stand even in extreme fire weather would be a low-severity surface fire (Figure 8d). Many of the large trees retained in the post-thinning stand would survive such a fire.

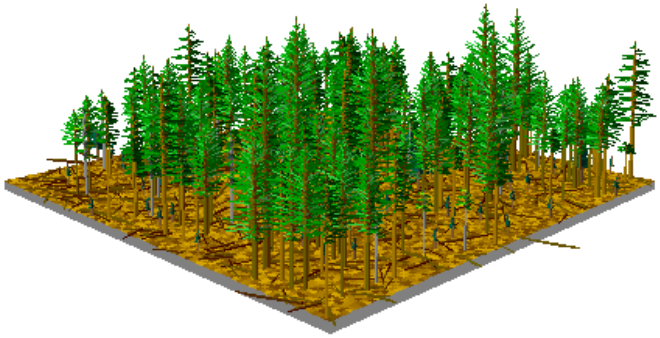
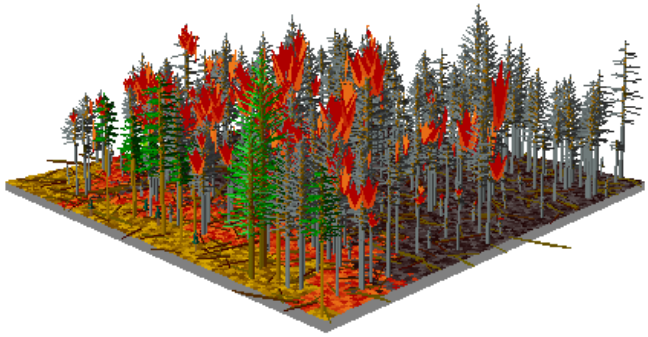
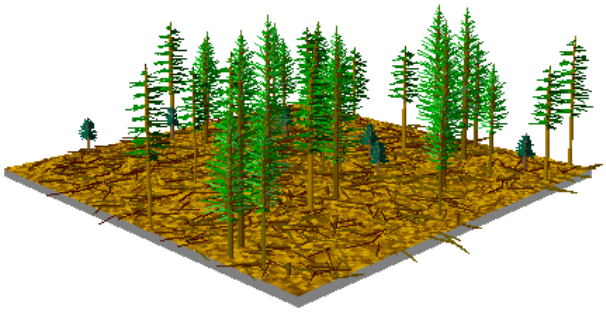


*Figure 8. A representative mixed-conifer stand in the dry frequent-fire forest type.*

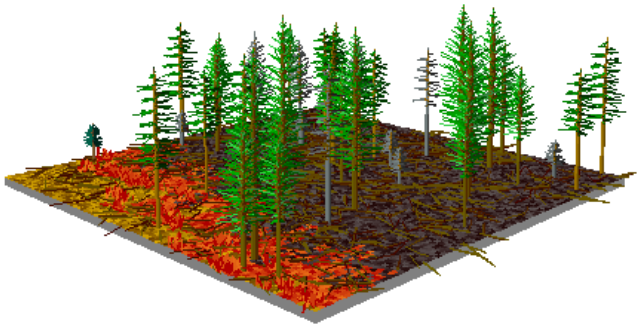
*A) With fire exclusion, there has been an increase in shade-tolerant species like white fir and an increase in fuel ladders.*



*B) Under severe weather conditions, fire behavior is likely to*



*C) Simulated thinning and fuels treatment shows the reduction in stand density and fuel ladders and shifts species composition toward large, fire-resistance ponderosa pine and Douglas-fir.*



*D) Fire behavior in the treated stand is unlikely to be extreme even under severe weather conditions.*

Past successes in fire suppression and the limited scale of proactive forest management have resulted in widespread changes in forest structure and composition, particularly in the *Dry frequent-fire forest type*. These forest changes, exacerbated by drought, are associated with fire regime change from frequent/low-severity fire to infrequent/high-severity and mixed-severity fire. In the Southwest and Intermountain West, the increase in the number of 'mega-fires' (uncharacteristically large and severe fires) is a region-wide problem. The 8000+ acre Shingle fire in 2012 in Kane County is indicative that the condition of forests in southern Utah is a concern. The cost of the wildfire program in the US is enormous and growing. For the USDA Forest Service, which is but one of the state and federal agencies responsible for wildland fire management, wildfire suppression has gone from 16% of the annual budget in 1995 to more than half in 2015. It is projected to reach 67% of the Forest Service's total annual budget in 10 years (USDA 2015). The inescapable conclusion is that traditional fire prevention and suppression approaches to wildland fire management are unsustainable; however, there are realistic alternative strategies which are well understood by wildland fire and natural resource managers (e.g., USDA 2015; Stephens et al. 2009).

Building and maintaining forests, particularly in the *Dry frequent-fire forest type*, which are resistant and resilient to both extreme fire and insect outbreaks requires proactive management including combinations of mechanical treatments (e.g., thinning) and prescribed fire. In this type of forest, mechanical treatments followed by prescribed fire or pile burning has been shown to be the most effective treatment for reducing the risk of crown fires (e.g., Stephens et al. 2009). Results of extensive research indicate that "mechanical plus fire, fire-only, and mechanical-only treatments using whole-tree harvest systems were all effective at reducing potential fire severity under severe fire weather conditions" (Stephens at al. 2009).

Management to create and maintain fire resilient forests is a clear alternative to the current unsustainable fire suppression strategy (USDA 2015). Under this alternative, wildland urban interface and back-country lands must be actively managed to maintain structure and tree species composition consistent with low severity fires. To be effective, this management does not have to be done in every stand and on every acre, but it must be extensive enough to achieve the goal of fire resilient forest landscapes (Fule et al. 2001). When "communities, adjacent lands, and back-county areas have been made fire-resilient, sustainable wildland fire management would then involve maintaining..." these structures and compositions over time (USDA 2015).

There is considerable consensus among scientists and forest resource managers in support of a combination of tools (thinning, mechanical treatments, and prescribed fire) to achieve forests which are resistant and resilient to a broad range of environmental challenges (e.g., Covington 2000; Allen et al. 2002; Roccaforte et al. 2008; Stephens et al. 2009; Reynolds et al. 2013; Fettig and McKelvey 2014; DeRose and Long 2014; Shepperd et al. 2015; North et al. 2015; Temperli et al. 2014; Windmuller-Campione and Long 2015). These strategies, however, can only be effective if they are actually implemented and barriers to implementation are more likely to be societal than scientific (e.g., Gill and Stephens 2009; Long 2009). The staffs of the National Forests in southern Utah have either begun or will soon begin development of new Land and Resource Management Plans (i.e., revised Forest Plans). It will be important to explicitly include provisions in the new Forest Plans for the proactive management necessary to build and maintain forest resilience.

*7.5 Objectives*

Wayne County supports proactive forest and fire management that will result in forests that are resistant, resilient, and productive. The County supports harvesting and salvage of timber on both Dixie and Fishlake National Forests as part of the overall management strategies. The County believes that management strategies must change and wants to be involved in any forest plan revisions. The County also wants the forests to continue to make firewood available for County residents.

Wayne County supports proactive management that will create and maintain fire resilient forests. We have been experiencing unparalleled fire seasons over the past 20 years. These wildland fires pose a threat to adjacent communities, forests and rangelands. These fires have grown in size, frequency, and intensity. We are now seeing the consequences of fire suppression, roadless area, and timber harvest policies that have helped to produce a dangerous excess of fuels over the past 20 to 30 years. These policies combined with the widespread bark beetle epidemic have been destructive to crucial wildlife habitats, watersheds, and overall forest health.

Wayne County supports restoration of a viable regional commercial forest products industry. In the forests of the 11 counties in the Five and Six County Associations of Governments there are 3.9 billion board feet of Aspen and 7.3 billion board feet of Conifers 5 inches and larger in diameter. Using a 150 harvest rotation 75.5 million board feet can be harvested each year. That is enough timber to support 5 sawmills using 15 million board feet each per year sustainably in perpetuity.

*7.6 Policy Statements*

1. Work with the U.S. Forest Service to implement Forest Plan amendments and/or revisions which would allow for timber salvage/harvest within both the Dixie and the Fishlake National Forests. This would reduce the risk of continued bark beetle infestation and spread. The areas could then again be managed as Backcountry. Bark beetle monitoring would be continued.

2. Support those policies that will end catastrophic, epidemic-level insect infestations, the County will work with the U.S. Forest Service to continue to assess forest health and may propose changes to the Forest Plan to allow for vegetation treatments where necessary.

3. Encourage change in U.S. Forest Service management strategies and policies in order to protect watersheds, fisheries, other natural resources and reduce the threat by catastrophic fires. Water quality and quantity could become an issue if a change in U.S. Forest Service management strategies and policies do not occur. Forest Plan amendments and revisions are needed.

Chapter 8
# Noxious Weeds

## *8.1 Resource Findings*

A plant is considered a noxious weed when it restricts beneficial uses of land or water, displaces desirable or native plants, or impacts human and animal health (Whitesides, 2004). Native and desirable plants must compete for moisture, nutrients, space, and sunlight with noxious weeds. The weeds that are of most concern are "exotics", or non-native species that possess aggressive invasive behaviors, high levels of adaptability, rapid reproductive rates and typically do not have naturally occurring predators. These plants often invade areas after human caused disturbances, such as road construction, non-intense farming, poorly managed grazing or logging, urban development, and high impact recreation (Whitesides, 2004). Additionally, natural disturbances such as drought, fires, and floods help to establish invasive plants.

The BLM defines noxious weeds as "a plant that interferes with management objectives for a given area of land at a given point in time" (BLM, 2007b). Federal or state law designates noxious weeds as displaying one or more of the following characteristics: aggressive and difficult to manage; parasitic; a carrier or host of serious insects or disease; or non-native, new, or not common to the United States (BLM, 2008). Additionally, the *Utah's Standards for Rangeland Health and Guidelines for Livestock Grazing* (BLM, 1997) distinguishes noxious weeds as particularly undesirable because they are non-native plants with no forage value and can be toxic, or capable of invading plant communities and displacing native species (BLM, 2008). Controlling noxious weeds can be difficult and expensive, often resulting in many negative economic and ecological impacts. Consequently, the BLM considers noxious weed invasions as one of the greatest threats to rangeland health nationwide.

### *8.1.1 Noxious Weed Dispersal and Establishment*

Noxious weeds are spread from one location to another through the dispersal of seeds or plant parts by wind, water, animals, machinery or people (Whitesides, 2004). Many weeds have adapted traits that specialize in spreading large quantities of seeds through bards, hooks, or other attaching mechanisms that can easily cling to animals, people or equipment. Additionally, noxious weeds are able to travel great distances in relatively short time periods due to an increasingly mobile and global society. Consequently, weeds flourish along highways, roads, trails, and river corridors (Whitesides, 2004). Weeds can also become established through misguided horticultural and home garden plantings (e.g., purple loosestrife), or through contamination of crop seeds, allowing livestock to feed upon weed seed contaminated forage, or through vehicles, boats, and other machinery. A comprehensive list outlining the ways in which weeds become dispersed was compiled by the Utah Noxious Weed Act and includes machinery and equipment (e.g., combines and hay balers), farm trucks and common carriers, seed, screenings sold for livestock feed, livestock feed material, hay, straw, manure, soil, sod, and nursery stock, weeds sold on purpose and livestock (Utah Administrative Code, 2016).

As noxious weeds continue to spread across the Western United States, 100% of Utah's counties (29 of 29) have been critically infested by at least one of the state-designated 27 noxious weeds (Tables 1-3; Whitesides, 2004). Noxious weeds are capable of spreading rapidly at a rate of 14% per year if left unchecked. Although, weed treatments during the last 25 years in the Richfield Field Office (RFO), which includes Wayne County, have reduced infestations to small and localized events that are treated as soon as they are recognized (BLM, 2008). One of the most common noxious weeds in Wayne County is cheatgrass, which is widespread throughout the county in isolated monocultures at elevations below 8,000 feet. Cheatgrass typically establishes in areas post wildlife, post grasshopper invasion, or areas with historic vegetative disturbance, although disturbance is not required for establishment (BLM, 2008). In locations with no history of cultivation or grazing by domestic livestock, cheatgrass is capable of thriving due to natural disturbances (e.g., rodents or predators digging in soil). In addition to common noxious weeds, new invasive plants are regularly identified and documented in counties across Utah, although it possible for potentially dangerous weed species to remain undetected in the state (Whitesides, 2004).

In accordance with the Utah Noxious Weed Act, the Commissioner of Agriculture designates noxious weeds as any plant that is injurious to public health, crops, livestock, land, or other property (BLM, 2008). The noxious weed law is administered by the Utah Department of Agriculture and Food, while enforcement of the law is left to the responsibility of individual counties (Whitesides, 2004). The law allocates authority to local county officials to conduct weed control and to prevent the spread of noxious weeds within each Utah county. The following tables (1-3) present the state-designated noxious weeds grouped as "Class A", "Class B", and "Class C".

| **"Class A" State Noxious Weeds** | |
|---|---|
| Black henbane - *Hyoscyamus niger* | Purple loosestrife - *Lythrum salicaria* |
| Diffuse knapweed - *Centaurea diffusa* | St. Johnswort - *Hypericum perforatum* |
| Johnson Grass (*Sorghum halepense*) | Spotted knapweed - *Centaurea stoebe* |
| Leafy spurge - *Euphorbia esula* | Sulfur cinquefoil - Potentilla recta |
| Medusahead - *Taeniatherum caput-medusae* | Yellow starthistle - *Centaurea solstitialis* |
| Oxeye daisy - *Leucanthemum vulgare* | Yellow toadflax - *Linaria vulgaris* |

Table 1. "Class A" weeds have low population size in Utah and are of highest priority in Early Detection Rapid Response (EDRR) (Utah's Noxious Weed List, n.d).

| **"Class B" State Noxious Weeds** | |
|---|---|
| Bermudagrass - *Cynodon dactylon* | Perennial pepperweed - *Lepidium latifolium* |
| Dalmation toadflax - *Linaria dalmatica* | Poison hemlock - *Conium maculatum* |
| Dyers woad - *Isatis tinctoria* | Russian knapweed - *Acroptilon repens* |
| Hoary cress - *Cardaria* spp. | Squarrose knapweed - *Centaurea virgata* |
| Musk thistle - *Carduus nutans* | Scotch thistle (Cotton thistle) - *Onopordum acanthium* |

Table 2. "Class B" weeds have a moderate population size in Utah and are controllable in most areas (Utah's Noxious Weed List, n.d).

| **"Class C" State Noxious Weeds** | |
|---|---|
| Canada thistle - *Cirsium arvense* | Quackgrass - *Elymus repens* |
| Field bindweed - *Convolvulus* spp. | Saltcedar - *Tamarix ramosissima* |
| Houndstongue - *Cynoglossum officianale* | |

Table 3. "Class C" weeds have high population sizes in Utah and are considered to be beyond control (Utah's Noxious Weed List, n.d).

Additions to the previously mentioned state-designated noxious weed list are shown in tables 4-8 and are based upon on new and invading weeds with the potential to occupy and alter plant communities in the RFO, including Wayne County (BLM,2008). There are 55 species total which have been designated as state noxious weeds by the Utah Noxious Weed Act (R68-9). The following tables 4-8 present a detailed list of the official, published State of Utah noxious weeds.

| **"Class 1A" Early Detection Rapid Response (EDRR)** | |
|---|---|
| Common crupina - *Crupina vulgaris* | Mediterranean sage - S*alvia aethiopis* |
| African rue - *Peganum harmala* | Spring millet - *Milium vernale* |
| Small bugloss - *Anchusa arvensis* | Syrian beancaper - *Zygophyllum fabago* |
| Small bugloss - *Anchusa arvensis* | Ventenata (North Africa grass) - *Ventenata dubia* |
| Plumeless thistle - *Carduus acanthoides* | Malta starthistle - *Centaurea melitensis* |

Table 4. Noxious and invasive weeds included in the "Class 1A" category are the highest priority for Early Detection Rapid Response (EDRR) (Riding, 2016).

**"Class 1B" Early Detection Rapid Response (EDRR)**

| | |
|---|---|
| Camelthorn - *Alhagi maurorum* | Japanese knotweed - *Polygonum cuspidatum* |
| Garlic mustard - *Alliaria petiolata* | Blueweed (Vipers bugloss) - *Echium vulgare* |
| Purple starthistle - *Centaurea calcitrapa* | Elongated mustard - *Brassica elongata* |
| Goatsrue - *Galega officinalis* | Common St. Johnswort - *Hypericum perforatum* |
| African mustard - *Brassica tournefortii* | Oxeye daisy - *Leucanthemum vulgare* |
| Giant reed - *Arundo donax* | Cutleaf vipergrass - *Scorzonera laciniata* |

Table 5. "Class 1B" noxious and invasive weeds are known to exist in very limited populations and should be considered high priority (Riding, 2016).

**"Class 2": Control**

| | |
|---|---|
| Leafy spurge - *Euphorbia esula* | Dyers woad - *Isatis tinctoria* |
| Medusahead - *Taeniatherum caput-medusae* | Yellow starthistle - *Centaurea solstitialis* |
| Rush skeletonweed - *Chondrilla juncea* | Yellow toadflax - *Linaria vulgaris* |
| Spotted knapweed - *Centaurea stoebe* | Diffuse knapweed - *Centaurea diffusa* |
| Purple loosestrife - *Lythrum salicaria* | Black henbane - *Hyoscyamus niger* |
| Squarrose knapweed - *Centaurea virgata* | Dalmation toadflax - *Linaria dalmatica* |

Table 6. **"Class 2" noxious and invasive weeds** pose a threat to the state and should be considered as a high priority for control. Weeds listed in this category exist in fluctuating populations throughout the state and are at a level where control or eradication may be possible (Riding, 2016).

**"Class 3": Containment**

| | |
|---|---|
| Russian knapweed - *Acroptilon repens* | Musk thistle - *Carduus nutans* |
| Houndstongue - *Cynoglossum officianale* | Quackgrass - *Elymus repens* |
| Perennial pepperweed (Tall whitetop) - *Lepidium latifolium* | Jointed goatgrass - *Aegilops cylindrical* |
| Phragmites (Common reed) - *Phragmites australis* ssp. | Bermudagrass - *Cynodon dactylon* |

| | |
|---|---|
| Tamarisk (Saltcedar) - *Tamarix ramosissima* | Perennial Sorghum spp.: Johnson Grass (*Sorghum halepense*) and Sorghum almum (*Sorghum almum*). |
| Hoary cress - *Cardaria* spp. | Scotch thistle (Cotton thistle) - *Onopordum acanthium* |
| Canada thistle - *Cirsium arvense* | Field bindweed (Wild Morning-glory) - *Convolvulus* spp. |
| Poison hemlock - *Conium maculatum* | Puncturevine (Goathead) - *Tribulus terrestris* |

Table 7. **"Class 3" noxious and invasive weeds** are a threat to the agricultural industry and agricultural products, and are widely spread with varying populations throughout Utah. The goal of weed control efforts may include reduction or removal of new or increasing weed populations, while established weed populations may be managed by various weed control methodologies that are approved by the weed control authority (Riding, 2016).

**"Class 4": Prohibited**

| | |
|---|---|
| Cogongrass (Japanese blood grass) - *Imperata cylindrical* | Scotch broom - *Cytisus scoparius* |
| Myrtle spurge - *Euphorbia myrsinites* | Russian olive - *Elaeagnus angustifolia* |
| Dames Rocket - *Hesperis matronalis* | |

Table 8. **"Class 4" noxious and invasive weeds include** annuals, biennials, or perennial plants **found extensively throughout Utah. These weeds are considered to be beyond control and** a threat to the state due to retail sale or propagation in nursery and greenhouse industries. Prohibited weeds are designated by the commissioner as having the potential, or are known to be harmful to human or animal health, the environment, public roads, crops, or other property. Statewide weed control efforts are directed towards containment of smaller infestations, or prohibiting the sale or propagation of these plants (Riding, 2016).

Additionally, Wayne County declares Bull Thistle (*Cirsium vulgare*) as a noxious weed that is prominent in the county (County Declared Noxious Weeds in Utah, 2016).

The noxious weed lists are continually updated as new, problematic species emerge. The absence of a species within the lists does not mean that the species is not considered in management decisions. As an example, invasive species of cheatgrass (*Bromus tectorum*) and Russian thistle (*Salsola tragus*) are not included in the lists, yet these species are known to infest large areas of uplands and rangelands in Wayne County and throughout the state of Utah (BLM, 2008).

### *8.1.2 Ecological Impacts of Noxious Weeds*

The negative ecological impacts of noxious weeds are well documented, severe and often permanent (Whitesides, 2004). Throughout Utah, millions of acres of diverse plant communities within rangelands, forests, wilderness areas, national parks, recreational sites and wildlife management areas have been invaded and greatly damaged by monocultures of noxious weeds (Dewey, 1995). Typically, areas impacted by noxious weeds are unable to naturally return to their pre-invasion condition. Watersheds dominated by noxious weeds are of particular concern because these vital systems tend to be less efficient in absorbing and storing water, causing an increase in soil erosion (Whitesides, 2004). Additionally, flooding and reduced recreational use occurs as a result of aquatic weeds either blocking irrigation systems, clogging machinery, or destroying fish habitat.

Noxious weeds also reduce forage for all classes of herbivores and diminish habitat for small birds and animals (Whitesides, 2004). Many weeds can poison or injure animals, for example domestic livestock. Several Utah noxious weeds, such as musk thistle (*Carduus nutans*), scotch thistle (*Onopordum acanthium*), and yellow star thistle (*Centaurea solstitialis*) can cause physical distress or irritation to humans and animals from barbs, spines, and prickles (Whitesides, 2004).

Fire frequency and intensity in sagebrush steppe and pinyon juniper communities within Utah has been severely altered due to the proliferation of Medusahead (*Taeniatherum caput-medusae)* and cheatgrass (*Bromus tectorum)* (Whitesides, 2004). Additional ecological impacts include the prevalence of leafy spurge (*Euphorbia esula*), which has been documented to reduce bison forage by eighty-three percent and deer and elk forage by seventy percent in North Dakota's Theodore Roosevelt National Park (Whitesides, 2004). Spotted knapweed (*Centaurea maculosa*) has also reduced the forage capacity for elk by forty percent in Montana. Based upon these regional studies, it is likely that invasions of Utah noxious weeds may have similar impacts to the wildlife and livestock forage capacities of Wayne County.

### *8.1.3 Economic Impacts of Noxious Weeds*

Crops compete with noxious weeds for moisture, nutrients, sunlight and space, resulting in the decrease of food quality, feed and fiber (Whitesides, 2004). Agricultural producers during the 1950's reported diminished crop yield and quality, with the total cost of weed control amounting to approximately $5.1 billion per year. By 1979 this value doubled and during the 1980's farmers paid over $3 billion per year for chemical weed control, and roughly $2.6 billion for cultural, ecological and biological methods of control (Whitesides, 2004). During this time, weed infestations and money used for weed control resulted in a 17% loss to crop value.

The current losses and weed control costs in 46 major crops, pasture, hay, range and animal health are valued to be more than $15 billion per year for the agricultural sector. Non-crop sectors, such as golf, turf, and ornamentals, highway rights-of-way, industrial sites, aquatic

sites, forestry and other miscellaneous sites have a total of approximately $5 billion in losses and control costs for noxious weeds (Whitesides, 2004).

Without the use of chemical herbicides in modern weed management, the losses to the agricultural sector would increase 500% from $4.1 billion to $20 billion per year. Introduced species have a total economic impact on the U.S. economy that equals or surpasses $13 billion per year, due to the fact that these species make up 65% of the total weed flora in the United States (Whitesides, 2004).

If not controlled, natural weed populations can cause disastrous yield losses of 50 to 90 percent for crops grown in natural weed infestations (Whitesides, 2004). Unlike other pests (e.g., insects and disease pathogens), weeds remain a consistent problem for crop production throughout the growing season. Maintaining weeds during the first four to six weeks after planting is critical to avoid significant yield losses. The value of yield losses in crops related to weeds for Utah varies annually based upon the price of the commodity. Whitesides (2004) estimated the percentage yield loss for a few important crops in the state as:

| **Crop** | **% Yield Loss in Utah** |
|---|---|
| Hay | 11 |
| Corn | 13 |
| Wheat | 13 |
| Barley | 12 |
| Potatoes | 7 |
| Onions | 16 |
| Oats | 16 |
| Dry Beans | 14 |

The negative economic impacts of noxious weeds are not isolated to cropland. The Bureau of Land Management estimated the impacts of noxious weeds on rangeland productivity, which was compiled in an Environmental Impact Study in December 1985 (Whitesides, 2004). The results are shown below:

| **Weed%** | **% Reduction in Grazing** |
|---|---|
| Dyer's Woad | 38 |
| Canada Thistle | 42 |
| Dalmatian Toadflax | 46 |
| Hoary Cress (whitetop) | 55 |
| Leafy Spurge | 59 |
| Yellow Starthistle | 65 |
| Spotted Knapweed | 80 |
| Medusahead | 90 |

*8.2 Noxious Weed Management*

Managing invasive plants in Utah will continue to be an ongoing effort as non-native plants become permanent fixtures on the landscape (Whitesides, 2004). Although, there are methods and tools that can decrease the possibility of new invasions and empower many to decrease the negative impacts of weeds. Based upon Dr. Steve Dewey's Biological Wildfire Model (Dewey, 1995), the main elements of weed control include:

1. Prevention
2. Early Detection and Rapid Response
3. Management of Established Populations
    a. Identify the perimeter
    b. Eliminate satellite populations
    c. Contain and suppress main population
    d. Revegetation or Restoration
    e. Protect Defensible Spaces

Budgetary deficits contribute to limited resources while enacting the above plan. Further insights into this Strategic Weed Plan have been provided by the Utah Weed Control Association (UWCA) and are presented as:

A. Education and Research
B. Mapping and Monitoring
C. Prevention, Early Detection, and Rapid Response
D. Control- Integrated Weed Management
E. Restoration
F. Regulation and Enforcement
G. Funding

As a statewide measure, the Utah Noxious Weed Act includes prescribed treatments to prevent the dissemination of noxious weed seeds, or weed plants that could result in new growth throughout Utah (See Utah Code R68-9-4). Additionally, the Board of County Commissioners within each Utah county, along with their county weed board and their county weed supervisor are required to submit an "Annual Progress Report of County Noxious Weed Control Program" to the Commissioner of Agriculture and Food by January 15 of each year (Utah Administrative Code, 2016). Furthermore, public and individual notices of noxious and invasive weed control and prevention are required to be posted within each Utah county (See Utah Code R68-9-6).

A. <u>Education and Research</u>

Education and research are important components in the effort to stop the spread and introduction of noxious weeds. This includes involvement from government and elected officials, landowners and managers, recreational users, children K-12, and the general public. Additionally, providing information to the public through UWCA websites, contact lists of weed professionals, development of an education committee for UWCA, and a marketing strategy for

weeds programs will help increase public awareness (Whitesides, 2004). Furthermore, noxious weed reports from field botanists will aid in identifying new projects.

B. Mapping and Monitoring

Noxious weed mapping and monitoring allows land managers to determine and document weed locations in Utah in order to correctly calculate the number of acres containing priority weeds, and to understand the rate at which noxious weeds spread. These measures help identify boundaries of new invading species (Whitesides, 2004). Mapping and monitoring surveys also increases public knowledge and provides information on weed biology and ecology to forecast high risk weed invasion sites. Management plans are designed based upon mapping and monitoring procedures, which outline specific control actions, evaluate the economic and social impacts of weeds, and track the status of weed management efforts through time.

C. Prevention, Early Detection and Rapid Response

Early weed prevention and action rely upon cooperative weed management, and county mapping and inventory measures to control new invasive plants (Whitesides, 2004). Communication across boundaries about new invaders is key to continue controlling priority weeds and weeds that pose the greatest threat, as well as identifying new pathways for invasive plants, and utilizing partnerships to remove and monitor invasions.

Additionally, increasing public awareness through education is crucial for prevention. Noxious weed importation and use may decrease as the public becomes capable of identifying and reporting noxious species to local agencies (Whitesides, 2004). In the event of early detection, a "watch out" list of potential invaders is necessary, as well as routine weed surveys, and maps of invasive plants in high risk areas. Plant databases are also used for reporting and aid in educating land mangers on proper identification. Following early detection, rapid response is essential for plants not yet listed on the State Noxious Weed list. As an example, county weed boards, or other partner groups form a "decision support system" to aid in identifying priority species. Additionally, "weed alerts" may be required through communication systems, mailings and websites (Whitesides, 2004).

D. Control- Integrated Weed Management

The successful completion of an integrated weed management plan requires an understanding of certain items, such as: weed reproduction and dispersal, weed ecology, allelopathy, plant competition, and biological weed control, chemical weed control, preventive weed control, cultural weed control, and physical weed control, integrated pest management, and resources (e.g., books, websites, people) (Whitesides, 2004).

E. Restoration

Restoration is implemented following the invasion of an aggressive weed species and the completion of weed control/management activities in order to restore the site to a more preferable species composition. This is done through understanding the ecological system,

identifying the noxious weed, and planting with the crop (outcome) in mind, creating a plan for each situation, and annual evaluations by land managers (Whitesides, 2004).

F. Regulation and Enforcement

The Utah Department of Agriculture and Food administer the noxious weed law. Individual counties, as well as county weed boards, and the county weed supervisor are responsible for the enforcement of the law through regulating the movement of articles contaminated with noxious weeds (Whitesides, 2004).

Each Utah county has a county weed control board of three to five appointed members. The responsibilities of the county weed control board include the creation and application of a county-wide coordinated noxious weed control program to prevent and control weeds within the county, as well as: 1) To cooperate with other county weed control boards, 2) Administer the work of the county weed supervisor, 3) Post a general notice of noxious weeds within the county by May 1 of each year, 4) Notify landowners of noxious weed control or have their property declared a public nuisance, and 5) Hold noxious weed hearings (Whitesides, 2004).

Wayne county employs county weed control supervisors to identify and remedy noxious weeds, and to direct the weed control program for the county weed board. Additional duties include: 1) Evaluate all land under the jurisdiction of the Wayne county weed control board to establish compliance with the law, 2) Collect data on infested areas, 3) Provide consultation for methods of weed control and prevention, 4) Assist and supervise control and prevention, 5) Investigate violations and enforce noxious weed controls, and 6) Complete any other duties essential to the county weed control board (Whitesides, 2004).

*8.3 Objective*

Wayne County's objective as to noxious weeds is to prevent the invasion of noxious weeds and undesirable invasive plant species into the County.

*8.4 Policy Statements*

1. To be flexible enough to allow citizens, the County, the State and Federal Land management agencies to aggressively timely combat such invasive plant species.

2. Prevention, preserving and protecting lands not presently infested is the first line of defense against aggressive noxious weeds.

3. Encourage BLM, USFS, and State agencies to meet the weed control requirements of existing agreements, including the County Weed Management Plan.

4. Aggressive weed management practices are necessary in grazing allotments currently impacted by noxious weeds, and especially so in areas where adjacent private landowners are aggressively controlling weeds. Encourage cooperation between adjacent landowners and federal agencies to control weeds.

5. Weed management efforts of the County Weed Department and implementation of all federal, state, and local noxious weed laws and enforcement are important to decrease weed infestations.

6. The goals and objectives of the County Weed Department and the Weed Control Board provide useful guidance for weed control, and we support implementation of their programs.

7. Control of listed noxious weeds within Wayne County as prioritized by the State and County weed management plans and defined in the Utah Noxious Weed List should be priority for management.

8. Funding local, state, and federal governments for appropriate levels of weed control on all lands in the County is a high priority.

9. Support monitoring efforts to accurately identify the extent of noxious weed infestations and the identification of dispersal mechanisms where possible.

10. Educate public land users regarding all possible vectors of weed spread.

Chapter 9
# Hydrology, Water Quality, River Terraces, and Flood Plains

## *9.1 Resource Findings*

### *9.1.1 Hydrology*

Water resources in the United States are divided into successive hydrologic units beginning with regions, subregions, accounting units and catalog units. A hydrological unit is defined as "any geographic area containing water that naturally drains to a specific outlet" and is organized from the smallest (cataloging units) to the largest (regions) (BLM, 2008).

Hydrologic regions are the first level of classification and are used to divide the country into major geographic areas containing either the drainage area of a major river, or the combined drainage areas for multiple rivers. Regions are then divided into subregions, which can comprise of: the area drained by a river system, a segment of river and its tributaries, closed basin(s), or a collection of streams that create a coastal drainage area (BLM, 2008). These subregions are subsequently split into smaller accounting units. Lastly, the smallest level of classification includes catalog units, which are comparable to a watershed. Catalog units represent part or all of a surface drainage basin, a grouping of basins, or a distinct feature (BLM, 2008; U.S. Geological Survey [USGS], no date).

Wayne County, Utah is located in the Upper Colorado Hydrologic Region of the Colorado River Hydrologic Basin (figure one). The county lies within the watersheds of the Upper Colorado-Dirty Devil River Basin (Fremont sub-basin), and the Lower Green River Basin (Lower Green sub-basin) (figure two) (Ramsey et al., 2016).

Wayne County has many streams that originate in the mountains and flow down toward the valleys and are part of the Dirty Devil drainage basin. These streams are fed by snow melt and springs which keep some flowing year around. The quality of water in these streams is generally very good near their headwaters then begin to degrade as they flow down joining others and eventually dump into the Fremont River which merges with the Muddy Creek to form the Dirty Devil River. The Dirty Devil eventually flows into the Colorado River (Lake Powell). The precipitation in Wayne County varies from less than 6 inches in the low desert areas to over 40 inches on some of the high mountain areas. The central part of the County shows good potential for groundwater development from the Navajo Sandstone aquifer. Most of the flood plains and river terraces of significance are located along the Fremont River. Most of the issues dealing with flood plains and river terraces are also associated with the lower Fremont from Caineville and below.

The largest watercourse in Wayne County is the Fremont River (figure three). The Fremont River is often considered the "lifeblood" and the most important natural resource of the county as early settlers depended on the river to support farming and ranching activities (Murphy, 1999). The river originates from Fish Lake, which is a 2,500-acre natural lake with an

average depth of 85 feet located in Sevier County. From Fish Lake, the Fremont River flows northeast into the Johnson Valley Reservoir and then proceeds southeast to Mill Meadow Reservoir located on the Sevier-Wayne County border. From Mill Meadow Reservoir, the river continues its course south towards the towns of Fremont, Loa, Lyman, and Bicknell, with a southeast shift to flow below the town of Torrey. The river then makes it way alongside Utah highway 24 into Capitol Reef National Park and into the town of Caineville to eventually meet with the Muddy Creek near Hanksville. As the Fremont River follows this path, it collects water from many streams and eventually becomes the Dirty Devil River, which drains into the Green River. The Dirty Devil River then flows south toward the Colorado River, or the upper reaches of Lake Powell near the eastern boundary of Garfield County (Murphy, 1999).

Among the other large streams in the county are Pleasant and Oak Creeks, which follow the east side of Boulder Mountain, traverse gorges in the Waterpocket Fold and eventually drain into the Fremont River (Smith et al., 1963). Boulder Creek, which is located on the south side of Boulder Mountain, drains into the Escalante River outside of the Capitol Reef area. Of the smaller streams, only a few on Thousand Lake and Boulder Mountains are perennial and supply water for livestock, wildlife, fisheries and downstream irrigation (BLM, 2008). These mountains receive precipitation that percolates downward through joints in the capping volcanic rocks to re-surface in the form of seeps or springs near the bases of cliffs. From there, small streams form and flow in landside or glacial deposits in irregular valleys to eventually travel farther down the mountains into topographically well-developed valleys (Smith et al., 1963). Many of these streams have been diverted to supply water for the local towns. The towns of Bicknell, Lyman, Teasdale, and Torrey obtain their culinary water supplies by piping water from mountain springs or streams into town water systems. Additional water needs are supplied by ephemeral streams, ground water springs, and several small lakes and reservoirs in the area (Smith et al., 1963).

The Fremont River, Otter Creek, and their tributaries are the main sources of irrigation water in Wayne County (Wayne County Resource Assessment, 2012). The eastern part of the county obtains irrigation water directly from the Fremont River, while the western part of the county receives irrigation water stored in reservoirs from spring snow melt run-off. Irrigation water is also supplemented with springs, seeps and wells based upon seasonal conditions. In addition, local stockholders obtain their water from nine irrigation companies located in the county (Wayne County Resource Assessment, 2012). The various streams and rivers in Wayne County are shown in table one.

The small streams located elsewhere in the county, such as those among the cliffs and ridges of Capitol Reef are dry most of the year and typically only flow in response to increased precipitation events, such as flash floods (Smith et al., 1963). These rocky areas are vulnerable to sudden thunderstorm or erosional events due to their lack of soil cover and poor ground-water percolation. Rain during flash floods quickly runs off the bare rock slopes to gather rapidly in washes and gulches, often resulting in flood waters moving boulders several feet in diameter (Smith et al., 1963).

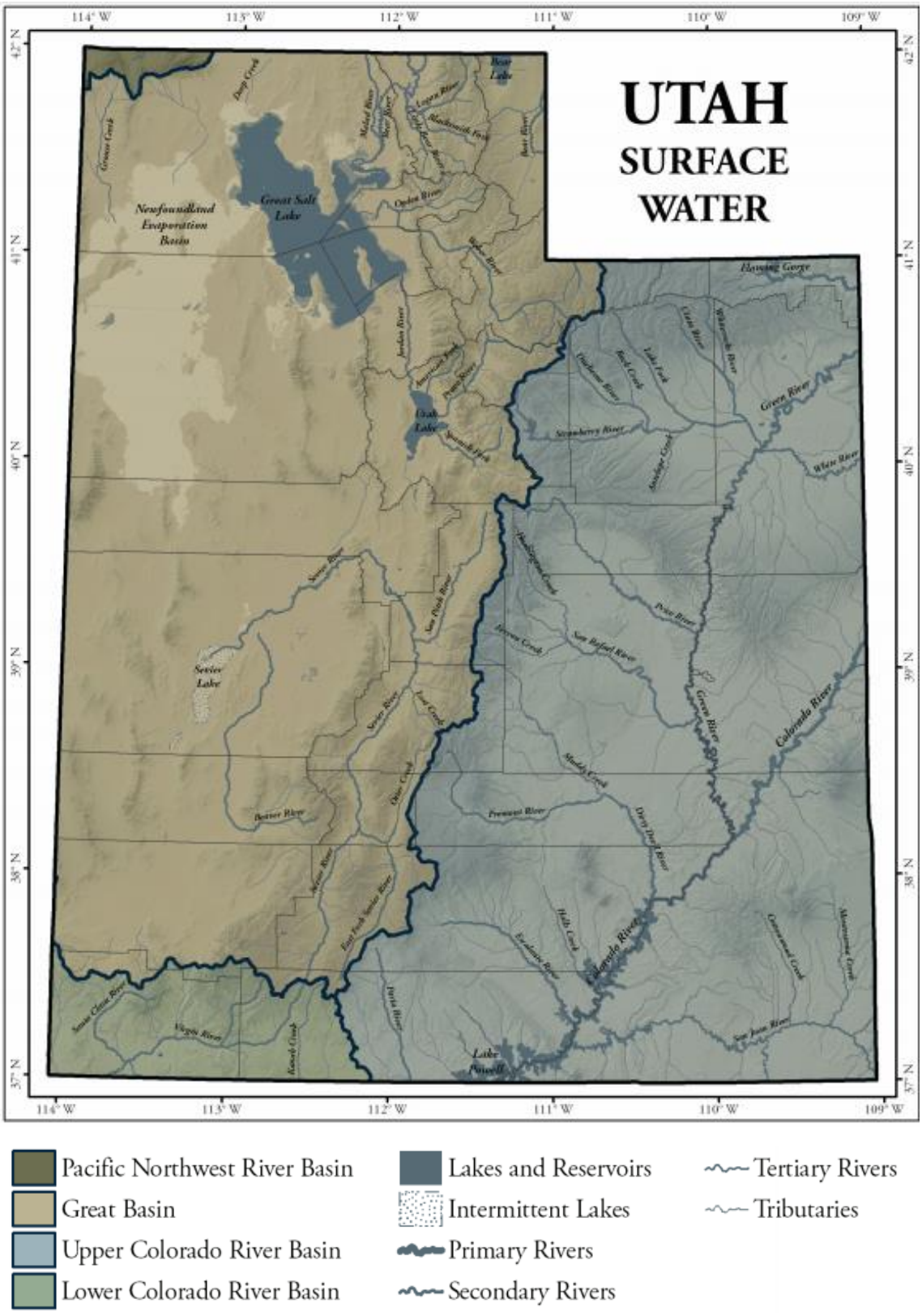

UTAH
SURFACE
WATER
Great Salt Lake
Newfoundland Evaporation Basin
Utah Lake
Sevier Lake
Lake Powell
Green River
Colorado River
Pacific Northwest River Basin
Great Basin
Upper Colorado River Basin
Lower Colorado River Basin
Lakes and Reservoirs
Intermittent Lakes
Primary Rivers
Secondary Rivers
Tertiary Rivers
Tributaries

**Figure One.** *Major hydrologic regions and surface water features in Utah. Source: Ramsey et al., 2016.*

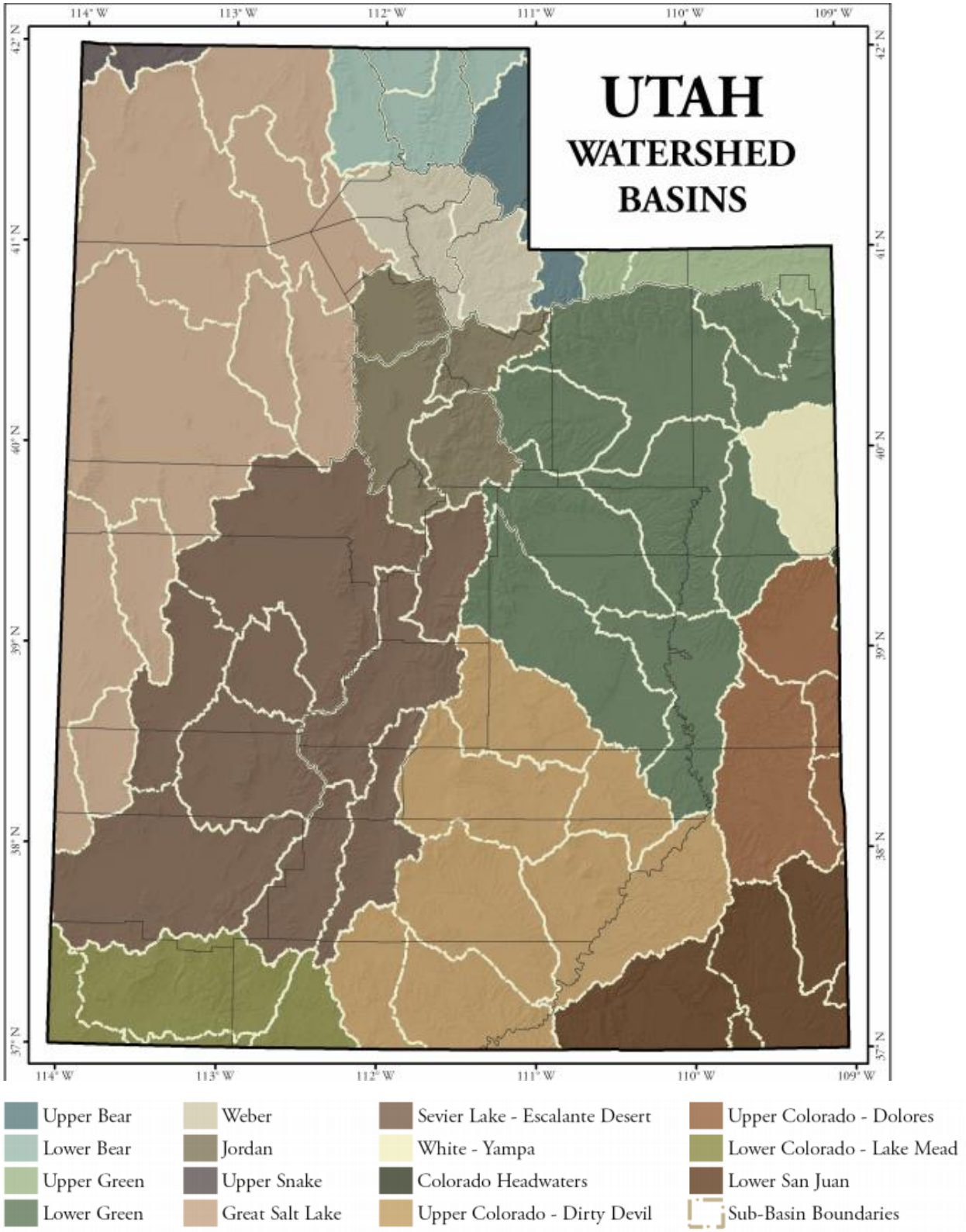


**Figure Two.** *Watershed basins and sub-basins in Utah. Source: Ramsey et al., 2016.*

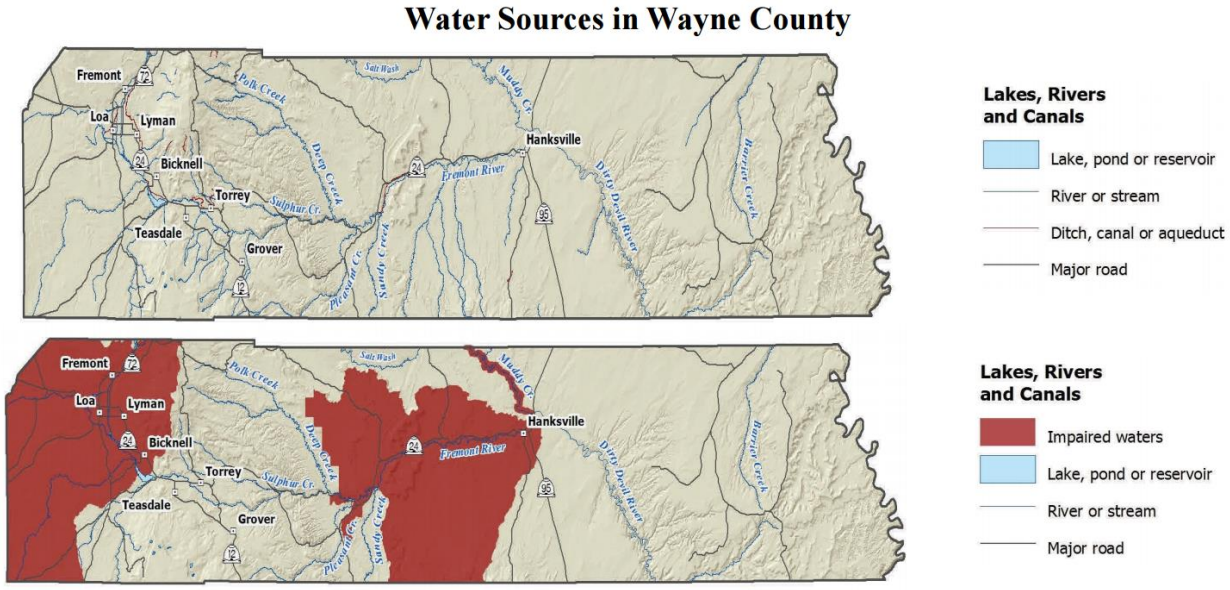



**Figure Three.** *Water Sources in Wayne County, Utah. Source: Wayne County Resource Assessment, 2012.*

**Table One. Stream and River Segments in Wayne County, Utah**

| | | |
|---|---|---|
| Birch Creek | Fish Creek | Rees Creek |
| Boulder Creek | Fremont River | Road Creek |
| Bull Creek | Government Creek | Sand Creek |
| Carcass Creek | Muddy Creek | Spring Creek |
| Cedar Creek | Oak Creek | Sulphur Creek |
| Cottonwood Creek | Pine Creek | Sweetwater Creek |
| Dirty Devil River | Pleasant Creek | Wild Horse Creek |
| Donkey Creek | Red Creek | |

Source: BLM, 2008; Murphy, 1999.

*9.1.2 Ground Water*

The upper Fremont River valley, a depression caused by faulting, altered by erosion, and partly filled by alluvium eroded from surrounding highlands, includes about 40 square miles in south-central Utah. The drainage basin which contributes water to the valley includes about 700 square miles. Water drains to the valley from several high plateaus. Sedimentary rocks of Triassic, Jurassic, Tertiary, and Quaternary age and volcanic rocks of Tertiary age are exposed in the area.

The Tertiary volcanic rocks yield water to several large springs and flowing wells; this unit is the principal source of ground water in the valley. The valley fill of Quaternary age, which is more than 500 feet thick in places, is also an important source, yielding water to many wells. The average annual inflow to the valley via the Fremont River during 1950-57 was 29,120 acre-feet and the average annual outflow during 1909-57 was 64,840 acre-feet.

The source of most of the surface and ground water in the valley is precipitation on the Fish Lake, Awapa, and Aquarius Plateaus, where annual precipitation is between 20 and 40 inches. Recharge to the ground-water reservoir in the valley fill occurs from infiltration of water from precipitation; infiltration from streams, canals, ditches, and irrigated fields; and by subsurface inflow through volcanic rocks of Tertiary age.

A large but undetermined quantity of water is stored under both artesian and water-table conditions in volcanic rocks bordering and underlying the valley. More than 1 million acre-feet of water is stored in the unconsolidated valley fill. Artesian conditions in the valley fill exist in three areas near the western side of the valley; water-table conditions exist mostly along the eastern side of the valley. Perched water-table conditions exist southeast of Loa in the middle of the valley.

The ground-water surface slopes in the same general direction as surface drainage. Water levels fluctuate seasonally as they are affected by recharge and discharge, but no long-term trends were noted during the past 10 years. Ground water moves toward the valley through the volcanic rocks mostly in a northeasterly direction and discharges from springs along the western and southern margins of the valley. In the alluvial valley fill it moves in a down valley direction, probably not more than a few inches a day, toward springs in Bicknell Bottoms.

About 80,000 acre-feet of water is discharged by springs and seeps in the valley during most years. The ground-water accretion to the Fremont River from springs and seeps in and relatively near the streams, as determined by a seepage run, was about 72 cfs (cubic feet per second). Most of this accretion occurs in Bicknell Bottoms. Areas of high evapotranspiration, including about 5,000 acres, discharge about 9,000 acre-feet of water annually. The principal phreatophyte in this area is meadow grass; rabbit brush and greasewood grow in fringe areas. Approximately 3,500 acre-feet of water is discharged from flowing wells and about 700 acre-feet is pumped from wells during a year. The amount of water leaving the valley by subsurface outflow is relatively small-probably not more than 1,000 acre-feet annually. Irrigation is the principal use of both surface and ground water in the valley. Ground water is used also for the public supplies of Fremont, Loa, Lyman, and Bicknell, for domestic and stock use, and for fish culture.

The least mineralized water, having about 160 ppm (parts per million) of dissolved solids, is from large springs discharging more than 50 cfs of water from volcanic rocks. The most highly mineralized water is discharged from valley fill near outcrops of sedimentary rocks of

Mesozoic age. The ground water in the valley is suitable for most uses. All water sampled had a low-sodium content, which would make it suitable for irrigation; some of the samples, however, had a high-salinity content and such water should not be used excessively on poorly drained land. None of the maximum concentrations of dissolved constituents recommended for drinking water by the U.S. Public Health Service (1962) was exceeded in samples collected from large springs and flowing wells discharging more than 30,000 acre-feet annually from volcanic rocks. Most of the sampled water was hard to very hard. The temperatures of ground water ranged from 47° to 63° F, and the warmest water was from springs issuing from volcanic rocks along the western margin of the valley.

Most of the ground water in consolidated rocks of the eastern part of the county is saline. The Navajo Sandstone does contain fresh water over a broad area, but locally it can be degraded with salty water from interformational flow.

*(most of this section copied from: Bjorklund, L. J. 1969. Reconnaissance of the Ground-Water Resources of the Upper Fremont River Valley, Wayne County, Utah. U.S. Geological Survey and Utah Department of Natural Resouces, Technical Publication No. 22. Salt Lake City, Utah.)*

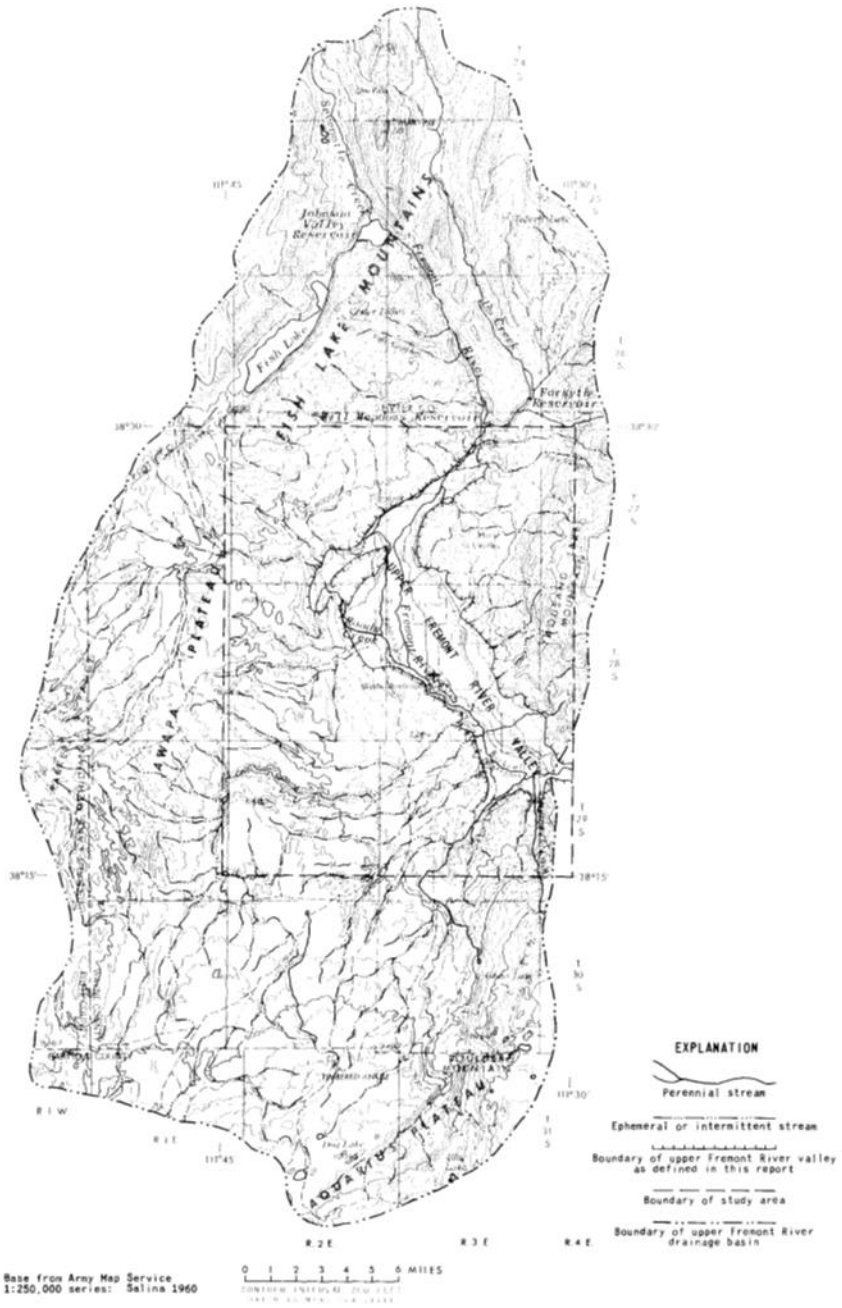



**Figure 1.—Upper Fremont River drainage basin.**

*9.1.3 Water Quality*

Baseline water quality in Wayne County, Utah is influenced by the geology and soil properties with which it comes into contact with, as well as flow conditions (BLM, 2008). Additionally, changes in the climate system have impacted the already strained water resources in the second driest state of the U.S. (Utah Resource Assessment, 2005). The availability of water in Wayne County is constricted by its landscapes, history of human settlement, modern economy, and its climate. Severe and sustained drought is common in Wayne County due to the high mountain desert location of its watersheds (Wayne County Resource Assessment, 2012).

Water quality standards and uses for each body of water (e.g., drinking water supply, recreation- swimming, fishing) are established by the State of Utah. The state is also responsible for identifying the scientific criteria necessary to support each use (BLM, 2008). A total maximum daily load (TMDL) analysis is completed on the impaired or polluted streams, rivers, lakes and reservoirs of Utah (figure four). A TMDL calculates the maximum amount of a pollutant that a water body can contain and still meet water quality standards. Accordingly, a TMDL is the sum of the allowable loads of a single pollutant from all contributing point or non-point sources (BLM, 2008). This calculation must account for seasonal variations in water quality and include a safety margin to guarantee the water body can be used for the purposes that the State has designated. Completion of TMDLs in Utah have identified the primary pollutants as sediment and phosphorus, which are by-products from irrigated lands, rangelands, and stream bank erosion (Utah Resource Assessment, 2005).

The Clean Water Act (CWA), Section 303, authorizes the water quality programs and TMDL programs. Utah's 2006 303(d) list of impaired waters identified the Lower Muddy Creek of Wayne County as polluted by selenium and in need of a TMDL analysis (table two). Likewise, the Fremont River is listed on the Utah State 303(d) list of impaired watersheds due a lack of dissolved oxygen, which contributes salinity to the Colorado River (Wayne County Resource Assessment, 2012).

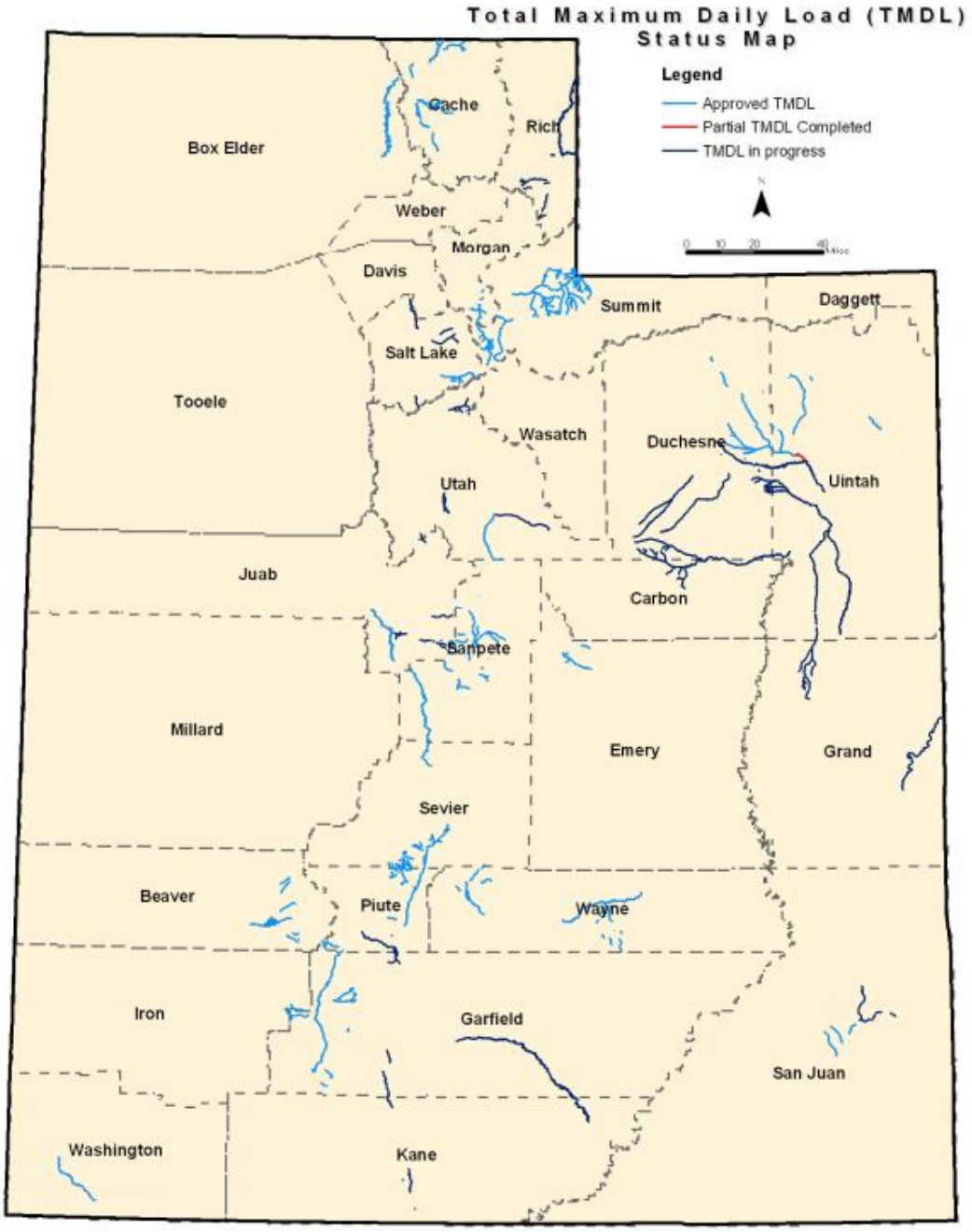



Figure Four. Total Maximum Daily Load (TMDL) Status Map of the impaired or polluted water bodies in Utah. Source: Utah Resource Assessment, 2005.

**Table Two. List of Impaired Stream and River Segments Requiring a TMDL Analysis**

| Water Body Name | Water Body Description | Causes | Status |
|---|---|---|---|
| Muddy Creek | Muddy Creek from confluence with Fremont River to Ivie Creek Confluence | Selenium | Needed |
| Fremont River | Tributary of Colorado River; Flows from the Johnson Valley Reservoir southeast through Capitol Reef Nat. Park to Muddy Creek to form Dirty Devil River | Dissolved Oxygen | Completed |

Source: BLM, 2008; Wayne County Resource Assessment, 2012.

*9.1.4 River Terraces*

River terraces are remnants of former floodplains that existed when a stream or river flowed at a higher elevation before down cutting of its channel occurred to form a new floodplain at a lower elevation. Accordingly, river terraces stand well above the level of the present floodplain, and are often located above and parallel to the river channel and its current floodplain. A number of factors are responsible for creating river terraces and include: erosion or stream incision, uplift of the land, a fall in sea level, or a change in climate (Blum & Tonqvist, 2000; Leet et al., 1982; Fairbridge, 1968).

Terrace gravels and sands located along the Fremont River and a few of its tributaries are estimated to be outwash or related deposits dating to the early Wisconsin age (Smith et al., 1963). The terrace gravel is finely grained and contains several rounded boulders of lava (2 feet in diameter), many pebbles of lava from Boulder Mountain, and limestone from the Carmel formation, as well as chert and quartzite originating from the Salt Wash member of the Morrison or Flagstaff formations. The gravels vary from less than 20 to more than 40 feet in thickness. At the location where the Fremont River terrace is intersected by the Torrey-Grover road, the terrace reaches greater than 1,000 feet wide and approximately 50 feet above the river. The terrace contains approximately 20 feet of gravel overlaid upon an erosional terrace cut in the bedrock. The height of this terrace above the river increases downstream. As an example, the terrace is approximately 150 feet above the river at the mouth of Carcass Creek. Additionally, the large terrace remnant (Johnson Mesa) located in the town of Fruita is approximately 250 feet above the river. The highest level that the Fremont River terrace reaches is approximately 200 feet above the river. Similar terraces are located above Oak and Pleasant Creeks, as well as

rock-cut terraces in the Fremont Gorge that span from 50 to 200 feet above their respective streams (Smith et al., 1963).

Additionally, the Fremont River terrace rests upon gray sandy lakebeds upstream from the mouth of Fish Creek and at the mouth of Donkey Creek. It has been suggested that these lakebeds were deposited when the outwash of Fish and Carcass Creeks initially met with the Fremont River Valley and were subsequently covered with approximately 10 feet of gravelly outwash from Donkey Creek (Smith et al., 1963). The gravel outwash terrace and the outwash along Donkey Creek were most likely divided before the late Wisconsin based upon evidence indicating that the Donkey Creek outwash cut below the level of the early Wisconsin outwash. Similarly, a late Wisconsin outwash stream deposited a small alluvial fan in the Fremont River Valley that is below the level of the early Wisconsin outwash (Smith et al., 1963).

Overall, the river terrace gravels in Wayne County provide insights into the early Wisconsin period when these gravels were deposited to form present day valleys. Analysis of river terraces in the county suggests that the major valleys of the early Wisconsin closely resemble present day valleys, with gorges and valley floors located in the same general positions (Smith et al., 1963). Additionally, modern-day terrace heights above river or creek levels provide a measure of erosion through time to the early Wisconsin period. The terrace heights of Wayne County indicate extensive downstream erosion, most likely caused from increases in overall relief of the area. The amount of erosion in Wayne County is comparable in magnitude to erosion occurring in the Colorado Plateau (Smith et al., 1963).

### *9.1.5 Floodplains*

The majority of flooding in Wayne County occurs along the Fremont River and its tributaries. This includes Sand Creek, Spring Creek and ponds used for culinary water supplies located adjacent to the river (Wayne County, n.d.). In addition, many of the perennial and intermittent streams within the area have steep streambed gradients that are vulnerable to flooding during rapid snowmelt or high intensity thunderstorms (BLM, 2008).

Floodplain maps for the county were created by the Utah Division of Emergency Services using a loss estimation program (HAZUS) to generate a computer simulated scenario for a 100-year floodplain (Wayne County, no date). The impact of flooding was examined with a 1% chance of flooding in any given year. The floodplain zones of Wayne County, Utah are shown in figures 5-8. These floodplain areas pose as potential risks for residents and their property (Wayne County, n.d.).

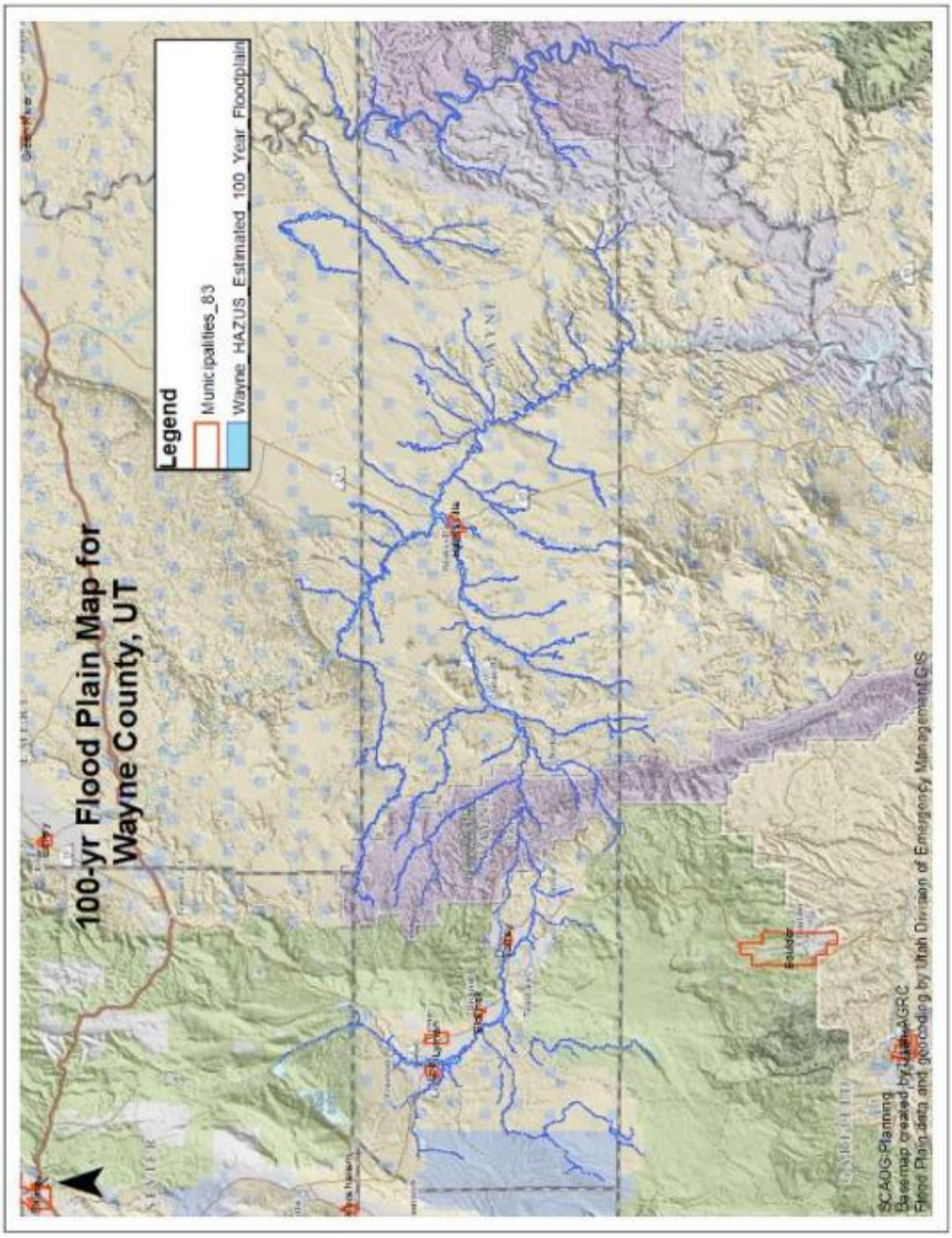



Figure Five. *100-year floodplain map for Wayne County, Utah. Source: Wayne County, n.d.*

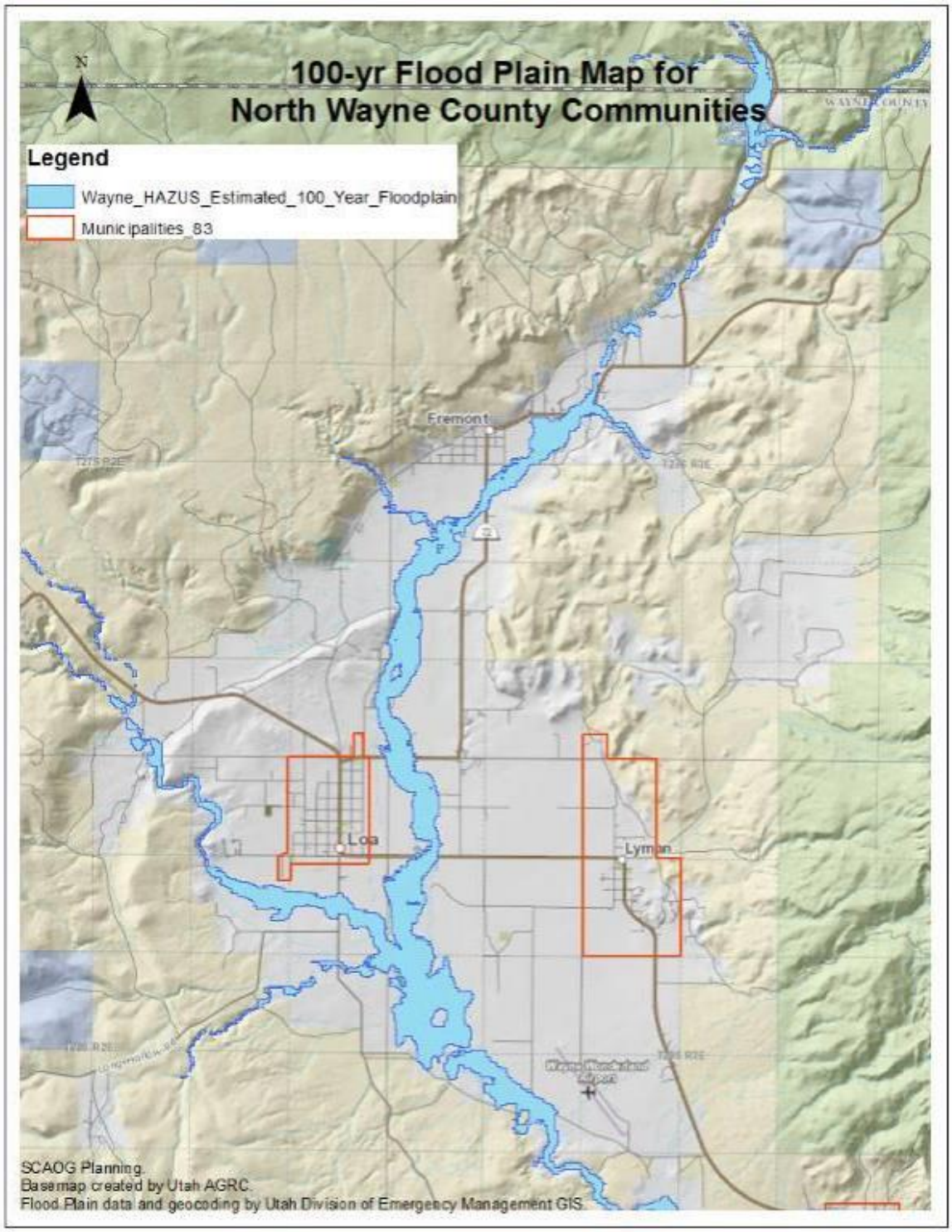



Figure Six. *100-year floodplain map for North Wayne County Communities. Source: Wayne County, n.d.*

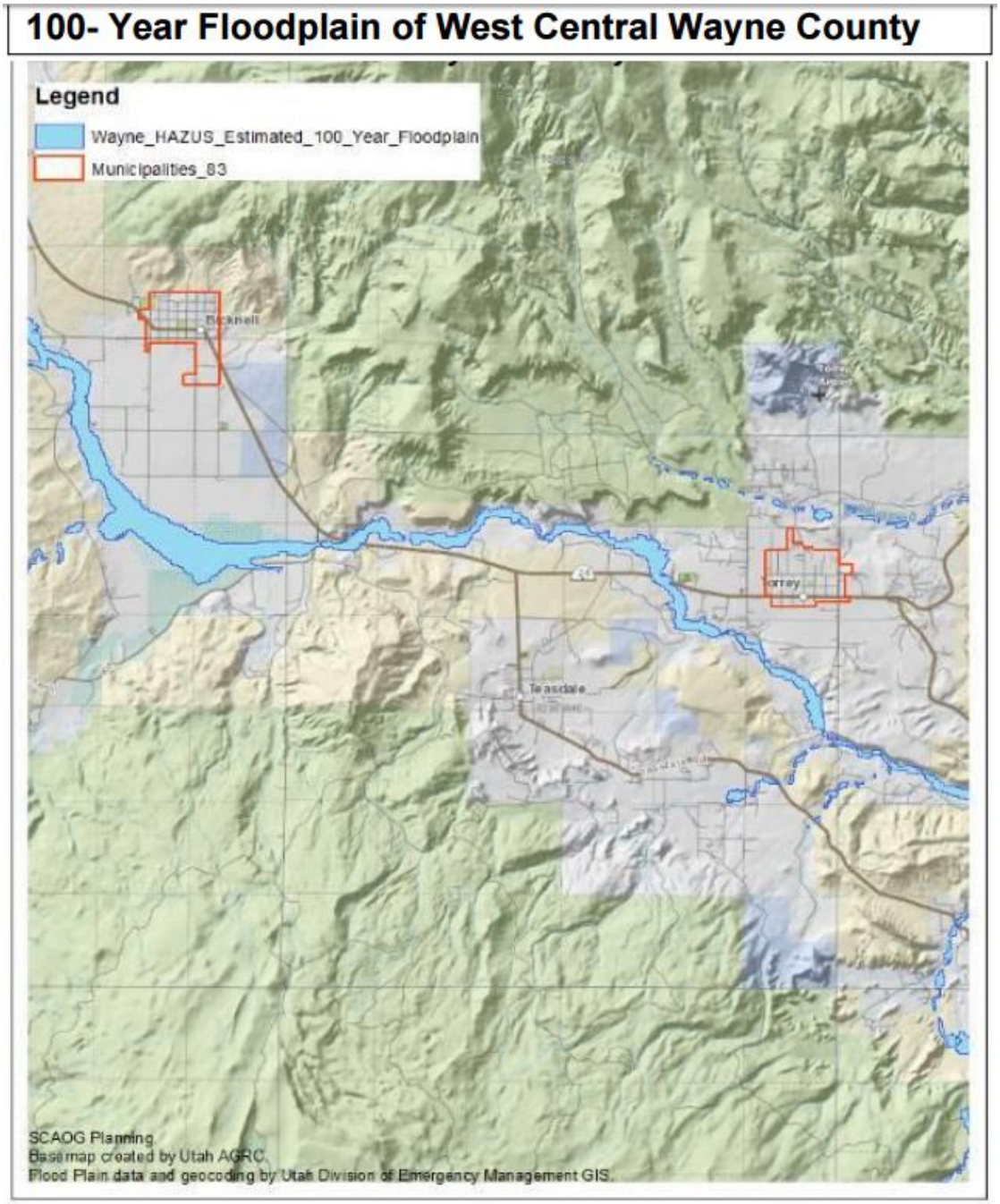



Figure Seven. *100-year floodplain map for West Central Wayne County, Utah. Source: Wayne County, n.d.*

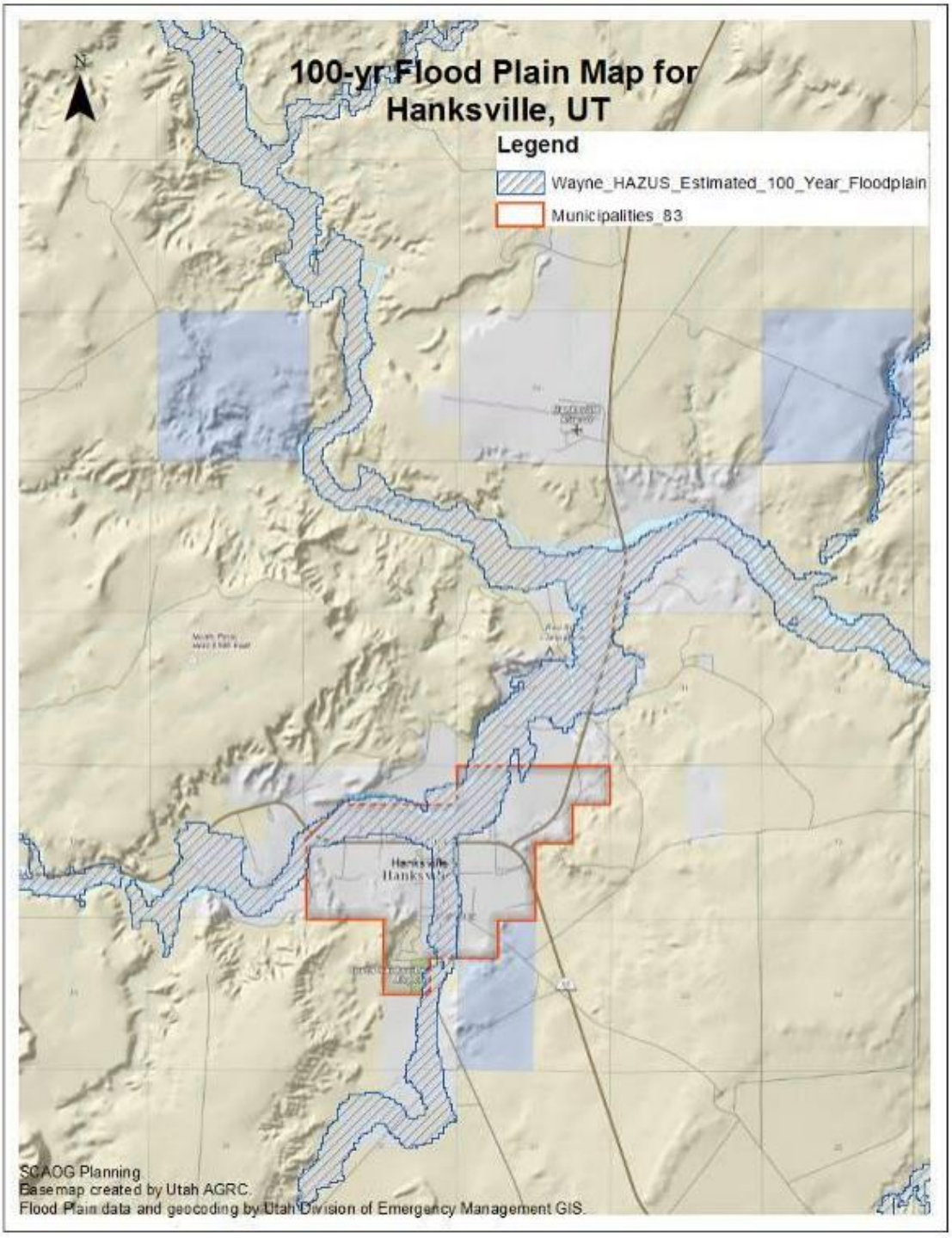



Figure Eight. *100-year floodplain map for Hanksville, Utah. Source: Wayne County, n.d.*

*9.2 Objectives*

Wayne County's objectives as to water quality, hydrology, flood plains and river terraces are to maintain water quality, quantity, in line with historic uses and in compliance with State Water Quality Standards. Flood plains and river terraces are to be maintained and changed only as additional storage facilities and diversions are approved and added or modified.

Hydropower facilities should be implemented as possible on canals, rivers and streams. These will add to the local economy and lessen the amount of power that needs to be transported into the County. These are also a clean source of power which helps to preserve our air quality.

Wayne County for years has been interested in additional water storage facilities. A reservoir site selection and screening study completed by the Utah Division of Water Resources in 2009, narrowed recommended sites to three; Red Desert, Lower Sandy Creek, and Caineville Wash.

*9.3 Policy Statements*

1. Multiple use and sustained-yield management principles shall be applied in public land use and natural resource planning and management in Wayne County. This is how the citizens of Wayne County are best served.

2. Ensure any recovery plan, habitat management plan, critical habitat designation, or any other plan proposing an "in stream flow" requirement adequately considers local existing and anticipated future water uses, local custom and culture, and local economic and individual needs.

3. Additional water storage facilities in the County that assures present and future growth and protection of Colorado Water Rights pursuant to the Colorado River Compact should be considered.

Chapter 10
# Riparian Areas and Wetlands

## *10.1 Resource Findings*

Riparian Areas occur as narrow strips along streams or as small patches around seeps or springs or along the shoreline of lakes or ponds. The wetlands are located in valleys where they are fed by springs, streams and rivers. The largest wetland areas are located in the valleys near and along the Fremont River, such as the Bicknell Bottoms area. Most of the wetlands are private lands used for livestock. A very small percentage of public lands are made up of wetland and riparian areas.

Most riparian areas in the U.S. evolved with animals feeding on the lush vegetation and trampling on the streambanks to get to water. Although the original grazers were bison, moose, and deer rather than cattle, sheep, and goats, this evolutionary pressure means that most native riparian plant species regrow following a period of grazing (Bellows, 2003).

While conservationists and other non-farm community members often blame farmers and ranchers for riparian degradation, these rural land managers may also be victims of poor upstream urban and suburban land management practices. Non-agricultural land use practices such as forestry, home building, road construction, and urban and suburban development can also decrease water infiltration and increase runoff, erosion, and contaminant transport into riparian areas (Bellows, 2003). An example of this in Wayne County is the sediment fill-up of the Fremont River in the Bicknell Bottoms during the late 1980's and 1990's. During these decades the free flowing river through the bottoms became filled by sediment from floods. It is no longer free flowing through a portion of the bottoms. This was most likely caused by channeling of the run off to the river where in the past it had spread out over flat field areas before reaching the river allowing sediment to drop out. This section of the river should be cleaned out to restore the free flowing river and riparian areas near it.

Specialized grazing management practices can also successfully control weeds and non-native woody species. By understanding the growth habits and reproductive cycles of noxious and non-native plants in relation to those of desired riparian plants, the timing and duration of livestock grazing can be managed to favor their feeding on weeds or unwanted brush (Bellows, 2003).

Management intensive rotational grazing provides farmers and ranchers with a method for productively managing their livestock while protecting ecologically important riparian ecosystems. To be effective, these management practices must be flexibly implemented based on knowledge of local climate, native riparian vegetation, current riparian health, and livestock behavior (Bellows, 2003). Rather than just blame grazing for damage to riparian areas and cut grazing, land managers should work with ranchers to better manage to prevent unnecessary damage and promote positive benefits of grazing.

A riparian area is defined by the BLM's 1987 policy statement as "an area of land that is directly influenced by permanent water (BLM, 2008)". Visible vegetation or physical characteristics of permanent water influence, such as lake shores or stream banks must be present for a location to be considered a riparian area for management purposes. Sites with ephemeral streams or washes that lack the presence of vegetation dependent upon free water in the soil are excluded from the riparian classification. Riparian areas are identified as either lentic (habitats located in still, fresh water), or lotic (habitats located in rapidly moving fresh water) (BLM, 2008). Lentic riparian areas usually consist of meadows or springs, whereas lotic riparian areas are identified as creeks or rivers with running water.

The riparian-wetland areas located in the Richfield Field Office (RFO), which includes Wayne County, represent less than 1 percent of the land area (BLM, 2008). The Dirty Devil River and the Fremont River contain the most substantial areas of riparian vegetation on public land within the planning area (figures one and two). These rivers are located in the Upper Colorado River Basin (figure three), within the watersheds of the Upper Colorado-Dirty Devil River Basin (Fremont sub-basin), and the Lower Green River Basin (Lower Green sub-basin) (figure four) (Ramsey et al., 2016). The ecological importance of riparian areas greatly exceeds their limited physical areas in the county. Riparian areas are indicative of healthy, productive and biologically diverse ecosystems that are capable of supporting habitat for fish, birds, and other wildlife species. Additionally, riparian areas influence the structure of soils and vegetation, as well as the quantity and quality of water onsite and downstream. These ecologically important areas help store floodwaters, recharge groundwater, reduce the risk of flash floods and filter sediments (BLM, 2008).

The Utah BLM Riparian Policy outlines management objectives for riparian areas in order to improve or maintain riparian areas in proper functioning condition (PFC). Each stream or varying sections of a stream is evaluated for functioning condition, regardless of the type of riparian or wetland ecosystem. The process for determining functioning condition is completed through rating riparian areas by category to reflect ecosystem health and impacts from management practices. Riparian areas classified as in PFC contain adequate vegetation and landform structure to dissipate stream energy from high water flows (BLM, 2008). The riparian areas in properly functioning condition provide essential functions, such as reducing erosion, improving water quality, filtering sediment, capturing bedload, and aiding in floodplain development. These ecosystem functions allow for enhanced flood water retention and ground water recharge, as well as the promotion of root masses which act to stabilize stream banks from cutting action. Additionally, diverse ponding and channel characteristics necessary for fish production and greater biodiversity are associated with properly functioning riparian areas (BLM, 2008).

The riparian areas classified as "Functioning at Risk" are in functioning condition, however at least one soil, water, or vegetation feature makes these areas vulnerable to degradation from high water flow events (BLM, 2008

"Non-Functioning" riparian areas are unable to provide adequate vegetation, landform, or large wood debris to dissipate stream energy during high water flows. Consequently, these riparian areas do not reduce erosion, improve water quality, and do not perform the necessary functions to support biodiversity and ecosystem health.

Riparian areas throughout the RFO have been inventoried and evaluated by the BLM. The results suggest approximately 455 miles of lotic riparian habitat and 1,423 acres of lentic riparian habitat on the public lands of the RFO (BLM, 2008). These inventories were completed in the early 1990s, however more recently the BLM expanded the definition for riparian areas to include seeps and springs in the *Utah Standards and Guidelines for Rangeland Health* (BLM, 1997). Under this more comprehensive definition, 59 percent of riparian areas in the RFO have been inventoried and are presented in tables one and two. PFC is established by *Utah Standards and Guidelines for Rangeland Health* (BLM, 1997) as the minimum standard for BLM management of riparian areas. It should be noted that these statistics (tables 1-2) do not represent the total riparian areas in the RFO since not all have been surveyed.

**Table One Lotic Riparian Conditions Inventory**

| | Proper Functioning Condition (PFC) | Functioning-At-Risk | | | | Non-Functional | Total |
|---|---|---|---|---|---|---|---|
| | | Trend Up | Trend Not Apparent | Trend Down | Total | | |
| **Miles** | 305 mi | 30 mi | 61 mi | 11 mi | 102 mi | 48 mi | 455 mi |

Source: BLM, 2008

**Table Two Lentic Riparian Conditions Inventory**

| | Proper Functioning Condition (PFC) | Functioning-At-Risk | | | | Non-Functional | Total |
|---|---|---|---|---|---|---|---|
| | | Trend Up | Trend Not Apparent | Trend Down | Total | | |
| **% surveyed** | 67 % | 7% | 13% | 2% | 22% | 11% | - |
| **Acres** | 1,236 ac | 16 ac | 137 ac | 10 ac | 163 ac | 24 ac | 1,423 ac |
| **% surveyed** | 87 % | 1 % | 10% | 1% | 11% | 2% | |

Source: BLM, 2008

In addition, a comprehensive study of Utah wetland conditions was completed for the National Wetland Inventory (Emerson, 2014) in order to address the overall health of the state's wetlands. Nearly all of Utah's watersheds were evaluated and mapped based upon wetland attributes (e.g., emergent, forest, fringe mudflat, open water, playa, riverine, scrub/shrub and

water-pocket) (table 3). Table 4 summarizes wetland profiles for 46 Utah watersheds, listed in order of percent mapped. The watersheds located in Wayne County are outlined in red.

**Table Three. Wetland Type Descriptions**

| Utah Type | Description |
|---|---|
| Open Water | Perennial water bodies |
| Fringe Mudflat | Mostly non-vegetated wetlands near the shoreline of lakes and reservoirs where water availability is controlled by lake levels and where the primary movement of water is sheet-flow - often expansive mudflats or barren ground during low water-level periods around the fringes of reservoirs and endorheic lakes |
| Emergent | Palustrine wetland with emergent vegetation often associated with groundwater discharge or shallow surface flow |
| Playa | Ephemeral ponds, depressional features, or expansive mineral flats where evapotranspiration exceeds water supply or through-flow; a mineral soil must be present |
| Riverine | Perennial stream constrained to a channel (includes canals and ditches) Forested Associated with woody vegetation greater than 6 meters in height, commonly found around the margins of rivers, montane lakes, or springs |
| Scrub/Shrub | Associated with woody vegetation less than 6 meters in height |
| Water-pocket | Bedrock pothole where little to no soil is present and water is supplied only by precipitation |

Source: Emerson, 2014. National Wetland Inventory data.

**Table Four. Utah wetland profiles by watershed with over 50% of mapping completed**

| Watershed (% Mapped) | Emergent | Forest | Fringe Mudflat | Open Water | Playa | Riverine | Scrub/Shrub | Water-pocket |
|---|---|---|---|---|---|---|---|---|
| Ashley- Brush (100%) | 64.8% | 0.4% | 0.8% | 24.9% | 1.0% | 4.7% | 3.4% | - |
| Blacks Fork (100%) | 61.0% | <0.1% | 0.2% | 13.8 | 0.2% | 0.9% | 23.9% | - |
| Central Bear (100%) | 27.8% | - | - | 68.6% | 3.7% | - | - | - |
| Chinle (100%) | 0.9% | 0.7% | - | - | 0.6% | 6.1% | 90.8% | 0.9% |
| Colorado Headwaters-Plateau (100%) | 0.8% | - | - | - | 0.2% | 93.4% | 5.6% | - |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Lower Dolores (100%) | 19.1% | - | - | 17.6% | 1.0% | 47.3% | 15.0% | - |
| Lower Green-Diamond (100%) | 26.5% | 3.6% | 1.2% | 14.1% | 9.4% | 39.1% | 6.2% | - |
| Lower Green-Desolation Canyon (100%) | 18.2% | 0.7% | <0.1% | 3.1% | 3.7% | 65.6% | 8.6% | - |
| Lower White (100%) | 15.1% | 0.2% | - | 7.2% | 5.2% | 56.8% | 15.4% | - |
| Upper Colorado-Kane Springs (100%) | 7.4% | - | 0.3% | 13.1% | 4.5% | 71.1% | 3.7% | - |
| Upper Dolores (100%) | 59.4% | <0.1% | - | 15.3% | 5.1% | 5.0% | 15.1% | - |
| Upper Green-Flaming Gorge Reservoir (100%) | 34.7% | <0.1% | - | 15.3% | 5.1% | 5.0% | 15.1% | - |
| Upper Virgin (100%) | 9.6% | 0.2% | 0.2% | 23.4% | 1.4% | 63.8% | 1.5% | <0.1% |
| Westwater Canyon (100%) | 3.0% | 0.2% | - | 2.3% | 3.4% | 79.3% | 11.8% | - |
| Willow (100%) | 47.4% | 0.4% | - | 6.4% | 1.4% | 3.4% | 41.0% | - |
| Lower Virgin (99.8%) | - | - | - | 0.5% | - | 99.5% | <0.1% | - |
| Kanab (99.3%) | 0.4% | - | - | 7.9% | <0.1% | 91.6% | - | - |
| Lower Bear-Malad (99.1%) | 32.3% | <0.1% | 29.1% | 22.7% | 13.1% | 2.7% | <0.1% | - |
| Duchesne (98.5%) | 62.7% | 1.1% | 0.8% | 15.9% | 0.6% | 4.5% | 14.4% | - |
| Dirty Devil (97.8%) | 2.7% | - | 0.9% | 32.3% | 2.0% | 61.6% | 0.4% | - |
| Fort Pierce Wash (97.2%) | - | <0.1% | - | 2.6% | - | 97.4% | - | - |
| Fremont (89.2%) | 66.7% | <0.1% | 0.4% | 16.6% | 1.6% | 11.7% | 3.1% | - |
| Montezuma (88.7%) | 11.9% | 0.2% | <0.1% | 11.9% | 6.2% | 32.0% | 37.8% | - |
| Jordan (87%) | 35.5% | <0.1% | 24.6% | 15.5% | 22.8% | 1.1% | 0.6% | - |
| McElmo (85.2%) | 2.6% | - | - | 0.5% | <0.1% | 32.8% | 64.1% | - |
| Upper Lake Powell (84.8%) | 0.3% | - | 0.2% | 96.2% | 0.2% | 3.0% | 0.1% | - |
| Escalante Desert (81.3%) | 1.5% | <0.1% | 0.3% | 16.3% | 14.7% | 67.1% | 0.1% | - |
| Upper Sevier (80.3%) | 9.7% | <0.1% | 1.3% | 22.1% | <0.1% | 65.5% | 1.3% | - |
| Price (79.6%) | 56.9% | 0.2% | 0.6% | 12.6% | 5.9% | 14.9% | 8.9% | - |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Lower Green (78.1%) | 6.2% | <0.1% | - | 0.9% | 1.7% | 84.4% | 6.7% | - |
| Lower San Juan-Four Corners (75.5%) | 2.7% | 1.5% | - | 3.2% | 0.9% | 39.1% | 52.5% | <0.1% |
| Strawberry (69.8%) | 18.6% | <0.1% | 0.9% | 65.8% | 2.8% | 1.2% | 10.6% | - |
| Middle Bear (66.2%) | 50.8% | 0.6% | 0.7% | 34.8% | 4.1% | 4.1% | 5.1% | - |
| Lower San Juan (62.1%) | <0.1% | - | - | 48.2% | 0.3% | 30.5% | 21.0% | <0.1% |
| Bear Lake (59.8%) | 11.8% | 0.1% | 1.0% | 84.8% | 0.2% | 1.5% | 0.7% | - |
| Curlew Valley (59.8%) | 9.5% | - | 82.9% | 1.2% | 6.3% | <0.1% | - | - |
| Lower Weber (59.6%) | 39.5% | 0.5% | 19.1% | 31.8% | 6.7% | 1.4% | 1.0% | - |
| Great Salt Lake (58.7%) | 0.3% | - | 32.7% | 66.2% | 0.9% | <0.1% | <0.1% | - |
| Paria (58.5%) | 1.3% | - | - | 4.5% | - | 94.2% | - | - |
| East Fork Sevier (57.6%) | 36.2% | - | 1.6% | 27.4% | 1.6% | 32.5% | 0.7% | - |

Source: Emerson, 2014. National Wetland Inventory data.

Compared with upland habitats, riparian areas are in a constant state of activity, and thus are extremely responsive to internal and external changes. Fluctuations in seasonal water flows largely influence the productivity and density of riparian vegetation and channel development. Likewise, larger scale flood events are essential for ecosystem health and stability. These changes help to sustain and maintain resiliency among riparian ecosystems. The ability of a riparian area to endure major disturbances largely depends upon the strength and stability of a system's stream bank, hydrology, and vegetation characteristics (BLM, 2008). Degradation to any of these characteristics can result in impacts that may be too severe for a riparian area to withstand or repair. Repeated degradation in the absence of recovery often results in the gradual decline of a riparian area's functional condition, as well as vulnerability to further degradation. In order to prevent such degradation, the policy of the BLM is to maintain, restore, or improve riparian ecosystems to foster a healthy and properly functioning condition that promotes biological diversity, productivity, and sustainability (BLM, 2008).

A balanced combination of three essential components- soils, water and vegetation- is necessary to maintain healthy and properly functioning riparian-wetland areas (BLM, 2008). Riparian-wetland systems require physical (stream bank, channel, and soil properties), hydrologic (regular circulation of surface waters), and vegetation (hydrophytic communities) to function (BLM, 2008). The degradation of any of these 3 components- soils, water or vegetation- results in the decline of a riparian habitat's functional capacity. Additionally, riparian-wetland areas are considered as in PFC when the morphology of stream channels and stream functions are appropriate to soil type, climate and landform (BLM, 2007). This involves the presence of

an active floodplain, vegetation that is diverse in age structure and composition, revegetation point bars, and deep soil-binding root masses, as well as large woody debris to effectively disperse stream energy from high water flows and flooding. Such features allow riparian areas to capture sediment, stabilize stream banks from erosion, recharge groundwater, provide habitat, food and shelter for dependent animal species, and enhance water quality (BLM, 1997).

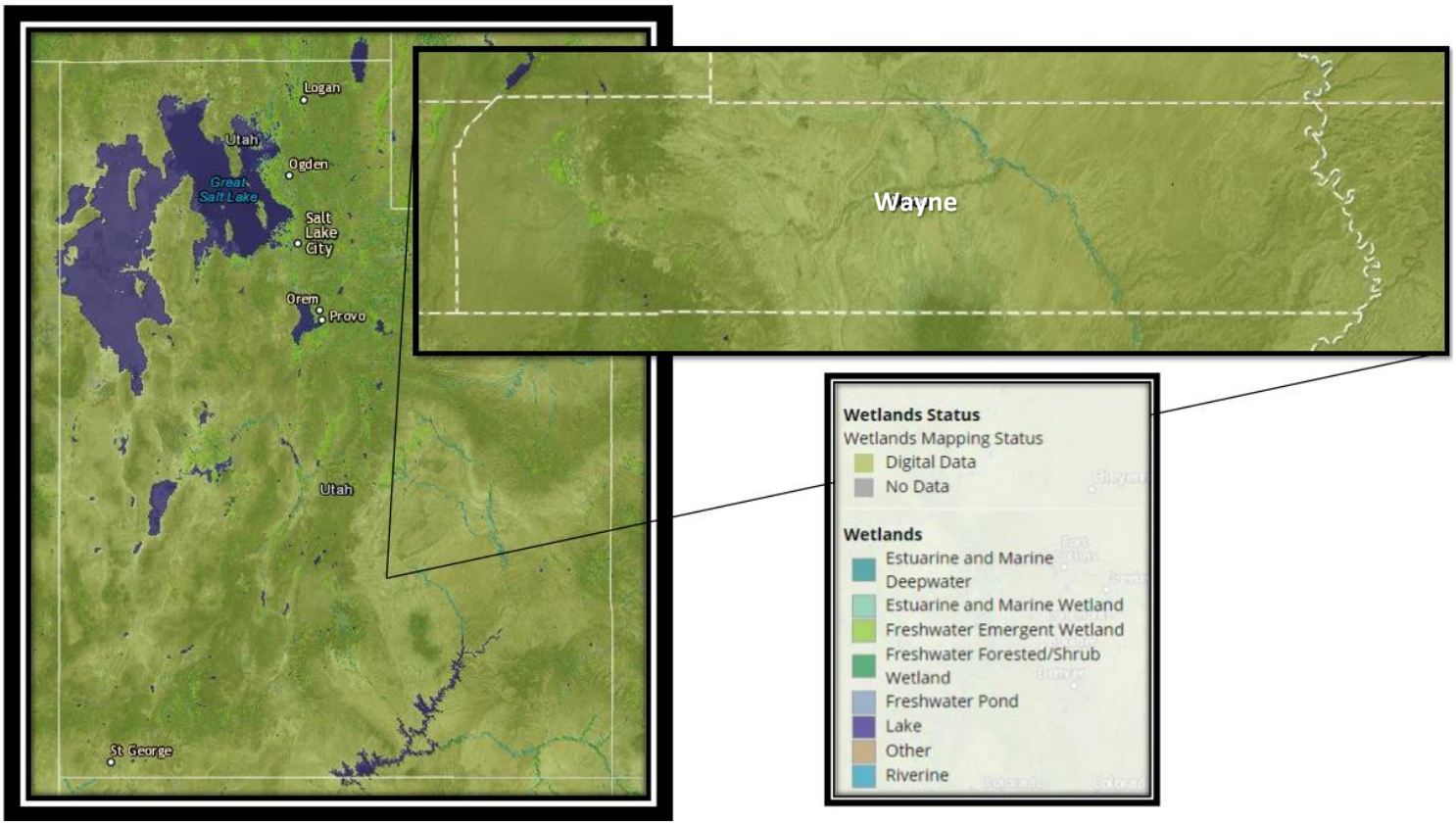
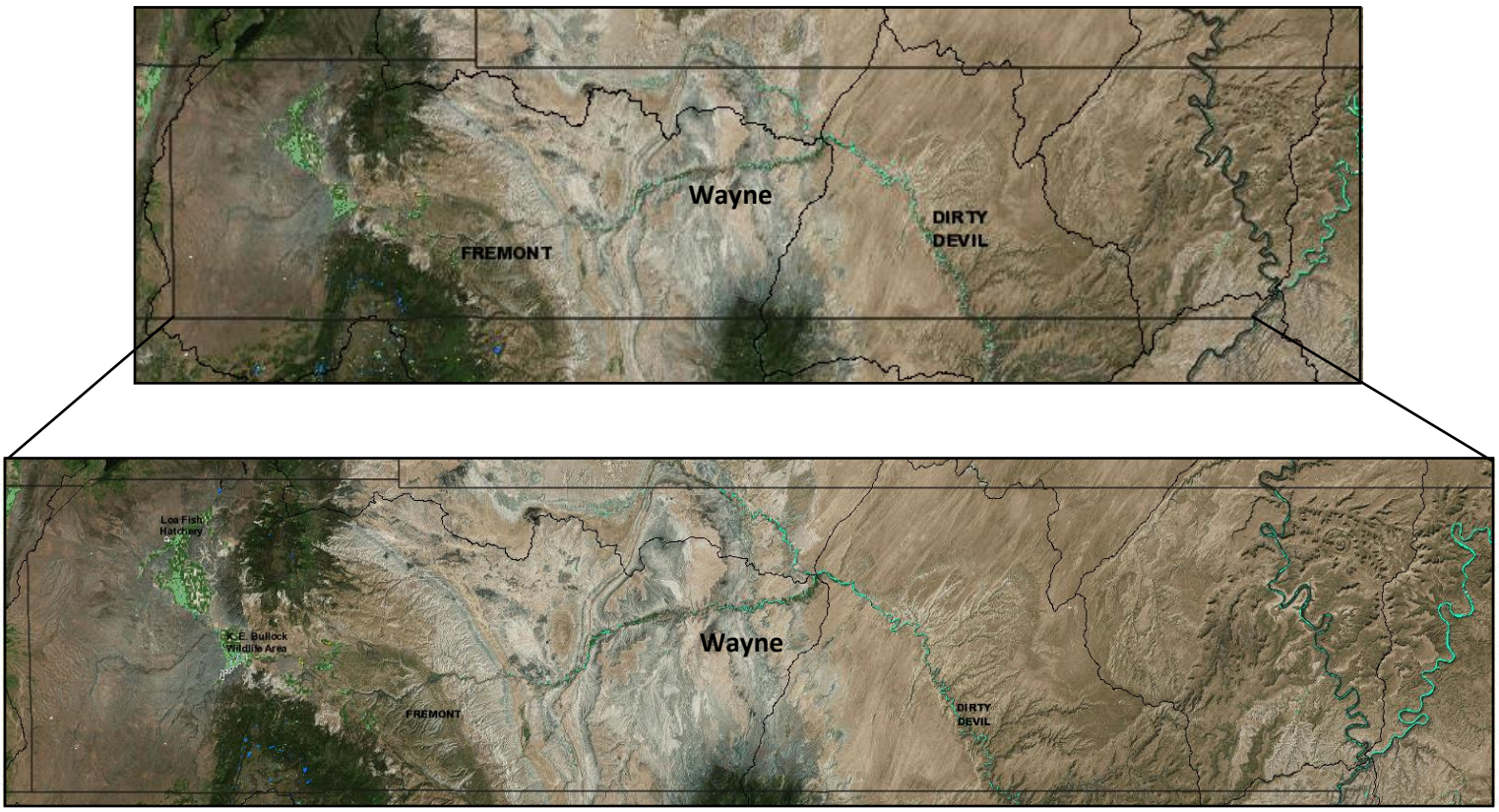



Figure One. *Freshwater Emergent Wetlands of Wayne County, Utah. Source: U.S. Fish and Wildlife Service, 2016*



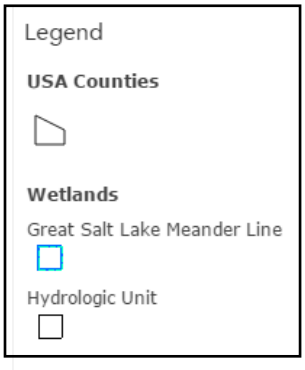




Figure Two: *ArcGIS map depicting Wayne County, Utah wetlands (shown in green) associated with the Fremont River, Dirty Devil River, the Loa Fish Hatchery and the K.E. Bullock Wildlife Area (Utah Geological Survey, 2016).*

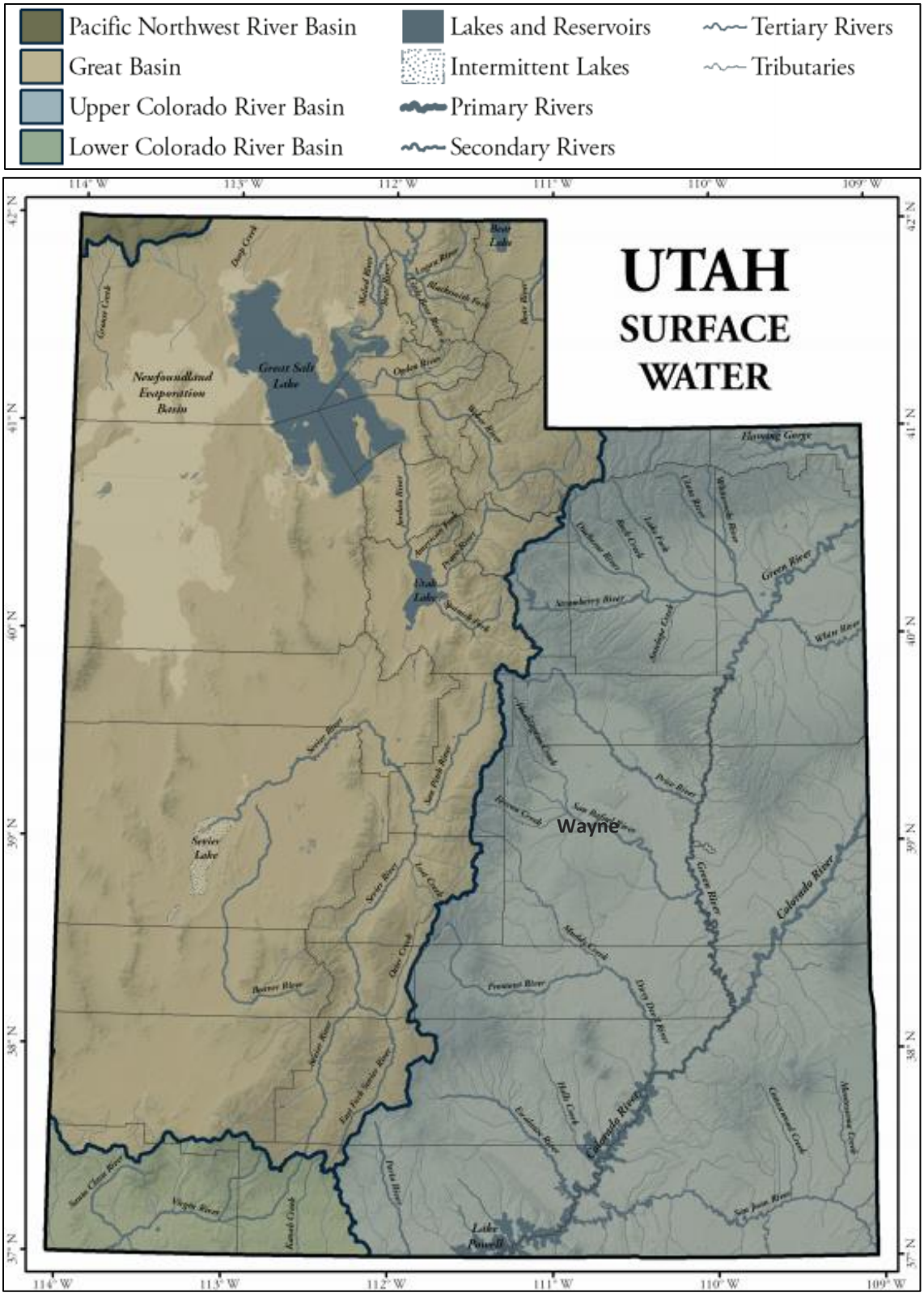



Figure Three. *Major hydrologic regions and surface water features in Utah. Source: Ramsey et al., 2016.*

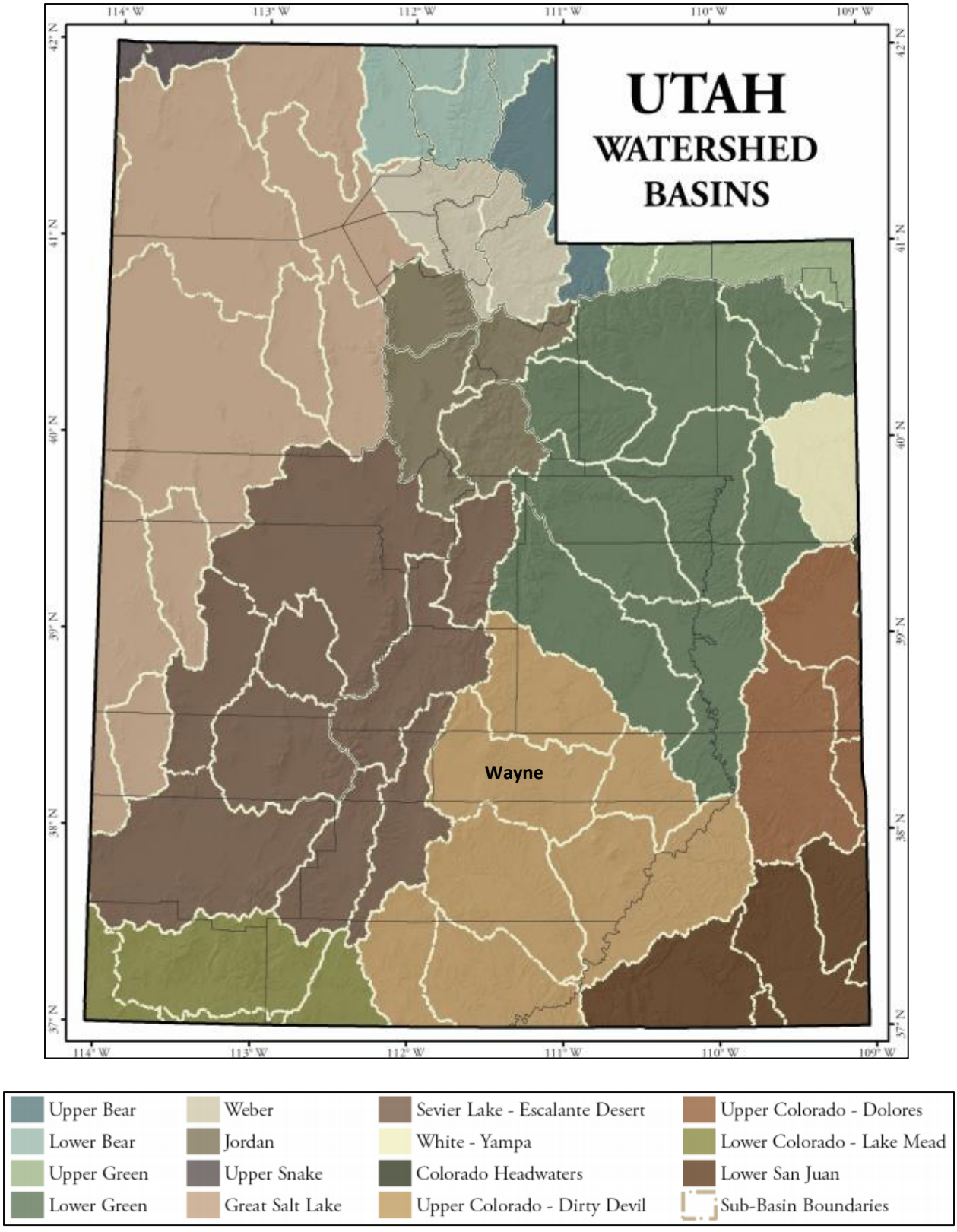



Figure Four. *Watershed basins and sub-basins in Utah. Source: Ramsey et al., 2016.*

*10.2 Objectives*

Wetland and riparian areas are important for many reasons and should be maintained. The County will support reasonable efforts to maintain or improve riparian areas and wetlands. Agencies must involve the County in any decisions that would directly affect historical use of wetland and riparian areas within the County.

Water quality and quantity are essential to the existence and maintenance of wetland and riparian areas. Any proposed diversion of water that would dry up any of these areas would be considered by the County on a case by case basis.

The positive effects of well managed grazing on riparian areas must be considered by landowners and public land managers. Cutting back grazing is not the only answer to protection and improvement of riparian areas in the County.

*10.3 Policy Statements*

1. Multiple use and sustained-yield management principles shall be applied in public land use and natural resource planning and management in Wayne County. This is how the citizens of Wayne County are best served. Multiple-use and sustained-yield management means that land owners and land management agencies should develop and implement management plans and make other resource-use decisions that meet the County's needs of economic and community development. This includes management of wetland and riparian areas.

2. Proper management of land use such as grazing, timber harvesting, mining, exploration, and recreation can protect wetland and riparian areas without cutting back use. Closing roads and cutting back grazing are not the only ways to protect these resources.

Chapter 11
# Wildlife, Fisheries and Predator Control,

## *11.1 Wildlife*

### *11.1 Resource Findings*

Wayne County has a wide range of habitats, with a corresponding large number and variety of wildlife species. Habitats are diverse because of physiographic variations, topographic features, elevation differences, precipitation variances, and management practices that alter vegetation communities. Major habitat types include: alpine; spruce-fir; quaking aspen; sane areas of ponderosa pine mixed into the transition zone between conifer-aspen and mountain brush; pinyon-juniper; and a wide range of sagebrush desert shrub types.

Wildlife is cooperatively managed with the Utah Division of Wildlife Resources (DWR), and coordinated with the Bureau of Land Management, Forest Service and the National Park Service on adjoining administered lands and with the public at large.

Wildlife hunting and fishing provide important recreational and economic opportunities in Wayne County. Therefore, hunting licenses and permits should be increased until wildlife herds are brought down to reasonable population levels so as to not interfere with original permitted AUMs originally established on all public lands allotments in Wayne County. That way, both hunting and recreationists and livestock grazers benefit together.

Beneficial wildlife management is tied to how livestock grazing allotments are managed. Increasing forage for livestock is the best way to benefit the wildlife; the two directly and mutually benefit from improved grazing conditions. Wildlife population goals should be quickly adjusted and changed in response to variations in the amount of available forage caused by drought or other climatic adjustments, and wildlife management agencies should give due regard to livestock needs, as a way of improving and preserving the vitality of wildlife populations.

The bison population limits on the Henry Mountains is 275 head as has been previously agreed by the Division of Wildlife Resources and the Henry Mountains Grazing Association and should be enforced through hunting permits. Wayne County notes that Division of Wildlife Resources has failed to follow the Henry Mountains Bison Management Plan (2007) and that the bison population is currently way over the population limits set forth in the plan.

Antelope on Parker Mountain should be limited to 1,500 head maximum. This should be a target for management by Division of Wildlife Resources, BLM and SITLA.

In Wayne County, the BLM, USFS and STLA manages public lands to sustain habitat for fish and wildlife. The ecosystems and landscapes that support more than 600 species of fish and wildlife residing within the BLM Richfield Field Office (RFO), which includes Wayne County,

are managed jointly by the RFO and Wayne County (BLM, 2008). On the condition that wildlife management plans and policies of Wayne County are consistent with federal law, all lands and natural resources within its geographic boundaries are subject to the planning authority of Wayne County (Wayne County Resource Management Plan, 2011). The BLM provides general fish and wildlife management guidelines described by *Utah Fish and Wildlife* 2000 (BLM, 1993b) to manage resources located on the public lands of Wayne County. Wildlife populations are managed by the Utah Division of Wildlife Resources (UDWR), and together with the BLM and Wayne County, strive to attain suitable habitats on public lands that are consistent with multiple-use management and sustained-yield management principles (BLM, 2008). The wildlife habitats in Wayne County extend across BLM lands, to other federal, state and private lands, which have often been influenced by past and ongoing human activities to cause increases in some species, and declines in others. These population shifts have resulted in overall changes in ecosystem function and productivity.

Fish and wildlife species can be characterized into 2 management categories and include economically important species, referred to as game species, and non-game species. Economically important species are essential for hunting, fishing and wildlife viewing (BLM, 2008). Non-game species possess little to no economic importance for hunting and fishing. Species not included in these two categories play important ecological roles and consequently are vital to the health and diversity of vegetation and animal communities in Wayne County.

The term "wildlife" in Utah refers to brine shrimp and crayfish; mollusks; and vertebrate animals (fish, amphibians, reptiles, birds, and mammals) existing in nature, excluding feral animals (Bailey, n.d.). Wildlife are protected under federal law (see Utah code 23-13-2), with the exception of coyotes, field mice, gophers, ground squirrels, jack rabbits, muskrats, and raccoons. Rare species listed under the Endangered Species Act are discussed in further detail in the chapter titled "Threatened, Endangered, and Sensitive Species."

### *11.1.2 Wildlife management*

Wildlife and their habitats provide diverse, productive and healthy natural environments for Wayne County, acting to greatly improve the quality of life for many residents through aesthetic pleasure (e.g., photography, wildlife viewing), inspiration, education, outdoor recreation and economic activities (e.g., hunting, fishing; Bailey, n.d.). Wayne County is home to an array of wildlife, including bison, bighorn sheep, pronghorn, mule deer, elk, black bear, cougar, furbearers (e.g. bobcats, raccoons, badgers, weasels, red fox, and beavers), and other non-game species. With so many wildlife species migrating between winter/summer ranges or residing in the County year-round, it is expected that conflicts occur among agricultural and livestock producers, as well as private landowners. Balancing these competing forces is important for the livelihood of the citizens and wildlife of Wayne County. Because wildlife can have both a positive and negative impact on the local economy, most people favor a balance between the habitat requirements of wildlife populations and economic activities needed to support Wayne County. Although, many citizens of Wayne County who depend upon raising

livestock and agricultural production have proposed increasing the number of hunting licenses to increase forage for both livestock and wildlife (Wayne County Resource Management Plan, 2011). Those in favor of this wish to decrease wildlife herds to acceptable population levels, without interfering with existing permitted assets under management (AUMs) established on public land allotments in Wayne County. In regard to these suggestions, wildlife population goals should consider available resources, such as forage, which is often restricted by drought, climatic factors, and competition.

Utah state law describes wildlife management policies and the balance between competing uses (See Utah Code 23-24-3), which is based upon open, public dialogue of wildlife issues. The Division of Natural Resources (DNR) selects individuals, who are nominated by interest groups, to serve as regional advisory councils (RACs). These council members can consist of citizens, local elected officials, sportsmen, agriculturists, federal land managers, and members of the public. The RAC is responsible for reviewing input and recommendations, the collection of data and assessment of expert testimony to inform policy recommendations to the Wildlife Board (Bailey, n.d.).

*11.1.3 The Wildlife Board*

The Wildlife Board is represented by non-consumptive wildlife interests, the agricultural industry, sportsmen groups, federal land management agencies, the Utah Association of Counties, and range management specialists (Bailey, n.d.). The governor selects a committee to nominate Individuals who are then chosen by the governor and the Utah Senate as Wildlife Board Members.

The Wildlife Board considers public input, suggestions from the RACs and the collection of facts to establish policies that best achieve the purposes and objectives of wildlife laws. The Wildlife Board must provide written clarification if RAC input is rejected. Through these measures, wildlife and fish management policies are created by engaging in administrative rules, issuing proclamations and orders under Utah Code (Bailey, n.d.).

*11.1.4 Addressing agricultural impacts caused by big game animals*

As mentioned previously, wildlife often cause damage to farming and ranching activities by competing with domestic livestock for forage, or by damaging crops, fences, or irrigation equipment. Methods to alleviate the damage include wildlife harvest and removal, distribution of landowner permits, and conservation leases to compensate for depredation, and lastly, direct compensation for agricultural losses (Bailey, n.d.). The total amount of compensation that can be distributed to landowners to avert or compensate for damages may not surpass the funding amounts (see Utah Code 23-16-4) allocated by the legislature for fencing material and compensation for damaged crops, fences and irrigation equipment. The DNR coordinates partnerships with state and federal agencies to work with private organizations, industry, local elected officials and stakeholders to apply Utah's Watershed Restoration Initiative (WRI) in

Wayne County. WRI offers a balance between wildlife and agricultural requirements. The long term results from WRI are measured in reduced wildfire acreage and suppression costs, decreased soil loss from erosion, decreased sedimentation and storage loss in reservoirs, enhanced water quality and yield, improved wildlife populations, enhanced agricultural production and resistance to invasive plant species, and lastly, decreases in federal listing of species under the Endangered Species Act (Bailey, n.d.).

### *11.1.5 Compensation for damage to livestock by bear, mountain lion, wolf, or eagle*

Private land owners with damage to their livestock (e.g., cattle, sheep, goats and turkeys) from bear, mountain lion, wolf, or eagle are encouraged to seek compensation through the Wildlife Damage Compensation Act (See Utah Code 23-24-1).

### *11.1.6 Species management plans*

Management plans offer guidance and direction for a variety of species in Utah, including wild turkey, chukar, greater sage-grouse, mule deer, elk, moose, pronghorn, mountain goat, bighorn sheep, Utah prairie dog, beaver, northern river otter, black bear, cougar, bobcat, and wolf (Bailey, n.d.). These plans are generated through public input from interested constituents and presented to the Wildlife Board for approval.

## *11.2 Wildlife Habitats*

Healthy and sustainable wildlife populations are supported by a diverse assortment of vegetation communities, which act to fulfill wildlife habitat requirements. The vegetation communities of Wayne County can be characterized into seven types: desert shrub, sagebrush steppe, pinyon-juniper woodland, forested, riparian/wetland, aspen, and non-vegetated (cliff talus). These habitats have been impacted by livestock grazing, fire suppression, development, natural events, and introduced plant species (BLM, 2008). Directing management applications towards habitat condition and composition, instead of individual species, allows for a more comprehensive ecological perspective regarding wildlife species than when focus is given solely to individual species. Disturbances to these wildlife habitats act to increase habitat for some species, while decreasing habitat availability for others. These ecosystem disturbances contribute to the increase of mobile species, or species that can withstand a broad range of habitat conditions, often out competing less mobile species. Habitat availability throughout the year largely depends upon elevation, aspect, and proximity of disturbance. Additionally, habitat use is restricted by varying levels of social tolerance and learned or existing behavior of wildlife species, which may impact movement into new habitats (BLM, 2008).

### *11.2.1 Desert Shrub*

Desert shrub landscapes consist of upland vegetation communities of shrubland and understories of grasses and forbs. A large amount of reptile species and an assortment of desert

wildlife species reside in these habitats (BLM, 2008). Herbaceous vegetation provide food (e.g. browse, seeds), cover and structure, which is vital for the survival of birds, and mammals during severe summer heat and winter cold conditions. A mixture of grassland types bolsters vegetation diversity, habitat structure and ecosystem health within these desert shrub communities.

### *11.2.2 Sagebrush Steppe*

Sagebrush habitats in mid to lower elevations are dominated by Wyoming big sagebrush (*Artemisia tridentata* subsp. *wyomingensis*). Exceedingly mobile species (e.g., mule deer, pronghorn, and Greater sage-grouse) rely on Wyoming big sagebrush for winter habitat, while sagebrush-obligate species, such as pygmy rabbit, depend upon this vegetation for yearlong habitat (BLM, 2008). Sagebrush is also used by Greater sage-grouse for breeding, nesting and brood-rearing activities that benefit from diverse vegetation and habitat structures of intermixed grasses and low sages. Sagebrush-obligate species are limited to sagebrush habitats during the breeding season or year round, and near-obligate species can reside in both sagebrush and grassland habitats. The loss of regional sagebrush communities, as well as the loss of sagebrush-obligate wildlife who depend upon these habitats has resulted in the critical need to preserve and improve upon existing sagebrush habitat for the future diversity of sagebrush steppe wildlife.

### *11.2.3 Pinyon-Juniper Woodlands*

Pinyon-juniper woodlands offer a greater amount of structural diversity than desert shrub or sagebrush steppe habits. Although, encroachment of pinyon-juniper woodlands into desert shrub and sagebrush steppe has had an impact on understory vegetation communities (BLM, 2008). Despite the diminishment of brush vegetation, wildlife species are able to find habitat in these xeric woodlands.

### *11.2.4 Forested Areas*

Coniferous habitats provide vital security (hiding cover) for big game species along national forest boundaries, as well as Thousand Lake Mountain and Boulder Mountain within Wayne County (BLM, 2008). These forested areas also serve an essential function as linkage corridors for wildlife migration to seasonal habitats.

### *11.2.5 Riparian Ecosystems*

The existence of riparian ecosystems is vital for the health and productivity of the landscape. Highly mobile wildlife species use these areas to fulfill life-cycle requirements, such as foraging, nesting, hiding cover and travel corridors (BLM, 2008). Riparian ecosystems support a wide degree of plant diversity to allow for both openness and ground cover. Although, invasive species, such as tamarisk and Russian olive, have contributed to vegetation monoculture and an overall decrease in riparian health.

*11.2.6 Aspen*

Numerous wildlife species, for example predaceous birds, find habitat in aspen stands and neighboring open brush, meadows and grasslands. Big game species rely on aspen ecosystems for cover, calving, and fawning habitat, while migratory birds use these ecosystems as nesting habitats.

*11.2.7 Non-Vegetated (Talus Cliffs)*

Talus cliffs are sparsely vegetated slopes consisting of angular granite, sandstone, or other acidic bedrock debris that accumulate at the base of vertical cliffs (Cliff and Talus Habitats, n.d.). The absence of soil, persistent erosion, and acidic bedrock restricts vegetation to mosses, lichens and herbs growing in crevices or bare rock with few trees (BLM, 2008). Wildlife species use these talus slopes as basking sites or hiding locations within crevices. Large boulders may provide caves for species such as bobcats. Cliff and talus areas are also used by raptor species and non-perching birds (e.g., black swifts) for nesting and brood-rearing habitat. Rock outcrops and cliffs that span from 30 to 400 feet high are nesting locations for prairie falcons. The fractured talus slopes below cliff faces act as nesting grounds for canyon and rock wrens, especially in areas of intermingled and sparse forests of ponderosa pine, Douglas fir and sagebrush steppe communities (BLM, 2008).

*11.3 Wildlife Species of Interest*

Wildlife species of special interest include big game animals, such as raptors, upland game birds, bison, bighorn sheep, pronghorn, mule deer, elk, wolves, black bear, cougar, furbearers (e.g. bobcats, raccoons, badgers, weasels, red fox, beavers, porcupines and marmots), and other non-game species (e.g. small mammals, bats, reptiles and amphibians; BLM, 2008). These big game and non-game species are managed by the BLM and UDWR through monitoring habitat condition, long term vegetative trends, annual observations of wildlife utilization levels and the preferred age class of animals produced in each Wildlife Management Unit (WMU; BLM, 2008). WMU boundaries are established by UDWR to include the seasonal habitat requirements of large, free-roaming wildlife species, and are often restricted by physical features, such as ridgetops or drainages, or artificial road or highway features. The WMU seldom align with administrative boundaries.

At risk species for Wayne County were compiled by Utah's State Listed Conservation Species Agreement and the U.S. Fish and Wildlife Service to include: Bobolink, Burrowing Owl, Colorado River Cutthroat Trout, Ferruginous Hawk, Fringed Myotis, Greater Sage-Grouse, Humpback Chub, Kit Fox, Lewis's Woodpecker, Pygmy Rabbit, Spotted Owl, Utah Prairie Dog, Western Toad, and the Yellow-Billed Cuckoo (Wayne County Resource Assessment, 2012). Additionally, sensitive species of the RFO from Utah BLM sources include various species of mollusks (e.g., California Floater, Ninemile Pyrg, Otter Creel Pyrg, Southern Bonneville Pyrg, Carinate Glenwood Pyrg, Smooth Glendwood Pyrg, and Black Canyon Pyrg), sensitive

amphibians (e.g., Western Boreal Toad, Great Plains Toad, and Columbia Spotted Frog), reptiles (e.g., Common Chuckwalla, and Desert Night Lizard), birds (e.g., Bald Eagle, American White Pelican, Ferruginous Hawk, Greater Sage-Grouse, Long-Billed Curlew, Burrowing Owl, Short-Eared Owl, Black Swift, Lewis's Woodpecker, American Three-Toed Woodpecker, Northern Goshawk and Grasshopper Sparrow), and sensitive mammals (e.g., Fringed Myotis, Western Red Bat, Spotted Bat, Townsend's Big-Eared Bat, Allen's Big-Eared Bat, Big Free-Tailed Bat, Pygmy Rabbit and Kit Fox; BLM, 2008). The following is a description of specific Wayne County wildlife species of interest.

### *11.3.1 Bison*

The Henry Mountains are located in Garfield County, south of Wayne County and provide habitat for the only free-roaming and huntable herd of American bison on public land in the 48 contiguous United States (BLM, 2008). Bison graze upon grasses and other vegetation, which often results in conflicts among livestock and bison on allotments where both ungulates are present. Drought further exacerbates the conflict between livestock and bison due to competition for forage. To maintain a harvest population of approximately 275 animals, an annual hunt is held through the State DWR and the Henry Mountains Grazing Association. According to the Wayne County Resource Management Plan (2011), the Utah DWR has been unsuccessful in maintaining the bison population and proposals to increase to the number of hunting permits have been issued.

### *11.3.2 Bighorn Sheep*

Habitat for desert bighorn sheep includes open vegetation, such as low shrubs, grasslands, and other treeless vegetation associated with steep talus and rubble slopes (BLM, 2008). The diet of bighorn sheep consists of an assortment of shrubs, forbs, and grasses. Unlike mule deer and elk, bighorn sheep are yearlong residents of their range and do not have seasonal ranges. Big horn sheep lambing takes places on the steep talus slopes, generally within 1 to 2 miles of a water source.

Bighorn sheep are susceptible to viral and bacterial diseases transmitted by livestock, particularly domestic sheep. Entire bighorn sheep populations have been known to be decimated by diseases through nose-to-nose contact, wet soils, stock watering ponds and areas of intense use (BLM, 2008). Guidelines for domestic sheep grazing in or near bighorn sheep habitat has been proposed by the BLM to prevent the spread of diseases and include 3 herd management plans: *The Utah BLM Statewide Desert Bighorn Sheep Management Plan* (BLM, 1986), *Revised Guidelines for Domestic Sheep and Goat Management in Native Wild Sheep Habitats* (BLM, 1998a), and the *Utah Bighorn Sheep Statewide Management Plan* (UDWR, 1999). Supplementary resources can be found in the H*enry Mountains Desert Bighorn Sheep Habitat Management Plan* (BLM, 1990a).

### *11.3.3 Pronghorn*

The habitat of pronghorn consists of open vegetation types of salt desert shrub, grassland, and other treeless types. Pronghorn typically feed upon a diversity of forbs, shrubs and grasses. During spring and summer months, forbs are of particular importance, while shrubs are more vital during winter months (BLM, 2008). Pronghorn fawning takes place throughout their range. The Wayne County Resource Management plan (n.d.) recommends limiting the number of pronghorn located on Parker Mountain to a maximum of 1500 animals through DWR, BLM and SITLA management protocols.

### *11.3.4 Mule Deer*

Mule deer are migratory species moving between seasonal high elevation summer and low elevation winter ranges. The diet of mule deer includes sagebrush (e.g., Wyoming sagebrush), and shrubs during winter months (e.g., mountain mahogany, fourwing saltbrush, and antelope bitterbrush). Fawning takes place during the spring (BLM, 2008).
Mule deer return fairly consistently to their specific winter ranges, resulting in high population densities in moderately small areas. The natural stress of winter survival, combined with small winter ranges and high population densities are further exacerbated by human activity, such as antler hunting and recreational activities within mule deer winter territory (BLM, 2008). Typically, mule deer distance themselves approximately 600 feet from areas of human activity, although factors such as drought, limited forage and habitat encroachment has resulted in conflict among mule deer and humans in Wayne County. Damage to agricultural assets has prompted many in Wayne County to urge the DWR and BLM to better manage habitat for deer populations to avoid further damage (Wayne County Resource Management plan, n.d.).

### *11.3.5 Elk*

Elk migrate seasonally between summer high elevation ranges in aspen and forested habitats to winter mid-to-lower elevations in sagebrush and woodland habitats. Winter elk herds can contain 50 to 200 plus animals. During the summer, their diet consists of grasses and forbs. Calving occurs in late spring and early summer in aspen-mountain browse habitat. Often human recreational activities further intensify the natural stressors associated with winter survival (BLM, 2008).

### *11.3.6 Black Bear*

Black bears are native to Utah and are currently the only bear species residing in the state (BLM, 2008). In Wayne County, black bears are found in large forested areas, or near water sources in the upper regions of Boulder Mountain and in Fishlake National Forest.

*11.3.7 Cougar*

Cougar, or mountain lions, inhabit areas ranging from desert to above timber habitats in Wayne County and are found statewide throughout Utah. Despite the abundance of cougars, Individuals are rarely seen due to their private nature. Cougars prey upon mule deer, rabbits, elk, or other animals. Approximately 80 percent of their diet consists of deer, making it necessary for their movement to mirror the seasonal migration of mule deer (BLM, 2008). Cougars are active year-round, with most activity during dawn and dusk. Hunting occurs on a restricted and carefully monitored basis in Wayne County.

*11.3.8 Wolves*

The gray wolf is the largest species in the canid family and can be found in restricted, remote and undeveloped areas of North America where human populations remain sparse. The historical range of gray wolves included nearly all of the northern hemisphere in habitats north of 15-20˚, with the exception of southeast U.S. where the red wolf was the dominant canine (Utah Wolf Management Plan, n.d.). The Utah Territorial Legislature initiated the extermination of wolves in Utah beginning in 1888 to 1930, when the last wolf was killed. The first documented sighting of wolves in Utah since 1930 occurred in 2002 when a wolf was captured and returned to Yellowstone National Park, marking the first documented sighting in over 72 years. Wolves are habitat generalists and require large home ranges in diverse habitats ranging from forests, deserts, grasslands and arctic tundra. The diet of wolves consists primarily of ungulates, however wolves will feed upon beaver, hares, and other small mammals and do prey upon livestock. Large predators, like wolves, fulfill important ecological roles and add to the integrity of many ecosystems through accelerating nutrient cycling, providing carrion for other species, controlling prey populations (e.g., deer and elk), influencing the way prey use the landscape (e.g., limiting overgrazing), and provide necessary biological diversity to many ecosystems (Utah Wolf Management Plan, n.d.).

Despite the ecosystem benefits associated with wolves, the establishment of wolf packs in Utah is prohibited under Senate Bill 36 (Wolf Management Act) from the 2010 General Session. Senate Bill 26 states that the UDWR is required to prevent the formation of wolf packs in areas of the state where wolves were removed from the protection of the Endangered Species Act (Bailey, n.d.). Additionally, the UDWR is responsible by law to request that the U.S. Fish and Wildlife Service remove wolves located in areas where they are still protected under the Endangered Species Act. The portion of the Utah Wolf Management Plan that allows for two packs to become established in Utah is suspended by Senate Bill 36, although if wolves are delisted across all of Utah, the management plan will be fully applied (Bailey, n.d.).

*11.3.9 Greater Sage-Grouse*

Wayne County is home to the largest population of Greater sage-grouse in Utah. Greater sage-grouse prefer sagebrush plains habitat, as well as areas located in foothills and mountain

valleys (BLM, 2008). Other essential habitat elements include an understory of grasses and forbs, and wet meadows for young chicks to thrive. Breeding grounds, or "leks" are used consecutively throughout breeding seasons. Because Greater sage-grouse are ground nesters, they are vulnerable to predators and human disturbance. During the winter, Greater sage-grouse depend upon sagebrush for their diet and remain in sagebrush habitats where the vegetation is above the level of snow, or where vegetation can be used for both forage and cover (BLM, 2008

In the past decade the topic of ravens and their potential impacts on sage-grouse has been discussed range wide. Ravens are the largest passerine (perching) birds in North America. Known as scavengers, ravens are also effective hunters. Ravens have been known to team up to hunt down animals too large for a single bird. They also prey on eggs and nestlings of other birds, reptiles (to include young desert tortoise), rodents, grains, worms, and insects. Ravens relish carrion and forage on human garbage. In winter, ravens may gather in flocks to forage, often near livestock feedlots or areas of human activity, and to roost at night. During the rest of the year, they often form pairs or small groups. Once exterminated as pests, they are now one of the most common birds in the sagebrush steppe ecosystem. Since the late 1960s, populations increased throughout much of its range in North America; for example, in the Central Valley of California, raven sightings along roads increased by greater than 7,600% between 1968 and 1992 (Messmer, 2011).

Biologists have previously documented the impacts high local densities of ravens can have on endangered species such as the desert tortoise. Increased raven populations, particularly in sagebrush steppe ecosystems also have increased biologist concerns regarding their effect on sage-grouse populations. Raven predation of sage-grouse eggs and chicks has been documented by many recent sage-grouse studies here in Utah and across their range. However, the effect on local populations has been largely unknown. A recent study conducted in Nevada reported increased common raven numbers had negative effects on sage-grouse nest survival, especially in areas with relatively low shrub canopy cover. The authors of the study encouraged wildlife managers to reduce interactions between ravens and nesting sage-grouse by managing raven populations and restoring and maintaining shrub canopy cover in sage-grouse nesting areas. Utah wildlife managers have been working with their partners to protect these areas and as such they recognize predation is part of the natural system (Black and Zscheile, 2011).

However, excessive predation has been recognized as a conservation threat by each of Utah's 11 sage-grouse working groups. Excessive predation is defined as predation that impacts the ability of a population to sustain itself given functional habitat conditions. These situations may exist when new predators occupy habitat at densities above historic levels due to anthropogenic activities. Such may be the case for ravens. If we know raven predation is a threat, even a limiting factor in some areas, what can and is being done to address the immediate threat (Black and Zscheile, 2011)?

Greater sage-grouse (*Centrocercus urophasianus*) distribution and abundance in western North America have declined over the last century. Many factors have been implicated for this

decline including: predation, habitat loss, and habitat fragmentation. Densities of common ravens (Corvus corax) have increased throughout the historic range of sage-grouse. Raven depredation of sage-grouse nests has been implicated as a potential factor limiting sage-grouse productivity in fragmented habitats. Raven depredation on sage-grouse nests is a common occurrence in northeast Nevada based on infrared video cameras set up at nest sites (Dinkins, 2011).

### *11.3.10 Furbearers*

According to UDWR, furbearers include bobcats, raccoons, badgers, weasels, red fox, and beavers (BLM, 2008). The population densities of red fox are fairly high throughout the County. Bobcats are also common; however, appearances are infrequent due to their secretive nature.

### *11.3.11 Upland Game Birds*

Lands within Wayne County contain significant migration, nesting and winter habitats for upland game birds year round. Upland species consist of Greater sage-grouse, blue grouse, pheasants, and quail (BLM, 2008). Upland grasses and forbs located in grassy meadows and fields are the primary food source for upland species. The location of these food sources is ideal for rapid flight and escape from predators.

### *11.3.12 Other Non-Game Species*

Non-game species include small mammals, bats, reptiles, amphibians, and mollusks, however more information on these species is needed (Bailey, n.d.). Site-specific inventories have not been completed, although databases through the Utah Natural Heritage Program have documented relative occurrences for these groups of wildlife.

### *11.3.13 Migratory Birds*

Since 1916, migratory birds have been protected by treaty (with Great Britain) and by law through the Migratory Bird Treaty Act (MBTA) established in 1918. In 2001 President Clinton signed the Responsibilities of Federal Agencies to Protect Migratory Birds, which directed federal agencies to "design migratory bird habitat and population conservation principles, measures, and practices into agency plans and planning processes…" (BLM, 2008). In an effort to focus on cooperative migratory bird habitat enhancement and restoration of important areas, Bird Habitat Conservation Areas (BHCA) were identified. Additional regulation of BHCAs are not required, nor are there special designations for these areas (BLM, 2008). Neotropical birds, such as hummingbirds, finches, flycatchers, warblers, thrushes and orioles are located in habitats within Wayne County. These birds mostly reside in the area during summer months, with breeding and raising of young occurring in habitats ranging from lower elevation wetlands to high-elevation forests. Small populations are present yearlong depending upon seasonal conditions, although some species, such as the American robin and mallard, are

migratory. The rough-legged hawk, snow buntings, and rosy-crowned gray finches are winter residents from artic breeding grounds, or from high-elevation alpine areas (BLM, 2008). These birds use winter habitats in lower elevation foothills and river valleys, often replacing seasonal summer birds.

### *11.3.14 Raptors*

The BLM guides specific recommendations for raptor management on public lands through best management practices (BMP) to implement the United States Fish and Wildlife Service (USFWS), Utah Field Office's *Guidelines for Raptor Protection from Human and Land Use Disturbances* (BLM, 2008). USFWS originally established the guidelines in 1999, however updates in 2002 were made to reflect changes in court decisions, policies, and new executive orders (EOs). The guidelines were provided to aid in applying the biological requirements of raptors and to promote an ecosystem approach to raptor management.

Raptors of Wayne County include eagles (both golden and bald), peregrine falcons, harris hawks, red-tailed hawks, and kestrels (Animals of Wayne County, 2012) The nesting requirements of raptors are specific in terms of vegetation structure and diversity. Physiographic features of elevation and slope, as well as prey availability differ by species (BLM, 2008). Changes to nesting territories may have negative impacts to the raptor population since these areas are continually reused for nesting. Other negative impacts include the loss of habitat, decreases in food sources, and disturbances during nesting. Changes in land use to industrial, agricultural or recreational also results in habitat loss, as well as reducing food sources and disturbing nesting territories. The future of raptor populations depends upon each raptor nest, its offspring and the supporting habitat. Decreases in nesting site requirements will most likely occur from changes in vegetation structure and diversity (BLM, 2008).

Higher risk periods of courtship, nest construction, incubation and early brooding are periods in which adults are more likely to temporarily or permanently relinquish nests, causing eggs or young to be abandoned as a result of disturbances (BLM, 2008). Additionally, changes to the habit causes a loss or shift in raptor prey, further impacting raptor populations.

### *11.3.15 Wild Horses and Burros*

In Wayne County, wild horse and burro populations are managed to maintain an adequate size to be considered genetically viable. The passage of the Wild, Free-Roaming Horse and Burro Act of 1971 aimed to manage wild horses and burros, "in the area where presently [1971] found as an integral part of the natural system of the public lands" (BLM, 2008). Following the act and subsequent regulations, wild horses and burros on public lands were directed to be managed in way that balances the natural ecosystem between the minimum feasible management requirements to maintain horse and burro populations. Two wild horse and burro management areas are identified in Wayne County and include: The Robbers Roost Herd Management Area (HMA) and the Canyonlands HMA (BLM, 2008).

## *11.4 Fisheries*

### *11.4.1 Resource Findings*

Aquatic habitats are represented by mountain streams, reservoirs and lakes, seeps and springs, potholes, and various ephemeral water sources. Within Wayne County there is a variety of fishery habitats ranging from small potholes and streams to large reservoirs and natural lakes. There are many miles of perennial streams and numerous lakes and reservoirs within the County.

Fisheries in Utah support a diversity of sportfish species that are categorized into (a) coldwater species, such as whitefish, trout, char and salmon, and (b) warmwater/coolwater species, such as bass, pike, walleye, perch, catfish, bluegill, crappie and a variety of others (Bailey, n.d.). The BLM Richfield Field Office (RFO) identified sensitive fish species to include: Bonneville Cutthroat Trout, Colorado River Cutthroat Trout, Southern Leatherside Chub, Roundtail Chub, Bluehead Sucker and Flannelmouth Sucker (BLM, 2008). Fish species considered rare by federal listing under the Endangered Species Act are discussed further in the chapter titled "Threatened, Endangered, and Sensitive Species".

In Wayne County, fisheries are located in perennial and intermittent streams, as well as flat water (e.g., lakes and reservoirs). Riparian habitat and stream channel features influence the quality of fisheries habitat through moderating water temperatures and providing bank structures that decrease erosion and allow for overhead vegetation cover for fish (BLM, 2008). These riparian communities also act to slow overland flow, capture sediments and offer a filter to improve water quality. In addition, fish habitat is significantly influenced by water quality, specifically changes in sediment, temperature, and dissolved oxygen. The factors involved in restricting fish habitat include increased amounts of siltation, increased water temperatures, stream dewatering, riparian areas located in less than priority flow control (PFC), livestock degradation of habitat, and previous mining activities (BLM, 2008). Additionally, the factors which act to restrict native fish populations include competition and predation from non-native species, stream dewatering, hybridization, irrigation diversions, increased siltation and isolated populations.

At least 30 species of warm- and cool- to cold-water fish species, of which 18 are game fish are located in the streams and lakes of the Richfield Field Office (RFO), which includes Wayne County (BLM, 2008). Numerous non-native fish species also exist in these streams and lakes due to previous stocking initiatives, as well as essential aquatic invertebrates and amphibians.

There are approximately 16 species of fish found within Wayne County. Coldwater game species include lake, rainbow, cutthroat, brown and brook trout; kokanee; and arctic grayling. Nongame species found within Wayne County include: mottled sculpin, speckled dace, redside shiner, Utah chub, leatherside chub, mountain sucker, flannelmouth sucker, and Utah sucker.

Fish production in streams and lakes could be increased by improving aquatic habitat. This includes rebuilding or repairing small dams; and improving degraded stream habitat through bank stabilization, pool development, barrier removal, cover improvement, improvement of spawning habitat and maintenance of minimum instream flows.

*11.4.2 Economic value of fisheries*

The high-mountain streams and lakes, reservoirs and community ponds of Wayne County offer abundant opportunities to fish. The economic benefits from recreational fishing are relatively significant for Wayne County, with a total of 860 fishing licenses sold in 2010 (Utah's Blue Ribbon Fisheries, n.d.). The Department of Applied Economics at Utah State University estimated the economic impacts based upon anglers' expenditures in 2011 and found that an average angler spent $90 per fishing trip to Blue Ribbon waters in Utah (Kim and Jakus, 2013). The question remains if this trip is to Wayne County, how much of the trip cost is actually spent in the County? Many of the fishers seem to be self-contained. They arrive with supplies of food, gas and other necessities and don't buy anything of significance until they get out of the County where supplies are in general cheaper. There are currently 10 outfitter and guides companies that provide guide services for fishing within Wayne County. The clients of these businesses would obviously spend more per trip than those self-contained anglers.

*11.4.3 Fish stocking*

A regular updated list of stocking waters with dates and details of fish species stocked can be found for Wayne County through the *Current Official Utah DWR Fish Stocking Report* (2016) at Utahfishinginfo.com. Utah has an extensive and well-managed system of state fish hatcheries, which make it possible for Wayne County residents to attain high quality fishing experiences with higher catch rates, and larger fish specimens.

*11.4.4 The Wildlife Board*

State law outlines the methods used for maintaining the balance among competing uses, and forming the best fishery and wildlife management policies (Bailey, n.d.). These methods are initiated by open, public dialogue of wildlife and fishery issues. Regional advisory councils (RACs) are nominated by interest groups and include citizens, local elected officials, sportsmen, agriculturalists, federal land managers and overall members of the public. Each RAC listens to recommendations, acts to compile data and assesses professional testimony to make informed policy recommendations to the Wildlife Board.

The Wildlife Board gathers the recommendations from the RACs, as well as data from various sources and public input to create policies that best represent the purpose and intent of wildlife laws. Through this process, the Wildlife Board generates wildlife management policies (Bailey, n.d.).

*11.4.5 Sportfish management*

Sportfish management focuses on 1) protection and enrichment of conservation sportfish species, 2) quality and trophy fishing opportunities, 3) recruiting and securing new anglers through expansion of community fisheries, and 4) biological control of unwanted species through the stocking of predators (white bass/striped bass hybrids), and management of multi-story fisheries (Bailey, n.d.).

Warm and cool water species are actively managed by the UDWR and include: bluegill, channel catfish, black crappie, largemouth bass, smallmouth bass, tiger muskie, walleye, hybrid striped bass and yellow perch (Bailey, n.d.). Trout are dominant in coldwater systems of the Boulder Mountains. The primary concern for fisheries management is the protection of native aquatic species. Declines in native species typically occur in response to poor stocking and management decisions, which should be avoided.

*11.4.6 Species stocked in lakes and ponds*

Species stocked in flatwater environments include: rainbow trout, tiger trout, brown trout, cutthroat trout, kokanee salmon, splake, lake trout, brook trout, largemouth bass, bluegill, channel catfish, tiger muskie, striped bass/white bass hyrids, yellow perch, walleye, and black crappie (Bailey, n.d.).

*11.4.7 Stream fisheries*

Species stocked in streams include: (sterile) brook trout, brown trout, or tiger trout. Managing self-sustaining fisheries should be considered a priority.

*11.4.8 Planning*

High profile waters are managed in collaboration with the public through internet-based surveys, and committee-based methods that include interested members of the public (Bailey, n.d.). Completed plans are presented to the Regional Advisory Councils (RACs) for further public review and input.

*11.5 Objectives*

To work cooperatively with Division of Wildlife Resources and other state and federal agencies in managing habitat, setting herd numbers, and hunting license levels within the County.

To protect, maintain, improve and enhance Greater Sage-Grouse (GRSG) habitat and populations in designated sage grouse priority habitat within Sage Grouse Management Areas (SGMA's) of the County, while balancing the economic and social needs of the residents of Utah.

To perform a regional study to determine the detrimental effects of increased raven population on the Parker Mountain Sage Grouse.

*11.6 Policy Statements*

1. Multiple use and sustained-yield management principles shall be applied in public land use and natural resource planning and management in Wayne County. This is how the citizens of Wayne County are best served. Multiple-use and sustained-yield management means that land managers and Division of Wildlife Resources should develop and implement management plans with County involvement.

2. Involve the public in wildlife management decision making.

3. Support valid existing transportation and grazing privileges in Wayne County at the highest reasonably sustainable levels.

4. Wildlife Management Plans should be designed to produce and provide the desired vegetation for the watersheds, livestock forage, and wildlife forage that are necessary to meet present needs and future economic growth and community expansion in Wayne County.

5. Meet the recreational, including hunting and fishing needs and the personal and business-related transportation needs of the citizens of Wayne County by providing access throughout the county.

6. Meet the needs of wildlife, provided wildlife populations are kept at a reasonable levels so as to not interfere with originally permitted AUM levels under the Taylor Grazing Act;

7. Meet the needs of economic development in the county.

8. Meet the needs of community development in the county.

9. Create wildlife management objectives based on the carrying capacity of the habitat including all multiple use mandates (livestock grazing, mineral extraction, wild horses) on federal lands.

10. Support wildlife and wildlife habitat monitoring efforts and refine available habitat data.

11. Consultation and coordination should occur with the agencies and County where federal monies or resources are committed for the development of management plans, population objectives, wildlife introductions, or other decisions that may affect the economic viability of Wayne County.

12. Peer-reviewed science, or those data meeting the agency data specifications, should be used in the management of disease spread between native and domestic species, with consultation and coordination of local government.

13. Habitat improvements on federal lands are supported that increase forage to reduce private land conflicts with wildlife in consultation with the County, agencies, and permittees.

14. Adopt the existing **Parker Mountain Adaptive Resource Management Group (PARM**) plan http://utahcbcp.org/htm/groups/parkermountain with all its amendments and support management of Greater Sage-grouse according to the Utah Greater Sage-grouse Management Plan as it is not in conflict with the PARM plan, or local plans where they exist.

15. Develop monitoring programs that separate the use by species (e.g., wild horse, livestock, or wildlife) that can be used to inform management.

16. Encourage State and Federal wildlife and land management agencies to conduct a regional study to determine the extent of detrimental effects of increased raven population on the Parker Mountain Sage Grouse and recommend measures to offset these detrimental effects.

(See map appendix for wildlife habitats within Wayne County)

## *11.7 Predator Control*

### *11.7.1 Understanding Predators and Prey*

The relationship between predators and their prey is complex and subject to many variables. There are two general schools of thought about the role predators play in ecosystem management: Ecosystems work from the (1) top down (predator-driven) or from the (2) bottom up (prey-driven). Those who support and use predator control measures are implementing the top down theory. That is, if predators are removed, prey (game) species will increase. Those who believe in the bottom up idea support habitat manipulation over predator control. Both management strategies can be supported by various studies.

Sometimes a predator may be a "keystone species," which means that it plays a disproportionate role in the ecosystem. If it is removed, other species will be affected. A predator may affect other species (prey or predator) either directly or indirectly. For example, if coyotes are removed from a site for a long period of time there may be increased deer fawn survival (direct influence), but the absence of coyotes may also increase the populations of nest predators such as foxes and feral cats, which could cause the quail population to decline (indirect influence).

### *11.7.2 Factors affecting predation*

The effect of predation on wildlife varies over time and is influenced by both natural and human-induced conditions. A short-term over-abundance of predators can occur if a primary prey species for example, rabbits for coyotes increases dramatically and then suddenly and sharply declines. Hungry predators will then prey more on other prey species. Changes in habitat can cause prey to concentrate in certain areas, making them easier to catch. Roads, power line rights-of-way and large areas where brush has been cleared are examples of human-induced habitat changes (Texas A&M, 2011).

Wayne County favors aggressive and timely action to control predators that prey on livestock. Identify and map areas where high use recreational areas limit the use of predator control.

The Utah Department of Agriculture has a web page containing information regarding animal control: http://www.rules.utah.gov/publicat/code/r068/r068-007.htm. It also contains a link to study and training guides for vertebrate animal pest control. This guide contains information about the legal status of various predators in the state of Utah and methods of controlling each of them.

The Utah Legislature passed the Mule Deer Protection Act in 2012. The new law directs the Division of Wildlife Resources to reduce coyote populations for the benefit of mule deer, particularly in areas where predation occurs. To comply with this law, the Division of Wildlife

Resources has implemented a predator control program that provides incentives for members of the public to remove coyotes. Participants in the program can receive $50 for each properly documented coyote that they kill in Utah.

*11.8 Objective*

To work with federal and state authorities to aggressively control predators which cause damage to livestock and other animals that are valued by citizens of the County.

*11.9 Policy Statements*

1. Wayne County supports aggressive and timely action to control predators that prey on livestock on public and state lands in Wayne County.

2. Meet the needs of economic development in the County.

3. Meet the needs of community development and recreation in the County.

Chapter 12
# Recreation and Tourism

## *12.1 Resource Findings*

Wayne County is referred to as "Capitol Reef Country" by the Utah Office of Tourism with three adventure zones 1) The Highlands; 2) Capitol Reef; 3) East Desert.

**The Highlands** zone includes the Boulder (Dixie National Forest) and Thousand Lakes Mountains (Fishlake National Forest) which range in elevation well over 11,000 feet. These high mountain zones offer serene getaways for hiking, horseback riding and fishing. Boulder Mountain looms to the west of Capitol Reef National Park. At roughly 11,000 feet, the mountain's 50,000 timbered acres cover half of the Aquarius Plateau (an uplift along the Colorado Plateau), making it the highest forested plateau in North America. Blue Bell Knoll, also known as Boulder Top by locals, is the highest peak on Boulder Mountain at 11,313 feet. Thousand Lake Mountain, located in the easternmost section of Fishlake National Forest, towers from 7,000 to 11,000 feet. The mountain is surrounded by Fremont, Loa, and Lyman to the west; Bicknell, Teasdale and Torrey to the south; and the northern section of Capitol Reef National Park to the east. The mountain's unique topography features exposed layers of red sandstone along the lower slopes, while alpine forests and open meadows define the upper slopes.

**Capitol Reef** zone includes Capitol Reef National Park which lies in Utah's south-central desert, an oasis of colorful sandstone cliffs, impressive domes, and soaring monoliths. Once called "Wayne Wonderland," the park got its name in part from the great white rock formations which resemble the U.S. Capitol building, and from the sheer cliffs that presented a barrier to early travelers. Early inhabitants referred to the area as the "land of the sleeping rainbow" because of its beautiful contrasts: multi-colored sandstone surrounded by verdant riverbanks and arid desert vegetation, all nestled beneath deep blue skies. The area was designated as a national monument in 1937 and reclassified as a national park in 1971. The park is open year-round.

**East Desert** zone includes unique desert landscapes. It's a place where dinosaurs once roamed, a place with terrain that is similar to the planet Mars or our very own moon. This region was once the hide-out for famous outlaws, and offers access to the western edge of Canyonlands National Park. Access to the Henry Mountains with its large herd of free roaming buffalo, and Lake Powell (Glen Canyon Recreation Area) with over 2,000 miles of shoreline. (www.CapitolReef.org)

The expansive and beautiful landscapes of Utah have allowed the state to lead the nation in outdoor recreation, which has benefited both the economy and the health of its residents and visitors (The State of Utah Outdoor Recreation Vision, 2013). The recreational resources of Wayne County, Utah represent some of the most unique and least explored recreational opportunities in the region (BLM, 2008). Although, the county, once referred to by early inhabitants as "the land of the sleeping rainbow" due to the immense spectrum of colors in its rocks, valleys and sky, ranked 6$^{th}$ in statewide tourism (Utah Travel and Tourism Profile State and Counties, 2014). Accordingly, Wayne County had a 38.5% leisure and hospitality share of total private jobs in 2014.

As tourism visitation rates continue to rise, Wayne County has benefited from tax profits and sales in its tourism and recreational-related industries (Utah Travel and Tourism Profile State and Counties, 2014). However, the increase in foot traffic within the county's national parks, monuments and forests have impacted its soil, water, vegetation, and wildlife resources (BLM, 2008). In some areas of the county, recreational use has come into conflict with other uses, including livestock grazing, and wildlife habitat needs. The increase in tourism has also impacted road safety especially on the county's highways, increased garbage collection, search and rescue, fire control, drinking water demand, road maintenance, law enforcement, and almost all aspects of public service.

The most popular recreational destinations of Wayne County include Capitol Reef National Park, Factory Butte, Cathedral Valley, Glen Canyon Recreational Area, Dixie National Forest and Boulder Mountain (Figure One). Fish Lake (located in Sevier County) and Fish Lake National Forest are also frequently visited destinations. The recreational opportunities of these locations are diverse and vary from: hiking, backpacking, camping, picnicking, horseback riding, education/nature studying, hunting and fishing to rock climbing, rockhounding, cross-county skiing, OHV travel, sightseeing, snowmobiling, swimming, boating, and water-skiing (Wayne County Resource Assessment, 2012).

*12.2 Recreation Management*

The BLM is the steward of many outdoor recreation destinations in Utah that draws visitors from across the state, region, country and world (BLM-Utah Recreation Strategy, 2015). The public lands of Wayne County are managed by the BLM for multiple-use purposes, including energy development, livestock grazing, recreation, and timber harvesting. The BLM is also responsible for protecting natural, cultural and historical resources. In order for the Utah BLM to manage its Recreation and Visitor Services Program, a national five-year strategy was released in 2015 titled *Connecting with Communities*. The purposes of the strategy are to "reposition the resources of the BLM's Recreation and Visitor Services Program to achieve the social, economic, and environmental goals of local communities located near America's public lands while expanding the benefits of outdoor recreation to public land visitors (BLM-Utah Recreation Strategy, 2015)". This plan identifies external and internal efforts to foster teamwork among local communities, business and various service providers who rely upon the public lands for their standard of living.

These external and internal efforts listed in *Connecting Communities* (2015) include:

- Deepen the knowledge and skill base needed for maximizing partnership opportunities
    - Provide enhanced skills training
    - Encourage knowledge-sharing
- Ensure that BLM participation in partnerships remains relevant and effective
    - Stay up-to-date about the interests of network providers and primary recreation-tourism visitors
    - Maintain an accurate inventory of data
- Transform Communication and Outreach Efforts

    - Employ a palette of interpretive communication tools and technology to market recreation opportunities
    - Assess communication expertise, as well as BLM and partner social media, to improve message content and delivery
- Establish secure and reliable funding sources
    - Use all funding sources available to maintain priority sites and services
    - Use collected fees to their maximum potential to develop recreation benefits
- Reposition the recreation program within community service provider networks to better serve mutually shared customers
    - Proactively engage with community networks of service providers
    - Plan and manage recreation efforts to achieve specific and desired benefits to the community
- Facilitate greater well-being and economic benefits within communities
    - Capitalize on and protect the BLM's Backyard to Backcountry" recreation brand
    - Create collaborative recreation and travel management plans
    - Give priority to those recreation opportunities that promise the most significant social and economic benefits that are within the productive capacity of the community's delivery systems, and that best fit the character/setting of place-based recreation

*12.2.1 Recreation Management Areas*

Recreational use on public lands is managed by the BLM through Recreational Management Areas (RMA). Public lands are categorized as either Special RMA (SRMA), or Extensive RMA (ERMA). SRMAs include areas that require a recreation investment and intense recreational management due to high levels of recreation activity or valuable natural resources (BLM, 2008). The majority of public lands in Wayne County are managed as ERMAs. Areas designated as an ERMA include nonspecialized and dispersed recreational uses that do not require intensive management. The primary objective of ERMAs is not recreation management, although the abundance of recreation sites and areas make recreation management a significant consideration for these areas (BLM, 2008).

Many of the diverse recreational uses located on public lands, specifically within the Henry Mountains, require fees. The collection of fees is authorized by the Federal Lands Recreation Enhancement Act (FLREA). Under the FLREA, the recreation fee program is used to manage public lands through improving campgrounds, and picnic areas, creating new informational signs, replacing waterlines and hydrants that supply drinking water, monitoring recreation uses, improving hiking trails, and as a whole improving the recreational experience of visitors (BLM, 2008).

*12.2.2 Special Recreation Permitting*

Under the authorization of 43 U.S. Code of Federal Regulations (CFR) 2932, special recreation permits (SRP) are required for four types of uses that include: commercial use, competitive events, organized groups, and recreational use in special events (BLM, 2008). SRPs

are issued in order to manage visitor use, protect natural and cultural resources and to provide a means for accommodating commercial recreational uses. In some instances, the BLM issues SRPs for noncommercial use in special areas, such as long term visitor areas, river use areas, and backcountry hiking or camping locations. The special recreation management areas in Wayne County include: Big Rocks, Capitol Reef Gateway, Dirty Devil/Robber's Roost, Factory Butte and the Henry Mountains (Figure Two) (BLM-Utah Recreation Strategy, 2015).

SRPs are issued for 10 years or less, with the ability to renew annually. In the 2004 fiscal year, the Richfield Field Office (RFO), which includes Wayne County, issued 32 SRPs. The number of participants in recreational activities authorized by SRPs in 2004 amounted to 12,008, which generated $109,077 in revenue (BLM, 2008).

*12.2.3 Recreation Visitation*

The Recreation Management Information System (RMIS) documents the amount of recreation that occurs on BLM managed lands. There are 65 different types of recreation activities recorded by the RMIS at BLM sites and areas. These records are obtained through registrations, permit records, observations and professional judgement (BLM, 2008). Visitation is estimated by the number of participants and counted by actual visitor days. Participants represent the actual number of individuals who engage in a recreational activity. Federal agencies use a visitor day as a recreation unit of measurement. Accordingly, one visitor day represents an aggregate of 12 visitor hours at a site or area (BLM, 2008). Table one depicts the RMIS statistics for the RFO during the fiscal year of 2001 to 2004. Notice most of categories of visitation actually dropped during this period of time.

**Table One. Recreation Visitation in the Richfield Field Office**

| Activity | Oct. 2000-Sept. 2001 | | Oct. 2001-Sept. 2002 | | Oct. 2002-Sept. 2003 | | Oct. 2003-Sept. 2004 | |
|---|---|---|---|---|---|---|---|---|
| | Participants | Visitor Days | Participants | Visitor Days | Participants | Visitor Days | Participants | Visitor Days |
| **Backpacking** | 72,368 | 74,079 | 54,754 | 56,338 | 49,766 | 50,826 | 50,786 | 51,610 |
| **Camping** | 126,418 | 125,787 | 98,951 | 96,285 | 103,968 | 100,783 | 105,128 | 102,144 |
| **Climbing (Mountain/Rock)** | 2,122 | 583 | 1,514 | 414 | 1,413 | 353 | 1,480 | 370 |
| **Driving for Pleasure** | 156,429 | 73,151 | 129,200 | 55,149 | 132,402 | 53,477 | 132,195 | 55,034 |
| **Environmental Education** | 2,320 | 800 | 1,769 | 639 | 1,722 | 620 | 1,882 | 670 |
| **Fishing (Freshwater)** | 26,815 | 5,890 | 28,075 | 6,215 | 56,103 | 13,246 | 53,296 | 12,581 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Gather Non-Commercial Products** | 4,885 | 1,221 | 4,825 | 1,206 | 4,680 | 1,170 | 4,455 | 1,114 |
| **Hiking/Walking/ Running** | 80,699 | 42,967 | 62,744 | 31,152 | 65,323 | 30,247 | 66,189 | 31,507 |
| **Horseback Riding** | 4,905 | 1,026 | 4,825 | 1,005 | 4,680 | 975 | 4,455 | 928 |
| **Hunting-Big Game** | 22,364 | 15,878 | 18,684 | 12,240 | 17,955 | 11,720 | 17,871 | 11,945 |
| **Hunting-Small Game** | 9,770 | 2,035 | 9,650 | 2,010 | 9,419 | 1,950 | 8,910 | 1,856 |
| **Hunting-Waterfowl** | 990 | 165 | 1,055 | 176 | 2,675 | 446 | 2,540 | 423 |
| **OHV (ATV)** | 75,751 | 29,652 | 60,945 | 22,254 | 63,062 | 21,750 | 63,834 | 22,492 |
| **OHV (Cars/Trucks/SUVS)** | 76,600 | 43,785 | 58,804 | 31,954 | 56,483 | 30,625 | 57,787 | 31,836 |
| **Pack Trips** | 2,076 | 2,076 | 1,478 | 1,476 | 1,413 | 1,413 | 1,480 | 1,480 |
| **Picnicking** | 112,439 | 9,811 | 81,422 | 7,213 | 78,082 | 6,916 | 81,055 | 7,148 |
| **Powerboating** | 8,110 | 1,352 | 8,290 | 1,382 | 13,471 | 2,245 | 12,800 | 2,133 |
| **Rockhound/Mineral Coll.** | 4,128 | 1,032 | 2,951 | 738 | 2,826 | 706 | 2,960 | 740 |
| **Row/Float/Raft** | 2,064 | 2,069 | 1,476 | 1,476 | 1,413 | 1,413 | 1,480 | 1,480 |
| **Snow Play (General)** | 977 | 81 | 965 | 80 | 936 | 78 | 891 | 74 |
| **Swimming/Water Play** | 9,125 | 760 | 9,360 | 780 | 16,181 | 1,348 | 15,375 | 1,281 |
| **Target Practice** | 9,770 | 814 | 9,650 | 804 | 9,360 | 780 | 8,910 | 743 |
| **Viewing (Wildlife)** | 46,832 | 7,356 | 41,131 | 5,897 | 50,721 | 6,586 | 49,481 | 6,594 |
| **Viewing (All Other)** | 16,228 | 1,373 | 14,732 | 1,203 | 14,528 | 1,177 | 14,206 | 1,026 |
| **Other** | 117 | 141 | 104 | 106 | 155 | 154 | 95 | 86 |
| **Total** | 876,302 | 443,886 | 707,354 | 338,192 | 758,737 | 341,004 | 759,541 | 347,295 |

Source: BLM, 2008

### *12.2.4 Recreation Use Conflicts*

Recreational activities often conflict with one another to impact the opportunities and experiences of other participants. As an example, the intensive use of an area by motorized vehicles can disturb and displace non-motorized activities, such as hiking, backpacking, or biking. Recreation activities also affect other resources, including riparian areas, cultural resources, vegetation, wildlife, soils, grazing, and mineral extraction (BLM, 2008). Of particular concern is the impact that recreational activities have on the county's rangeland and livestock grazing. These impacts to rangeland vegetation and livestock grazing are often the result of careless actions or overcrowding of recreational participants that lead to the introduction of noxious and invasive vegetation species via seeds in the droppings of recreation pack stock animals, or in the transportation of soil in the tread of off-road vehicle tires; compaction and destruction of rangeland vegetation by snowmobiles; and erosion of hillside soil by off-road motorcycles (Butkus, n.d.).

In addition, the impacts to livestock include harassment by motorized vehicles chasing animals; hunters accidentally or purposely shooting livestock during and prior to hunting seasons; hikers leaving allotment gates opens causing livestock to escape into surrounding allotments; and destruction of allotment fences or livestock watering areas by motorized recreation activities (Butkus, n.d.). Much of these impacts are the result of increased use of all-terrain vehicles (ATVs) on lands managed by the Forest Service and BLM

### *12.2.5 Recreational Uses on Public Lands*

The abundant and diverse recreational opportunities and striking landscapes on Utah's public lands are a significant part of Utahn's outdoor heritage in many rural communities, including Wayne County. As early pioneers strived to make a living with agriculture products and metal/mineral resources, the connection to the natural landscape became firmly rooted into Utah's history. The establishment of the natural resource-related industries in the county matured throughout the 20$^{th}$ century and became a well-established source of income within the region (BLM, 2008). However, today few families rely solely on the agricultural and mining industries as a basis of revenue and instead seek out public lands to reconnect to traditional activities, as well as for social and leisure activities. The historical uses of public lands that continue today include hunting, wood gathering, pine-nut collecting, family picnics, family gatherings, wildlife viewing, Christmas tree cutting, and other traditional activities (BLM, 2008). Most of the traditional livelihood activities have been eliminated by regulations and federal land management restrictions.

A statewide survey conducted by Utah State University (USU) assessed the various ways in which Utah residents value public land resources and their perspectives on public land management (BLM, 2008). The term "public lands" refers to all federal and state managed lands, not just BLM lands. The surveys were mailed to a random sample of all 29 Utah counties to identify participation in a broad range of outdoor recreation activities and other non-commodity use activities on Utah public lands during a 12-month period. Results from these surveys are shown in tables 2-3. For comparison, Utah counties (Garfield, Piute, Sanpete and Sevier), and

Wayne County are included in the tables and indicate prevalent participation in public land activities among the county's' residents.

**Table Two. Percentage of survey respondents reporting participation in selected recreation activities on Utah public lands during the past 12 months.**

| Activity | Wayne County | Garfield County | Piute County | Sanpete County | Sevier County |
|---|---|---|---|---|---|
| **Camping** | 73.2% | 64.7% | 76.9% | 69.5% | 69.3% |
| **Picnicking** | 80.5% | 72.9% | 84.6% | 77.1% | 74.3% |
| **Backpacking** | 39.5% | 22.6% | 29.6% | 21.6% | 18.1% |
| **Day hiking** | 80.0% | 59.1% | 50.0% | 52.0% | 46.9% |
| **Bird watching** | 39.5% | 33.9% | 34.6% | 30.2% | 20.6% |
| **Wildlife viewing** | 80.0% | 75.0% | 85.2% | 65.1% | 73.1% |
| **Nature photography** | 56.4% | 35.1% | 50.0% | 33.3% | 39.1% |
| **Canoeing/kayaking** | 8.3% | 3.8% | 19.2% | 2.4% | 3.2% |
| **River rafting** | 2.9% | 3.8% | 11.5% | 4.0% | 8.7% |
| **Motor boating** | 32.4% | 20.4% | 51.9% | 24.2% | 36.2% |
| **Jet skiing** | 5.4% | 5.8% | 14.8% | 9.7% | 6.3% |
| **Swimming** | 24.3% | 30.8% | 29.6% | 35.5% | 23.4% |
| **Rock climbing** | 25.7% | 13.2% | 3.8% | 12.1% | 7.3% |
| **Mountain climbing** | 22.2% | 11.4% | 7.4% | 20.2% | 22.2% |
| **Hang gliding** | 0.0% | 0.0% | 3.8% | 0.0% | 0.0% |
| **Mountain bike riding** | 11.1% | 13.2% | 7.7% | 16.9% | 13.5% |
| **Hunting** | 56.4% | 56.4% | 81.5% | 46.5% | 47.0% |
| **Fishing** | 65.9% | 67.55% | 81.5% | 63.6% | 63.8% |
| **Horseback riding** | 22.2% | 40.5% | 37.0% | 24.6% | 22.1% |
| **Orienteering/geo-caching** | 11.1% | 7.8% | 16.0% | 9.6% | 11.3% |
| **Rock hounding** | 50.0% | 24.3% | 16.0% | 22.4% | 21.0% |
| **Visiting historical sites** | 66.7% | 60.7% | 57.7% | 65.4% | 60.8% |
| **Resort skiing/snowboarding** | 13.5% | 14.2% | 7.7% | 15.3% | 6.3% |
| **Backcountry skiing/snowboarding** | 8.1% | 3.8% | 7.7% | 11.3% | 1.6% |
| **Snowshoeing** | 13.5% | 4.8% | 7.7% | 4.8% | 4.0% |
| **Snowmobiling** | 16.2% | 9.5% | 15.4% | 16.0% | 10.4% |
| **ATV riding** | 61.5% | 58.1% | 92.9% | 53.5% | 58.6% |
| **Dirt bike riding** | 13.9% | 10.7% | 19.2% | 9.7% | 12.7% |
| **Four-wheel driving/jeeping** | 59.5% | 40.0% | 66.7% | 45.3% | 43.6% |
| **Sightseeing/pleasure driving** | 87.8% | 80.0% | 88.9% | 82.3% | 86.7% |

Source: BLM, 2008

**Table Three. Percentage of survey respondents reporting participation in selected non-commodity use activities on Utah public lands during the past 12 months.**

| Activity | Wayne County | Garfield County | Piute County | Sanpete County | Sevier County |
|---|---|---|---|---|---|
| **Collecting firewood for home use** | 53.8% | 56.1% | 50.0% | 33.6% | 26.2% |
| **Cutting Christmas trees** | 51.3% | 46.2% | 46.4% | 23.6% | 35.1% |
| **Collecting material for craft projects** | 28.2% | 24.5% | 22.2% | 16.7% | 20.2% |
| **Collecting rocks for home landscaping** | 48.8% | 30.4% | 34.6% | 19.8% | 28.5% |
| **Collecting plants for home landscaping** | 15.8% | 17.3% | 7.7% | 9.6% | 8.7% |
| **Gathering wild mushrooms** | 5.3% | 1.9% | 3.8% | 0.0% | 2.3% |
| **Gathering pinyon nuts** | 41.0% | 38.6% | 38.5% | 9.6% | 15.6% |
| **Gathering berries, herbs, or wild foods** | 13.2% | 19.1% | 22.2% | 10.4% | 9.4% |
| **Collecting fossils, rocks, or minerals** | 35.9% | 23.4% | 29.6% | 18.1% | 22.7% |

Source: BLM, 2008

*12.3 Tourism*

Wayne County's landscapes attract thousands of outdoor recreationists and tourists, as well as the revenue associated with recreation and tourism-related industries. The varied and stunning landscapes gives the county, and all of Utah, an advantage in the competition for tourists. A poll carried out by the President's Commission on America's Outdoors found that natural beauty was the most important criterion for tourists in choosing outdoor recreation sites (Scenic America, 1987). Unsurprisingly, many tourists are choosing to visit Utah for the state's

scenic beauty, and are encouraged to do so from the "Mighty 5" national parks marketing campaign. The campaign was launched in 2013 and has been successful in introducing Utah's natural wonders (Arches, Canyonlands, Zion, Bryce and Capitol Reef National Parks) to people from all around the world (Trenbeath, 2015). The campaign has been economically advantageous for the parks' gateway towns, despite setbacks faced by Park Service officials in managing massive crowds, while also acting to protect natural and cultural resources.

Of the "Mighty 5", Capitol Reef National Park is the most sought after destination in Wayne County and serves as a driver in both the national and local economies. Capitol Reef National Park is managed by the National Park Service (NPS) under a restricted use policy that includes a two-part mandate to preserve lands under its jurisdiction for future generations, while also managing those lands for the pleasure of the current population (Butkus, n.d.). The current population visiting Capitol Reef participate in such outdoor recreation activities as driving for enjoyment, sightseeing, camping, hiking, backpacking, orchard harvest activities and exploring the park's historical and geological resources.

A NPS report showed that in 2015, approximately 941,029 recreational visitors to Capitol Reef spent an estimated $66.6 Million in local communities while visiting the park. That spending supported a total of 944 jobs in the local area. Tourist expenditures accumulated to $24.7 Million in labor income, $43.4 Million in value added and $76 Million in economic output in local economies neighboring Capitol Reef National Park (NPS, 2015). According to the economic analysis of the report, the majority of visitor spending was on hotels (39.47%), followed by restaurants (19.03%), gas (14.72%), transportation (6.92%), retail (6.72%), groceries (5.70%), recreational industries (4.23%), and (camping 3.22%) (NPS, 2015). This supported 308 jobs in the hotel industry, and 250 jobs in the restaurant industry in communities surrounding the park (NPS, 2015). Many of the numbers in this report are suspect. Even in the report itself there is a section on "Limitations" that attempts to justify inaccuracy of the information in it due to such things as; estimates used for input data, the use of conversion factors, visitor segment shares, spending averages, and local area multipliers. Since this information can neither be verified nor refuted it can only be treated as propaganda.

The increased visitation rates to Wayne County have enhanced the growth of tourism tax profits and sales. In 2014, total tourism-related tax revenue increased 4.0% in fiscal year 2014 (Utah Travel and Tourism Profile State and Counties, 2014). Total taxable sales in the leisure and hospitality sector increased 9.7% in 2014 and were highest during summer months, followed by spring. Although, in spite of the growth in tourism-related tax revenue and sales, jobs in the leisure and hospitality sectors declined 8.5%, with a 7.8% decrease in wages. The county's leisure and hospitality job sector are largely dependent upon the seasons, with peaks during spring and summer months (Utah Travel and Tourism Profile State and Counties, 2014). Consequently, the tourist season of 2014 supported greater than three times as many leisure and hospitality jobs than in the off-season (fall and winter).

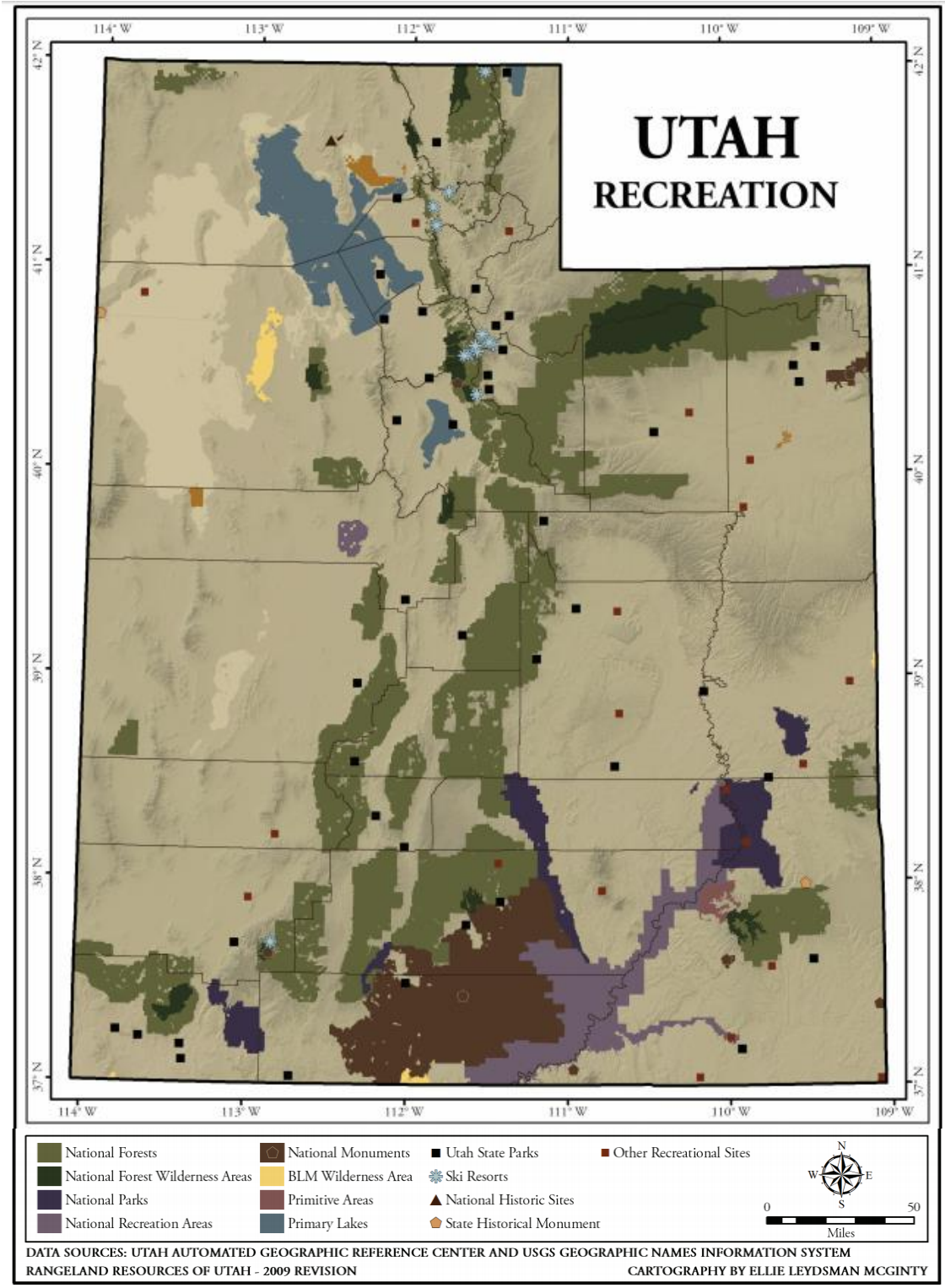
### *12.3.1 Benefits of Recreation and Tourism*

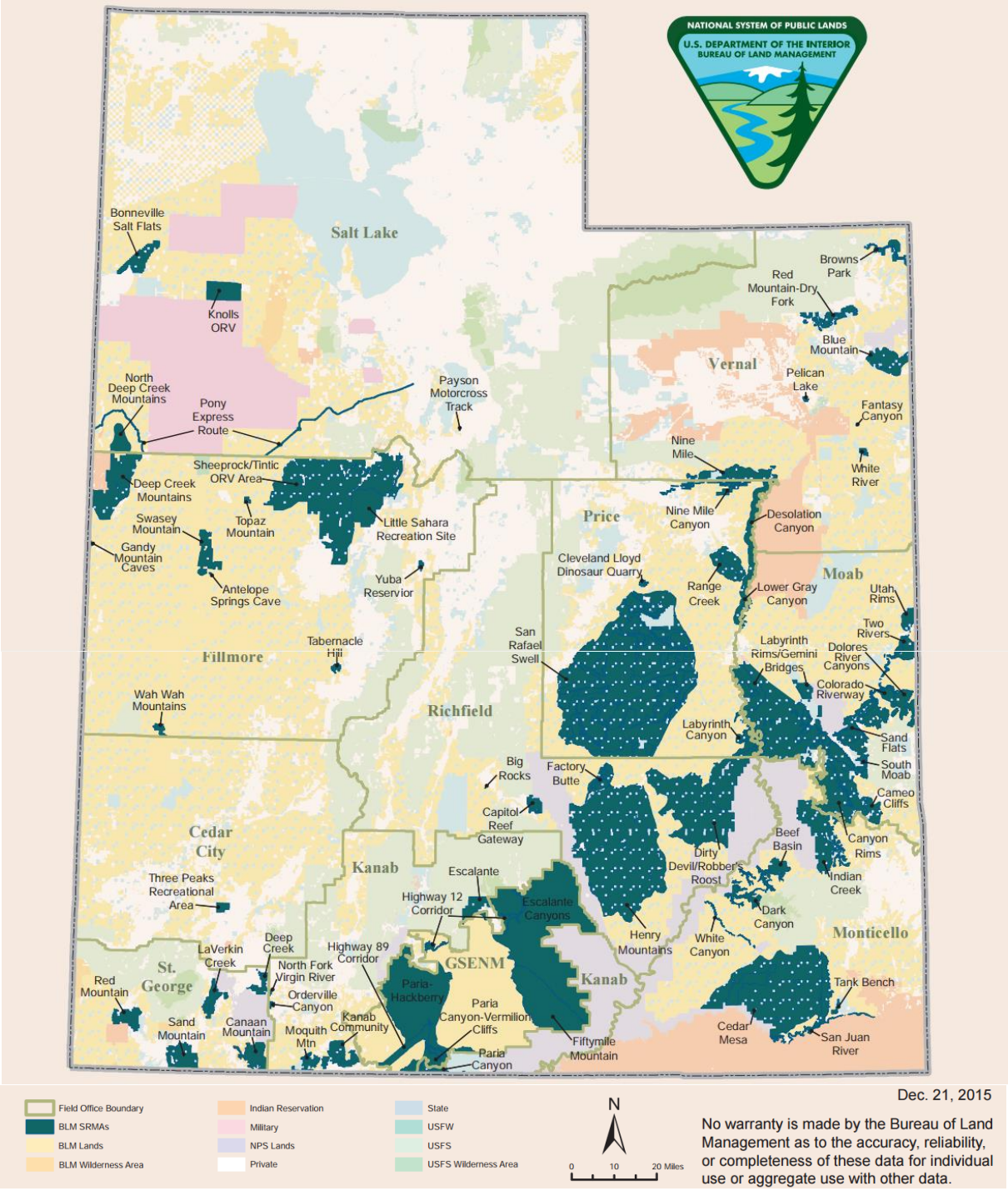
The broad range of recreational activities in Wayne County's breathtaking valleys, mountains and canyons adds to the quality of life for the county's residents and visitors. Such features attract college graduates, young families, and prosperous retirees to purchase homes in the area. Tax-paying businesses and knowledgeable workers are also attracted to areas of abundant recreational amenities, with small company owners reporting that recreation, parks and open spaces are the highest priority in choosing a new business location (The State of Utah Outdoor Recreation Vision, 2013). Recreational parks and opens spaces also have a positive influence on residential property values by providing local governments with higher property tax revenues. Furthermore, recreational opportunities appeal to outdoor manufacturing companies, which unlike the leisure and hospitality sector, are not influenced by seasonal variations. Thus, outdoor manufacturing companies are capable of stabilizing the local economy, while also providing reliable employment (The State of Utah Outdoor Recreation Vision, 2013). On the whole, outdoor recreation is a large and important driver in Utah's economy and provides jobs in development, manufacturing, sales, tourism, land and wildlife management, hospitality, and guide and outfitter services. Although much of this is probably true on a statewide basis, the improvement in tax base and businesses to the local communities and county is over stated.

Outdoor recreation not only offers improved economic stability, but health benefits as well. Increased participation in recreational activities has been shown to decrease obesity, diabetes, coronary heart disease, high blood pressure, cancer, osteoporosis and hip fracture rates (The State of Utah Outdoor Recreation Vision, 2013). These diseases are largely the result of a sedentary lifestyle, which cost Utah's residents, their families and society as a whole an estimated $485 million in 2008. This figure is projected to increase to $2.4 billion by 2018. Another significant influence of chronic illness is stress, which can cause many people to become vulnerable to physical and mental health problems. Stress-related issues have been found to decrease with physical activity, as well as simply surrounding oneself in a natural environment (e.g., park, mountains, or near a river or lake) (The State of Utah Outdoor Recreation Vision, 2013). Thus, outdoor recreation and exercise can serve as an enjoyable way to improve the public's physical and mental health.

Furthermore, outdoor recreation can provide social benefits that strengthen family and community bonds, as well as improve the lives of children, youth, adults, senior citizens, and the disabled in Wayne County. Children and young adults who participate in outdoor recreational activities are more likely to form a connection to the natural world, which is important for the future stewards of these lands (The State of Utah Outdoor Recreation Vision, 2013). Outdoor recreation also allows people to gain a fresh perspective from their busy and fast-paces professional or personal environments, which can lead to a greater quality of life. In conclusion, those who participate in recreational activities are more likely to have healthy child development (e.g., improved concentration, motor development, coordination, mental acuity, and mood), have a more active lifestyle as senior citizens (e.g., limit the beginning of disease), increased independence for disabled individuals and possess an appreciation for natural resources and places among present and future generations.

**Figure One. Recreational Areas and Sites in Utah**






Source: (BLM-Utah Recreation Strategy, 2015).

*12.4 Objectives*

Maintain traditional access for outdoor recreational opportunities available in Wayne County. Traditionally citizens of Wayne County and visitors have enjoyed many forms of outdoor recreation, such as hunting, fishing, hiking, family and group parties, family and group campouts and campfires, rock hounding, OHV travel, geological exploring, pioneering, parking their RV, or touring in their personal vehicles. All trails in Wayne County which have historically been open to OHV use should remain open.

*12.5 Policy Statements*

1. Multiple use and sustained-yield management principles shall be applied in public land use and natural resource planning and management in Wayne County. This is how the citizens of Wayne County are best served. Multiple-use and sustained-yield management means that land owners and land management agencies should develop and implement management plans and make other resource-use decisions that support these principles.

2. Public land outdoor recreational access in Wayne County should not discriminate in favor of one particular mode of recreation to the exclusion of others. Traditionally, outdoor recreational opportunities have been open and accessible to working class families, to families with small children, to the ill and persons with disabilities, to the middle aged and elderly, to persons of different cultures for whom a primitive or back country experience may not be the preferred form of recreating.

3. Wayne County proposes continued public motorized access to all traditional outdoor recreational destinations in all areas of the county.

4. Roads that are part of Wayne County's duly adopted transportation plan should remain open to motorized travel. None of them should be closed, and Wayne County should have the continued ability to maintain and repair those roads, and where reasonably necessary make improvements thereon. Traditional levels of wildlife hunting and fishing should continue. Traditional levels of group camping, group day use and all other traditional forms of outdoor recreation -motorized and non-motorized - should continue. In addition, all roads and trails administered by the BLM or Forest Service, in addition to those maintained by Wayne County, should remain open to public use, and any attempt to close any road or trail should be subject to the NEPA process and the county should be an interested party throughout the NEPA process.

5. All planning and management shall meet the needs of economic and community development within the County.

Chapter 13
# Cultural and Historical Resources

## Local History, Heritage, and Culture

### *13.1 Resource Findings*

Heritage is the traditions, achievements, and beliefs that are part of the history of a group of people. Culture is the beliefs, customs, arts, etc., of a particular society, group, place, or time (Merriam-Websters).

Wayne County and its people have a history, heritage, and culture that is quite unique. Although similar to many western and especially Utah communities. Wayne County with its rough and varied landscapes and roughly 97 percent government controlled land has resulted in challenges to those hearty individuals who have managed to survive and eke out a living in this beautiful area.

Wayne County lies between the High Plateaus and the Green river in south-central Utah. Eons of geologic history are visible, especially in Capitol reef National Park, first set aside in 1937. Ancient peoples and ancestors of modern Utes and southern Paiutes left many traces on the land, and in the 1920s the Fremont Culture was first identified here by anthropologist Noel Morss. In the late 1870s the first Mormon settlers arrived with their livestock and took up land. In 1892 they separated from Piute County when the legislature created Wayne County. Since then, the county has struggled to build and maintain water, power, and communication systems, roads, and schools.

Wayne's remote location (which attracted outlaws like Butch Cassidy), small population, and limited resources precluded the development of an industrial base or large businesses. Because only about 3 percent of the land is privately owned, land use issues loom large as residents try to maintain a cherished rural lifestyle while seeking job opportunities for their children. Community life, centered on church and family, has flourished form the beginning, with people frequently gathering to enjoy holidays and other activities (Murphy, 1999).

The livestock industry is the oldest and most important industry in the county. It was the lure of the fine grazing areas which brought some of the first settlers into the valley. But even before they came, cattle owned by a family by the mane of Tidwell were grazing in the region. These people built the first log cabin in the valley, located due east of Fremont town where the north creek of Horse Valley joins the river on the Hyrum Morrell farm. This place and the range Tidwell used still bear his name (Snow, 1953).

The dairy business may be regarded as a branch of the cattle industry. In pioneer days and for some years afterword the people of Wayne County found dairying to be one of the best ways to realize a profit from their cattle. The ventures at that time were private, many families from different parts of the county making butter and cheese to sell (Snow, 1953).

Although conditions for farming in the county are unfavorable, food is so essential to all life that a large percentage of the adult population engage in planting and harvesting on a small scale. Farmers have learned through experience which crops do best in the various localities and so direct their efforts to growing these (Snow, 1953).

Sheep were brought into the county in small numbers very soon after the first settlers arrived, and the industry developed along with the cattle industry. The sheep industry has declined in importance since the 1920s (Snow, 1953). Now only a few herds operate in the county.

*The Historic Nielson Grist Mill located southeast of Bicknell was constructed in 1898 to provide the weary farmers of Wayne County the means to locally sort and grind the grain they produced. Powered entirely by water, the mill served the area until 1948.*

*13.1.1 Settling Rabbit Valley* (Frye, 1998)

A peace treaty signed at Council Grove, Utah among the Mormons, Utes, and Paiutes in 1873 finally opened the plateaus and valleys east of Richfield to settlement. Sent by the church to bring isolated bands of Utes and Paiutes to that peace council, a party of 22 men, including later settlers Albert Thurber and George Bean, was impressed by the high valley's abundant grass, timber, and game.

Two years later, Thurber returned with part of the Richfield cooperative cattle herd. Others, such as Hugh McClellan and Beas Lewis, arrived soon afterward. It was the practice at that time for Mormons to pool their cattle together into a church-sponsored herd that would be trailed by one or two local ranchers. Some of the cattle would be privately owned and some would belong to the church. Thus, the cattle that first grazed in Rabbit Valley were either owned or managed by the Mormon Church; but the actual settlement of Rabbit Valley and the lower desert to the east was apparently accomplished through individual rather than Church initiative. [5]

Despite the 7,000-foot elevation of Rabbit Valley (and its consequently short growing season), ranchers and supporting farming communities began to follow the Fremont River downstream. At first, they built isolated homesteads, but soon laid out townsites. After Albert Thurber founded his namesake (later re-named Bicknell) in 1875, the small settlements of Fremont (1876), Loa (1878), East Loa (later, Lyman) (ca. 1879), Teasdale (1878), Grover (1880), and Torrey (1884) soon followed. This settlement pattern of cooperative herds followed by individual ranchers and then towns was also occurring to the south in Escalante and Boulder at about the same time. [6]

*13.1.2 Settlements in Lower Wayne County* (Frye, 1998)

Below and to the east of Rabbit Valley, the farming and ranching prospects were meager, at best. The desire for free, even slightly promising land, however, finally pushed homesteaders into and past that omnipresent barrier, the Waterpocket Fold. The first permanent settler was Ephraim Hanks, who along with his wife Thisbe and their children, began homesteading on Pleasant Creek in 1881. Hanks chose the only open, relatively flat land between the deep, narrow limestone and sandstone canyons of Pleasant Creek to grow fruit and run a small ranch. According to his son and biographer Sidney Hanks, the thousands of fruit blossoms in spring gave the homestead its name, Floral Ranch. This ranch changed hands several times during the early 20th century, until Lurton Knee bought the property in the early 1940s and established the Sleeping Rainbow Guest Ranch. [7] (Since Knee's death in 1995, the ranch has reverted to National Park Service ownership under the terms of a life estate he had established years earlier.)

Fruita, now Capitol Reef's most populated area, was at first bypassed by homesteaders in favor of the more open desert lands further east. Except for Caineville (1882) and Hanksville (1883), all the other communities along the banks of the lower Fremont River were abandoned after repeated flooding. Observed Crampton:

> Depletion of the range up-country and the ploughing of banks practically to the water's edge increased the volume of floods and the result was a severe lowering of the stream bed. By the turn of the century, Mormons along the Fremont below the reef found that much of their farm land had caved away to be washed downstream and that the river itself was dropping below the level of the headgates. The result was a contraction of the original frontier of settlement as people began to move away. [8]

This process of settling any available land and then slowly retracting to the most productive was a pattern found throughout the West. It was Mormon tenacity and cooperation that enabled them to homestead or ranch successfully on any land within the Colorado Plateau. The homesteading of Fruita is a classic example of that blend of individual, family, and group perseverance.

*13.2 Cultural Resources*

Cultural resources is a general term frequently used by archaeologists to describe the evidence of past human activities, such as prehistoric and historical sites and artifacts. Cultural resources can be structures such as historical or prehistoric buildings, bridges, homesteads, canals, or roads. Cultural resources can be things such as rock art, stone tools, food remains, ceramics, glass items, tin cans, documents and many other items that show how people lived.

Cultural resources includes studies of the human past from the earliest peoples up through historical times. (Include cultural chronology of area including Paleo-Indian, Archaic, Formative period (Fremont Culture), Proto-historic period, and the Historic period).

In Wayne County, we have remarkable historical and prehistoric cultural resources that are worthwhile to protect, study and preserve. There are a number of laws and regulations that control the impacts of federal government and state actions. Cultural resource laws provide the legal framework and process for considering the effect of federal and state activities on cultural resources. The intention of these laws is not to discourage development. Federal cultural resource laws apply to a project only when federal funds, permits, or lands are involved.

The National Historic Preservation Act of 1966 (NHPA) is a federal law that guarantees that local governments have a voice in federal decisions impacting historic and prehistoric properties.

Under provisions of Section 106 and Section 110 of NHPA, federal agencies are required to take into account the effects of all undertakings on historic and prehistoric properties that are included on the National Register of Historic Places, “or that meet the criteria for the national register.” Properties with National Register qualities that have not been formally included on the National Register are afforded equal consideration.

The scope of Section 106 compliance lies largely with the federal agency undertaking the action. Each agency determines the level of appropriate identification efforts and then oversees the consultation process. This process is undertaken through consultation with state historic

preservation officers, state and local governments, and members of the public. The Advisory Council on Historic Preservation may participate when there are substantial impacts to important properties, when a case presents important questions of policy or interpretation, and when there are issues of concern to Native Americans.

As part of the consultation process, federal agencies are required "to seek ways to avoid, minimize or mitigate the adverse effects." Most importantly, Section 106 specifically recognizes the importance of local government involvement in the consultation process.

Cultural and historical resources are characterized as physical evidence, or places of past human activity, and typically include: sites, objects, landscapes, structures; or sites, structures, landscapes, objects or natural features of importance to a group of people traditionally connected with it (National Park Service, 2016). Cultural and historical resource inventories have been completed in the lands managed by the Richfield Field Office (RFO), which includes Wayne County, for over 30 years at differing levels using an array of methods in accordance with Section 106 of the National Historic Preservation Act (NHPA; BLM, 2008). Additionally, to provide further knowledge and to foster impact mitigation from surface disturbing activities, academic institutions have performed various research excavations on the cultural and historical resources within the RFO planning area. The results from these combined resource inventories have identified thousands of cultural properties and chronological periods from a diverse collection of human cultural groups that span the last 13,000 years within the RFO (Beck and Jones, 1997). Altogether, less than 5 percent of the land area within the RFO has been inventoried to suggest great potential for future discovery of cultural resources in Wayne County and surrounding locations (BLM, 2008).

### *13.2.1 Site Types*

Sites are categorized into groups as either prehistoric or historic types based upon similar physical or cultural features. Some sites may be re-categorized after further research due to a lack of functional or cultural site information during the original recordation. Additionally, sites may represent more than one category and are consequently more complex and have the potential to provide more information than single-category sites (BLM,2008). Of the available site records for the RFO, 7,022 archaeological sites exist within the planning area and range from the oldest dating to the terminal Pleistocene approximately 13,000 years ago to Euro-American settlement in the early 1800s.

### *13.2.2 Prehistoric Site Types*

Prehistoric sites include Paleoindian, Archaic, Formative (Fremont or Anasazi), and Late Prehistoric (BLM, 2008). Formative sites represent the most abundant site type in the RFO. The following describes common sites found in the region:

#### Rock Art

Rock art can be categorized as either petroglyphs or pictographs. Petroglyphs are designs pecked or carved into the surface of the rock, while pictographs are painted onto the rock surface using a range of pigments (BLM, 2008). At certain sites, images were painted with subsequent

features created by pecking at the paint and rock surface; at other sites, designs have been carved into the surface and later painted. No one specific human group has been attributed to rock art with any degree of certainty, however rock art within the RFO is considered to represent groups living before 9000 B.C. to the present (BLM, 2008).

Rockshelter

Rock outcrops or large boulders typically constitute as rockshelters, which were used by both prehistoric and historic people as shelter from wind, sun, and other elements (BLM, 2008).

Lithic Scatter

A lithic scatter includes any group of stone artifacts or artifact fragments composed of flaked stone tools or debitage, as well as ground stone tools and tool fragments (BLM, 2008). This category can include only a single tool present to sites with thousands of diverse artifacts.

Ceramic Scatter

A ceramic scatter consists of any group of ceramic artifacts or fragments from prehistoric or historic activity. The majority of prehistoric ceramics represent the Fremont Indian culture, or tradeware from the Anasazi culture to the south (BLM, 2008). Although a small amount of pottery has been recorded from Numic (e.g., Ute or Paiute).

Cairn

A cairn is defined as pile of stones deliberately created (BLM, 2008). Many of the cairns located in the RFO date to the historical period (e.g., sheepherders' monuments, mining claim markers, etc.), although some may be prehistoric.

Hearth

A hearth is the remnant of a feature, such as clay- or rock-lined fire pits, ash pits, ash stains, and fire-cracked concentrations or scatters where humans intentionally used fire (BLM, 2008).

Rock Alignment

Any human arrangement of rock generally not recognized as part of a structure is considered a rock alignment.

Cist

Cists are small structures of slab-lined or coursed masonry approximately 1 meter in diameter built for storage (BLM, 2008). These structures typically are semi-subterranean, however they can occur on the surface, freestanding, or secured to a cliff face or ledge.

Burial

Human physical remains are found in burial sites below the surface or uncovered, and may be marked or unmarked (BLM, 2008).

Structural

Structural sites are built from an extensive range of material types that include structures of brush, trees, mud and sticks, coursed masonry and slab-lined, boulder-lined, or unlined pits within open or naturally protected areas (BLM, 2008).

Midden

Concentrations of ash, charcoal, bone, sherds, lithic fragments, human excrement and general garbage constitute as middens (BLM, 2008).

*13.2.3 Historical Site Types*

Historical sites are cultural resources of importance within the period of 1700 A.D. to the present. Historic resources are grouped into themes in order to interpret features, such as, ditches, fences, and houses (BLM, 2008). These features typically cannot be understood outside the functional complex they originated from.

Anglo Exploration

Historic features from the period before settlement are included in this pre-settlement category, such as the Old Spanish Trail, which was labeled a National Historic Trail in 2002 (BLM, 2008).

Ranching

Features used to raise domestic livestock, for example fences, water developments, cabins, corrals, camps, and sheepherders' monuments, are included in the ranching category (BLM, 2008). Because Wayne County has a long history of ranching activities, these features are useful as historic resources.

Farming

Features left behind from activities, such as raising crops; digging or drilling wells; building barns, sheds, and cisterns; using farm implements; and creating canals, ditches, and homes are grouped in the farming category (BLM, 2008).

Mining

Mining activities include exploration and extraction of mineral resources, such as shafts, and adits, drill sites, prospect holes, tailing dumps, and waste rock piles, ore bins, loading chutes, kilns, tramways, residences, and other buildings (BLM, 2008).

Transportation

Features, such as abandoned rail lines, railroad grades, construction camps, bridges, roads, trails and remnants of river navigation were used to transport people and goods across Wayne County and are therefore included in the transportation category.

Government Management

Attempts at managing the land and its resources by government agencies, such as the Civilian Conservation Corps (CCC) in 1930s, include dams, fences, land treatments or manipulations, spring developments, roads, and bridges (BLM, 2008).

### *13.2.4 National Register of Historic Places*

Federal law protects sites formally listed on the National Register of Historic Places (NRHP). The following sites in Wayne County are listed on the NRHP (2016):

A. Elijah Cutler Behunin Cabin
B. Bull Creek Archaeological District
C. Cathedral Valley Corral
D. Civilian Conservation Corps Powder Magazines
E. Cowboy Caves
F. D.C.C. & P. Inscription "B"
G. Fruita Rural Historic District
H. Fruita Schoolhouse
I. Grover School
J. Hanks' Dugouts
K. Hanksville Meetinghouse-School
L. Harvest Scene Pictograph
M. Horseshoe Canyon Archaeological District
N. Charles W. and Leah Lee House
O. Loa Tithing Office
P. Lesley Morrell Line Cabin and Corral
Q. Hans Peter Nielson Gristmill
R. Oyler Mine
S. Pioneer Register
T. Teasdale Tithing Granary
U. Torrey Log Church-Schoolhouse

## *13.3 Cultural History*

Archaeological evidence suggests that people arrived in the eastern Great Basin and northern Colorado Plateau near the end of the last ice age during the terminal Pleistocene, roughly 13,000 years ago (Beck and Jones, 1997; Graf and Schmitt, 2007). Over the course of time, the lifestyles of people occupying this region have varied considerably due to environmental and social adaptations, as well as regional migrations that necessitated changes in diets, structures, and modifications to the tools and objects these people created.

There are 4 wide-ranging cultural periods associated with prehistoric sites in the eastern Great Basin that are based upon differences in material culture, or traits, and subsistence arrangements and include: Paleoindian (before 5500 B.C.), Archaic (5500 B.C. to 700 A.D.), Formative (700 to 1300 A.D.), and Late Prehistoric (1300 A.D. to ca. 1776 A.D.) (BLM, 2008).

### *13.3.1 Paleoindian*

The earliest and most compelling evidence of human use within the Great Basin and northern Colorado Plateau dates to 13,000 calendar years ago (Beck and Jones, 1997; Gilbert et

al., 2008; Graf and Schmitt, 2007). Paleoindians existed alongside megafauna, with evidence indicating early human dependency on these Pleistocene animals (Spangler, 2001). Sites within the RFO cannot be assigned as Paleoindian with certainty, however early Paleoindian diagnostic artifacts of both fluted and stemmed projectile points can be found in the RFO planning area and surrounding vicinity. As an example, Paleoindian projectile points have been identified in the Henry Mountains to suggest that Paleoindian people may have frequented and used the Henry Mountains (BLM, 2008). Fluted points are categorized as either "Clovis-like" or "Folsom-like", while stemmed point types are typically grouped together in the Great Basin Stemmed point series. Additionally, the crescent is another diagnostic artifact of the early Paleoindian period and is frequently found near stemmed points (Beck and Jones, 1997). It is speculated that the crescent was used for hunting waterfowl and/or as a cutting tool due to edge-grinding and breakage patterns consistent with transversely hafted projectile points (Clewlow, 1968).

Most Paleoindian sites consist of open sites lacking surface deposits, although a few cave sites within the region have produced diagnostic Paleoindian artifacts. The majority of Paleoindian sites are located adjacent to pluvial lakes, or near wetlands to suggest the use of aquatic resources for subsistence (Beck and Jones, 1997; Duke and Young, 2007; Schmitt and Madsen, 2005). A study revealed that over 70 percent of fluted point sites (representing over 90 percent of reported flute points) from the Great Basin are located in valley bottoms that once were inundated by pluvial lakes or marshes (Grayson, 1993, 2011; Taylor, 2003). In comparison, stemmed points are found in greater concentrations at high elevation alluvial fan and foothill settings more so than fluted points (Grayson, 1993, 2011). Stem points date to the early Holocene, while fluted points originate from the terminal Pleistocene to indicate a greater use of wetland resources during the early Paleoindian period. Furthermore, in addition to stemmed points, and crescents, Pinto points are also a Paleoindian diagnostic artifact and are thought to be used during the late Paleoindian period. One of the few sites with diagnostic artifacts near the RFO planning area is the North Creek Shelter that dates between 9690 ± 60 B.P and 9519 ± 80 B.P. (Janetski et al., 2012). Overall, Paleoindian sites within the RFO planning area are considered significant because of their scarcity (BLM, 2008).

### *13.3.2 Archaic*

Early Archaic Period

The Archaic tradition is described as a generalized hunter-gather adaptation for survival (BLM, 2008). Archaic people employed common strategies to benefit from an assortment of desert environments, as lakeshore and other wetland habitats became scare (Spangler, 2001). Following the wetter and cooler Paleoindian period, the climate became warmer and drier than previous to cause a shift from big-game hunting to small game hunting, as well as seed and nut-gathering, which evidenced by the low abundances of artiodactyl remains in paleoenvironmental records and an increase in ground stone artifacts (Broughton et al., 2008; Byers and Broughton, 2004; Grayson, 1993, 2011; Rhode et al., 2006). As mean temperatures and aridity increased, Archaic people began to form small, highly adaptable, kin-related groups to live in throughout the year. These groups made it easier to track annual changes in resource availability (Tipps, 1988). Consequently, groups migrated from areas of depleted resources to locations of abundant supplies, which caused their diet to vary based upon the staple food of each new location. In addition, higher elevation locations were used in greater frequency during this early Archaic

period to indicate further subsistence generalization; as an example, the Cowboy Cave site in Wayne County (Schroedl and Coulam, 1994).

The diagnostic artifacts from the Early Archaic period include: Pinto points, Elko series points, and Northern side-notched points, all of which were probably used to tip atlatl darts. Basketry remained important, while netting and snares were most likely used for hunting small vertebrates (Aikens, 1970; Broughton et al., 2008; Byers and Broughton, 2004). Archaic sites are common in the RFO, although there is potential for new Archaic site discoveries in the area. The documented regional sites include seasonal cave and overhang dwellings, which represent only a portion of the sites used by Archaic groups, most likely because sociopolitical groups remained small (BLM, 2008).

Middle Archaic Period

The archaeological record of the Middle Archaic period includes Elko series, Northern side-notched, and Humboldt dart points (Madsen et al., 2005). Occupation of high elevation sites increased during this time, as evidenced by Cowboy Cave and nearby sites (Schroedl and Coulam, 1994). Environmental changes occurred in response to the warmer and drier climate, which in turn impacted resource availability. As a result, settlement and subsistence systems became less abundant. Because many Middle Archaic sites are impermanent and difficult to date, some archaeological scholars postulate that the region was uninhabited, while others argue that people were highly mobile and briefly made use of almost every available habitat (Simms, 1989).

Late Archaic Period

The climate of the late Holocene became cooler and more mesic, comparable to modern conditions. Large mammal prey increased, as evidenced by the increase in artiodactyl populations (Byers and Broughton, 2004). With the exception of Gatecliff and Gypsum appearing in tool assemblages, the material culture remained the same from the previous period. Additionally, occupation of high elevation sites continued to increase in intensity (Madsen and Schmitt, 2005).

Eventually, agricultural subsistence was incorporated into the hunter-gatherer tradition towards the end of the Archaic period. Evidence of agricultural use in southern and southeastern Utah has been attributed to Anasazi cultures from approximately 1000 B.C. (BLM, 2008). Although, people of the Late Archaic are still considered foragers, with archaeological evidence indicating the use of almost every type of available resource. Instead of adding a new item to their diet or migrating to a new location like Middle Archaic foragers, these Late Archaic people invented new ways of handling environmental stress, such as establishing larger villages, changing social organization, or by increasing mobility. Of particular interest is the domestication of plants, with the earliest evidence for corn in Utah near Richfield at the Elsinore site (Wilde et al., 1986).

*13.3.3 Formative*

Fremont Complex Farmers and Foragers

During the Formative period, the Fremont, and Anasazi or ancestral Puebloan cultures expanded in the region (BLM, 2008). Agriculture was practiced during the Fremont period from approximately 150 B.C. to A.D. 1450 by groups from the eastern Great Basin, Wasatch Plateau, and northern Colorado (Madsen and Schmitt, 2005; Massimino and Metcalfe, 1999). Fremont ceramics are spread across an even larger area than where agriculture was practiced, spanning from central Nevada into southern Idaho and southwestern Wyoming (Hockett and Morgenstein, 2003).

The Fremont complex implemented an assortment of subsistence and mobility patterns, with evidence of individuals within these groups innovating a variety of strategies throughout their lifetime (Madsen and Simms, 1998; Barlow, 2002; Coltrain and Leavitt, 2002). These subsistence strategies ranged from hunting and gathering, to fairly intensive farming that relied upon the productivity of wild and domesticated resources (Barlow, 2002). Fremont sites also reflect varying levels of diversity among their structures, which ranged from large, established villages located on either side of the Wasatch Plateau, to more impermanent camps of greater mobility, and lastly to the continued use of caves (Aikens, 1970; Bryan, 1977).

The distinguishing characteristics of the Fremont material culture include five major types of gray ware pottery; one-rod-and-bundle basketry; deer- or sheep- hide moccasins; an art style comprising of trapezoidal figurines in rock art and on clay figurines; and "Utah-type" metates categorized by a small secondary grinding surface. All of these cultural items form the basis of the Fremont as an archaeological complex, although each item is rarely found at every Fremont site (Madsen and Simms, 1998). Distinguishing Fremont residential structures include multi-room adobe pueblos, pithouses with aboveground granaries, and earlier impermanent structures with underground storage pits.

An important characteristic of the Fremont is the appearance of Maize in the southern Wasatch Plateau archaeological record approximately ca. 150 B.C. (Barlow, 2002; Madsen and Simms, 1998). Maize then spread throughout the rest of the Fremont area by ca. A.D. 500. The dispersal of maize and other technology, such as pottery, basin-shaped metates, and underground storage pits, has been debated as either a result of adoption by indigenous hunter-gathers, or the introduction of farming by migrating populations (Coltrain et al., 2007; Madsen and Simms, 1998). Although, it is likely that Fremont ancestors migrated away from ancestral Anasazi populations before the spread of domesticates in the Fremont region.

The RFO planning area contains many Fremont sites, or sites with Fremont characteristics; these include Icicle Bench, Radford Roost, Lott's Farm, Mukwitch Village, and Nawthis Village.

Ancestral Puebloan Farmers

The majority of the Formative period archaeological sites in the RFO planning area are Fremont complex sites, although the southern portion of the planning area expands into the greater Southwest's Anasazi of Ancestral Puebloan culture area. A large portion of the four-

corner states (Colorado, New Mexico, Arizona and Utah) were occupied by Ancestral Puebloan farmers. Many regional variants exist across these areas. The RFO regional variants identify with the Pecos Classification, and include both the Kayenta branch located to the south, and the Mesa Verde branch to the east.

The Southwest's Basketmaker III period sites (ca. A.D. 500 to 800) of the Mesa Verde region are characterized by shallow pithouses of clay-lined hearths located on ridges or mesa tops, while the Kayenta region sites consist of well-watered canyons and alluvial valleys. The artifacts associated with these regions include small basal-notched projectile points that suggest use of the bow and arrow, trough metates, and sand-tempered ceramics (Geib, 2011). Minimal lifeway changes occurred during the transition to Basketmaker II.

The Basketmaker period was followed by the Pueblo periods. From A.D. 800 to 950, the Pueblo I period experienced an increase in settlement aggregation, as well as an expansion of aboveground clay and jacal surface structures. Ceramic production practices became more advanced, resulting in the appearance of black-on-white and red ware during this time period. Sites dating to ca. A.D. 950-1150 of Pueblo II are similar to Pueblo I, however the establishment of small settlements in previously void areas increased as the regional population peaked during Pueblo II (Geib, 2011). Subsequently, during Pueblo III (ca. A.D. 1150- 1300), populations began to decline by ca. A.D. 1200, and later increased in a second peak at approximately ca. A.D. 1270 for the northern Kayenta region, as well as the Mesa Verde region.

Archaeological evidence of the Ancestral Puebloan has been documented in the RFO planning area in locations east of Capitol Reef National Park, extending to areas north of the Henry Mountains (BLM, 2008).

### *13.3.4 Late Prehistoric*

The abrupt decline and disappearance of the Fremont culture around A.D. 1300 was followed by the expansion of Numic-speaking tribes, including the Paiute, Ute, and the Shoshone (Grayson, 1993; Grayson, 2011). It has been hypothesized that Numic speakers migrated across the Great Basin from their homeland in southeastern California sometime before A.D. 1000 (Lamb, 1958; Bettinger, 1991, 1982, 1983; Young and Bettinger, 1992). This hypothesis is supported by genetic data (Carlye et al., 2000; Kaestle and Smith, 2001), as well as the documented introduction of chipped stone assemblages, basketry, and ceramics (Madsen and Rhode, 1994).

The Late Prehistoric period is characterized by projectile points, including the Cottonwood triangular and Desert side-notched types. The one-rod-and-bundle basketry of the Fremont was replaced by other basket types. Fremont and Anasazi pottery types were also replaced by brown ware during this time period.

Sites of the Late Prehistoric most often occur in riparian or lakeside wetland habitats (Janetski and Smith, 2007; Simms and Heath, 1990), as well as caves and upland areas (Aikens, 1970; Janetski, 1985; Janetski and Smith, 2007; Simms, 1989). Late Prehistoric groups were most likely mobile and relied upon wetland resources, as well as resources in an assortment of

other habitats (Madsen and Schmitt, 2005; Janetski and Smith, 2007). Many sites in the RFO planning area are from this Late Prehistoric period, however some sites have been mislabeled and recorded as Fremont (BLM, 2008).

### *13.4 Native American Tribes*

There are five Native American groups with territories within the RFO planning area, including the Southern Paiute, Ute, Navajo, Pueblo of Hopi, and the Pueblo of Zuni. Each group endured significant losses to their individual cultures, traditions and livelihoods, as well as the loss of ancestral homelands upon Euro-American contact. A comprehensive list of the federally recognized Native American tribes with a history of traditional use in or ancestral ties to lands within Wayne County include:

- Paiute Indian Tribe of Utah (headquartered in Cedar City, Utah)
- Uintah and Ouray Ute (headquartered in Ft. Duchesne, Utah)
- Hopi Tribe (headquartered in Kykotsmovi, Arizona)
- Navajo Nation (headquartered in Window Rock, Arizona)
- Southern Ute Tribe (headquartered in Ignacio, Colorado)
- Ute Mountain Ute Tribe (headquartered in Towaoc, Colorado)
- Kaibab Paiute Tribe (headquartered in Pipe Springs, Arizona)
- San Juan Southern Paiute Tribe (headquartered in Tuba City, Arizona)
- Moapa Paiute Band (headquartered in Moapa, Nevada)
- White Mesa Ute Band (headquartered in White Mesa, Utah)

The BLM also includes the Navajo Utah Commission in Montezuma Creek, Utah and the Utah Division of Indian Affairs in Salt Lake City, Utah in discussions associated with land use planning (BLM, 2008).

The BLM is the primary custodian of public land in Wayne County, however tribes operate as sovereign nations since many Native American groups existed in the area for thousands of years before Euro-American contact and settlement. The religious practices of Native Americans are permitted or authorized in federal lands, under Executive Order (EO) 13007 on Indian Sacred Sites, which acts to "protect and preserve Indian religious practices (BLM, 2008)". Federal land managers are required to help protect Native Americans' basic rights, and the practice of their religions. This involves tribal access to sacred sites and preventing physical damage or disturbances that may obstruct their use (BLM, 2008).

#### *13.4.1 Tribal Interest*

Today, the Utes own their own tribal government and manage 1.3 million acres of trust land. In the last five years, the Uintah and Ouray Reservation experienced a boom in oil and gas exploration and development. More than half of the tribal members live on these reservation (Ute Indian Tribe, 2014). The Uintah and Ouray Ute, as well as the Hopi Tribe Utes have ancestral ties to central Utah and have consulted with the BLM on proposals in the RFO planning area.

The present-day Southern Paiute are federally recognized in Utah as the Paiute Indian Tribe of Utah. The tribe is made up of five constituent bands: Cedar Band of Paiutes, Kanosh Band of Paiutes, Koosharem Band of Paiutes, Indian Peaks Band of Paiutes, and Shivwits Band of Paiutes (Bureau of Indian Affairs 2015). The Paiute assert both traditional use of and ancestral ties to lands managed by the RFO (BLM, 2008). This includes specific claims to sacred areas and other site locations, which have been documented and supported by the ethnographic study completed by Dr. Richard Stoffle of the University of Arizona (September 2004; BLM, 2008).

The Navajo Nation has one of the most sophisticated forms of Native American government that operates as a three branch system (executive, legislative and judicial), with a population that is estimated to exceed 250,000 (Navajo Nation Tourism Office, 2011). Navajo tribal interest is confined to areas east of Capitol Reef National Park dating back to the 1850s when Kit Carson and the U.S. Army attempted to "round up" the Navajos and move them to New Mexico (BLM, 2008). Although, many Navajos escaped into the Henry Mountains and remained there for some time after this "Long Walk" or "Big Roundup". Because of this, the Navajo Nation claims the area, as well as locations extending to the Dirty Devil River corridor and the Horseshoe Canyon drainage as a traditional cultural property. To date, no formal nomination has been completed for these locations (BLM, 2008).

The Hopi reservation spans 1.5 million acres in northeastern Arizona's Coconino and Navajo counties and contains 12 villages (The Hopi Tribe, 2015a). The Hopi assert ties to prehistoric groups and believe they can track Hopi clan migrations through symbols present in area rock art (BLM, 2008).

Lastly, the Zuni Tribe resides on a reservation that covers 450,000 acres in McKinley and Cibola Counties in western New Mexico, with additional holdings in Catron County, New Mexico, and Apache County, Arizona (Pueblo of Zuni-Information Technology, 1999a).

BLM consultation efforts with several Native American tribes have helped recognize areas of tribal religious significance and/or traditional use within the RFO planning area (BLM, 2008). Many tribes have also supported preservation and protection of certain archaeological sites, and voiced concerns about the impact to sites from disturbance.

*13.5 Historic (After ca. 1776)*

The Historic Period is referred to the time recorded by Euro-American written history, which began with Spanish Catholic Priests Francisco Dominguez and Silvester de Escalante leading the first Europeans into Utah in 1776-1777. The Spanish priests were later followed by trappers, explorers, and emigrants traveling to the Pacific Coast (BLM, 2008). Between the early 1830s and the late 1840s, many travelers followed The Old Spanish Trail, which intersects portions of the RFO (NPS, 2001). Expeditions into Wayne County by John C. Fremont in 1854 provided the earliest documentation of the county (Murphy, 1999). Subsequent expeditions down the Colorado River by John Wesley Powell in July 1869 led to the discovery of the Henry Mountains and the Dirty Devil River (Newell and Talbot, 1998).

The establishment of Wayne County took place in May 1892 following European settlement, which largely consisted of Mormon pioneers of Scandinavian descent (Wayne County Utah, 2014). These communities relied upon, and continue to produce wheat, barley, rye, oats, corn, alfalfa hay and wild hay. Communities also depend upon the ranching activities of sheep, swine, cattle (diary and ranching), chickens, and horses. Additionally, mineral resources located throughout the region was an important economic driver and included extraction of gold, copper, lead, zinc, uranium, gypsum, salt and coal. Mining (bentonite, uranium, coal, limestone, gypsum, and salt), and oil and gas exploration continues to support economic development for the region (Wayne County Utah, 2014).

Today, Wayne County consists of rural agricultural communities with fewer than 2.1 people per square mile (U.S. Bureau of the Census, 2015). According to the 2000 Census, more than 65 percent of residents in the RFO planning area are employed in sales, office, service, management, professional and related occupations (U.S. Bureau of the Census, 2015). The remaining portion of the population is employed in farming, fishing, forestry, construction, extraction, maintenance, production, transportation, and material moving occupations (U.S. Bureau of the Census, 2015). Recreation activities, such as ATV trail riding, hiking, fishing, hunting, boating, camping, and other outdoor activities in parks, forests, lakes, and rivers are important for both locals and tourists alike (Bushman Web Service, 2013).

### *13.6 Cultural and Historical Resource Impacts and Conditions*

The condition of cultural and historical resources differs throughout the RFO planning area due to the diversity of terrain, geomorphology, access and visibility, as well as past and ongoing land use practices (BLM, 2008). Recorded sites often are discovered by the presence of exposed artifacts, features and/or structures, which causes sites to become vulnerable to natural elements (e.g., wind and water erosion, natural deterioration and decay), as well as animal and human disturbance, development and maintenance activities. Site conditions in the RFO are predicted to worsen with time due to vandalism, collecting activities (unauthorized digging or "pothunting"), and the limited site monitoring resources (BLM, 2008). As archaeological and historical sites deteriorate from natural causes and illegal activities, the wealth of information stored in these significant cultural and historical resources will decline for future generations.

### *13.7 Consultation and Management of Cultural and Historical Resources*

The BLM manages 2.1 million acres of the 5.5-million-acre RFO planning area for multiple-use purposes, under the direction of the Federal Land Policy and Management Act of 1976 (Public Law 94-579). Cultural resources management in the RFO planning area is directed by Section 106 of the National Historic Preservation Act of 1966 to consider the effects of undertakings for land use, development and management activities on historic properties (BLM, 2008). The BLM, and other federal agency undertakings include, but are not limited to: land development and infrastructure, oil and gas exploration and development, mineral extraction and mining activities, waterworks, transmission projects, roads and other transportation development, timber harvest, vegetation habitat management, range and grazing management, and land exchange. Additionally, statute and agency policy require the BLM to provide the Advisory Council on Historic Preservation (ACHP) an opportunity to comment on the nature of

undertakings and the impact to cultural resources (BLM, 2008). The historic preservation review process required under Section 106 is summarized in the regulations section issued by the ACHP. To compete this review process, the BLM must determine whether or not it has an undertaking that is designated in the regulations as a kind of activity that could disturb historic properties (e.g., properties that meet the criteria for the NRHP, or are included in the NRHP). If so, the BLM is required to consult with the State Historic Preservation Officer (SHPO). If no undertakings are present, or the undertakings consist of activities that have no potential to impact historic properties, no further action is needed under Section 106 (BLM, 2008).

Throughout most of Utah, the State Protocol Agreement and the Utah SHPO designate the manner in which the BLM will meet its obligations under the NHPA, as well as the National Programmatic Agreement among the BLM, the ACHP, and the National Conference of State Historic Preservation officers (BLM, 2008). Specific review thresholds were established by the agreement, in which the BLM are required to request the review of Utah SHPO and the SCHP in certain situations. These include (obtained from BLM, 2008):

- Non-routine interstate and/or interagency projects or programs
- Undertakings that directly and severely impact National Historic Landmarks or National Register eligible properties of national significance
- Highly controversial undertakings, when council review is requested by the BLM, SHPO, a Native American tribe, a local government, or an applicant for a BLM authorization
- Undertakings impacting National Register eligible or listed properties
- Land exchanges, land sales, Recreation and Public Purposes Act (R&PP) leases, and transfers
- When BLM professional staff do not possess suitable regional experience or professional expertise and until performance is mutually acceptable to the BLM Deputy Preservation Officer and SHPO
- When BLM's professional cultural resources staff request to bring a certain project to the attention of the SHPO.

The BLM review process can be significantly consolidated for projects that do not affect historic properties through the Protocol Agreement. The subsequent steps are applied when determining whether or not an undertaking has no potential impact: (1) determine the area of potential effect (APE); (2) complete a Class I (literature) search and/or review other applicable records for historic properties/eligible historic properties within the APE; (3) inform the tribes or other entities that would have consulting party status of the proposed action and offer them the opportunity to identify traditional cultural and religious properties and/or other historic and potentially eligible properties; (4) communicate/consult with tribes and other entities that would have consulting party status through letter and phone calls to demonstrate a "good faith" effort by the BLM; and (5) carefully and thoroughly document the BLM's findings and communications/consultation (BLM, 2008). The BLM will decline the review of the SHPO in the following situations:

- No Potential to Affect determinations by qualified BLM staff
- No Historic Properties Affected; no sites present, determined by qualified BLM staff

- No Historic Properties Affected; no eligible sites present, determined by qualified BLM staff
- No Historic Properties Affected; eligible sites present, but not affected as defined by 36 CFR 800.4.

The field office is required to assess the impact to cultural resources before activities (e.g., vegetation treatments, land disposals, range improvements, or energy development) take place. This is done through the regulations of National Historic Preservation Act, within Title 36 of the Code of Federal Regulations, Part 800, and agreements among the BLM and the Utah State Historic Preservation Officer (BLM, 2008).

*13.8 Objectives*

The history of Wayne County is an irreplaceable part of our local heritage. By protecting evidence left behind by those that preceded us, we can preserve it for future generations. Wayne County's objective as to Cultural Resources is to strike a balance between preserving and protecting our natural and cultural resources and accommodating the varied requirements of our ever increasing and demanding population.

*13.9 Policy Statements*

1. Multiple use and sustained-yield management principles shall be applied in public land use and natural resource planning and management in Wayne County. This is how the citizens of Wayne County are best served. Multiple-use and sustained-yield management means that land owners and land management agencies should develop and implement management plans and make other resource-use decisions that support these principles.

2. Plan for and meet the needs of economic and community development while striking a balance between preserving and protecting our natural and cultural resources and accommodating the varied requirements of our ever demanding and increasing population.

3. Wayne County will consider "consulting party" status as it pertains to the NHPA prior to energy development, transportation, transmission lines and other development projects.

4. Wayne County will work with federal and state governments to identify impacts to cultural resources on publicly owned lands, and to minimize and mitigate damage to cultural resources affected by vandalism, looting, and development activities on public lands.

Chapter 14
# Wilderness and Related Special Designations

## *14.1 Scope*

Utah Code Section 17-27a-401 subsection (1) authorizes Wayne County to prepare a comprehensive and long-range general plan, and subsection (3) requires the general plan to contain a resource management plan ("RMP") for the public lands within the county. Subpart (b) (xxii) of subsection (3) requires the resource management plan to address the subject of wilderness. Closely related to this subject are the following additional special designations: national conservation areas (NCAs), wilderness study areas (WSAs), BLM wilderness reinventory areas, Forest Service inventoried roadless areas, citizen wilderness proposals, national monuments, non-WSA lands inventoried for alleged wilderness characteristics, areas of critical environmental concern (ACECs), and any other designation, classification categorization, withdrawal, or similar action that has the purpose or effect of eliminating, restricting, or reducing energy and mineral development, motorized travel, grazing, active vegetation management, or any other traditional multiple use on public lands.

Accordingly, this part of the resource management plan;

1. Establishes Wayne County's *findings* with respect to any prospective wilderness areas and additional special designations on public lands in Wayne County;

2. Establishes Wayne County's *objectives* with respect to prospective wilderness areas and additional special designations on public lands in Wayne County; and

3. Establishes Wayne County's planned *policies* for accomplishing those objectives.

## *14.2 Resource Findings*

In 1964, Congress passed the Wilderness Act establishing (1) a national system of lands to preserve a representative sample of ecosystems in their natural condition for the benefit of future generations, and (2) a process for reviewing other lands for their wilderness potential. The act originally applied only to national forests, national parks, and national wildlife refuges. With the passage of FLPMA in 1976, Congress directed BLM to also inventory, study, and recommend which public lands under its administration should be designated wilderness.

In 1979, the BLM began a wilderness inventory of 22 million acres of public land in Utah. The original inventory completed under then Interior Secretary James Watt documented less than 1 million acres. By 1986, following the inventory and public inventory process, and the settlement of appeals, the BLM designated 3.2 million acres in Utah as WSAs including 7 WSAs within or partially within Wayne County. A discussion of the current resource values and uses in each WSA, established in 1980 under the authority of Section 603(c) of FLPMA, can be found in

the *Utah BLM Statewide Wilderness Final Environmental Impact Statement* (BLM 1990b). Those values and resources described in the 1990 document have not changed significantly since that time, as documented in monthly WSA monitoring reports available in the Richfield Field Office (RFO). Although WSAs are, by definition, roadless, several of the WSAs in the RFO do include inventoried ways. During the 1979–1980 Utah Wilderness Inventory, it was necessary to divide routes used by motorized vehicles into "roads" and "ways." To be considered a road, 3 criteria had to be met: (1) constructed; (2) maintained by mechanical means; and (3) regular and continuous use. All other motorized routes were defined as ways, which could be left open to motorized travel as long as their use did not "impair" the suitability of the area for wilderness designation. Decisions on which ways will remain open and which will be closed will be made as part of the land use planning process (USDI/BLM 2008).

A re-inventory of wilderness characteristic lands was conducted under the direction of then Interior Secretary Bruce Babbitt in 1999. This re-inventory inventoried 3.1 million acres in Utah and resulted in 2.6 million acres with wilderness characteristics.

WSAs are established three different ways. 1) WSAs were identified by the wilderness review as required by Section 603 of FLPMA. 2) They may be identified during the land use planning process under Section 202 of FLPMA. 3) Finally, they may be established by Congress. Section 603(c) of the FLMPA requires that WSAs be managed in a manner that does not impair the suitability of such areas for preservation as wilderness. However, the Act also requires that mining, livestock grazing and mineral leasing (e.g., grandfathered uses) continue in the manner and degree as they were being conducted in 1976. Thus, to the extent that grazing was allowed in the wilderness prior to 1976, its use, specifically including allowing the same number of livestock as existed in 1976, should be continued. Grandfathered uses are protected and must be maintained in the same manner and degree as they were being conducted on October 21, 1976, even if they impair wilderness characteristics. *Rocky Mountain Oil and Gas Association v. Watt*, 696 F.2d 734, 749 (10th Cir. 1982). This requirement includes the authority to develop livestock related improvements. *Utah v. Andrus*, 486 F. Supp. 995 (D. Utah 1979) (quoting and adopting provisions of a solicitors' opinion dated Sept 5, 1978).

The vast majority of wilderness in the contiguous United States (93 percent) is found in western states (Regan, 2013). Since its creation in 1964, the National Wilderness Preservation System has grown from 54 areas (9.1 million acres) to 757 areas (109.5 million acres) in 2011.

The process of inventorying potential wilderness lands in Utah has been controversial since the beginning. With every rendition of inventory the approach, interpretations, and individuals doing the inventory work has changed. The results have always been more land with wilderness characteristics that could be designated wilderness. This moving target over the decades has allowed federal agencies to ignore the original intent of the Wilderness Act and designate lands containing roads of all types, seismic lines, mines, drill pads, animal watering facilities, and other man made disturbances. One method of ignoring the roadless criteria is to merely draw boundaries around them in a cherry stem fashion. This does not remove the road but

just allows ignoring them as if they didn't exist. Also, decades of locking up land allows natural rehabilitation of land scarring. This is in some areas hastened by agency closing of historic mines and reclaiming the sites. In essence they are trying to make wilderness out of land that was obviously not decades earlier. True wilderness cannot be made by drawing boundaries around roads and other disturbances or by making roads, fences, seismic lines or other man made features themselves boundaries. This practice does not make wilderness, it only allows those that advocate more wilderness, whether inside agencies or outside, to lockup more land to be treated as wilderness.

The BLM and Forest Service land use plans for public lands in Wayne County should produce planning documents consistent with Wayne County's resource management plan to the maximum extent consistent with federal law and FLPMA's purposes, and that reflect the following values: Preserve traditional multiple use and sustained yield management on the subject lands to:

- Achieve and maintain in perpetuity a high-level annual or regular periodic output of agricultural, mineral, and various other resources from the subject lands;
- Support valid existing transportation, mineral, and grazing privileges in the subject lands at the highest reasonably sustainable levels;
- Produce and maintain the desired vegetation for watersheds, timber, food, fiber, livestock forage, wildlife forage, and minerals that are necessary to meet present needs and future economic growth and community expansion in each county where the subject lands are situated without permanent impairment of the productivity of the land;
- Meet the recreational needs and the personal and business-related transportation needs of the citizens of each county where the subject lands are situated by providing access throughout each such county;
- Meet the needs of wildlife, provided that the respective forage needs of wildlife and livestock are balanced according to the provisions of Subsection 63J-4-401(6)(m);
- Meet the needs of community economic growth and development;
- Provide for the protection of existing water rights and the reasonable development of additional water rights; and
- Provide for reasonable and responsible development of electrical transmission and energy pipeline infrastructure on the subject lands.

The BLM and Forest Service:

- Should not designate, establish, manage, or treat any of the subject lands as an area with management prescriptions that parallel, duplicate, or resemble the management prescriptions established for wilderness areas or wilderness study areas, including the non-impairment standard applicable to WSAs or anything that parallels, duplicates, or resembles that non-impairment standard;

- Lack congressional authority to manage public lands, other than congressionally authorized WSAs and roadless areas, as if they are or may become wilderness;
- Lack authority to designate geographic areas as lands with wilderness characteristics or designate management prescriptions for such areas other than to use specific geographic-based tools and prescriptions expressly identified in their organic legislation;
- Lack authority to manage the subject lands in any manner other than to prevent unnecessary or undue degradation, unless the agencies use tools expressly identified in their organic legislation and do so pursuant to a duly adopted provision of a resource management plan adopted under the applicable provisions of their organic legislation;
- Should conduct wilderness characteristics inventories only in a manner that is closely coordinated with inventories for those characteristics conducted by state and local governments, and should reflect a consensus among those governmental agencies about the existence of wilderness characteristics, as follows:
    - Any inventory of wilderness characteristics should reflect all of the criteria identified in the Wilderness Act of 1964, including:
    - A size of 5,000 acres or more, containing no visible roads;
    - The presence of naturalness, the opportunity for primitive and unconfined recreation, and the opportunity for solitude;
    - Geographic areas found to contain the presence of naturalness must appear pristine to the average viewer, and not contain any of the implements, artifacts, or effects of human presence, including:
    - Visible roads, whether maintained or not; and
    - Human-made features such as vehicle bridges, fire breaks, fisheries, enhancement facilities, fire rings, historic mining and other properties, including tailings piles, commercial radio and communication repeater sites, fencing, spring developments, linear disturbances, stock ponds, visible drill pads, pipeline and transmission line rights-of-way, and other similar features.

Factors such as the following, though not necessarily conclusive, should weigh against a determination that a land area has the presence of naturalness:

- The area is or once was the subject of mining and drilling activities;
- Mineral and hard rock mining leases exist in the area;
- The area is in a grazing district with active grazing allotments and visible range improvements.

Geographic areas found to contain the presence of solitude should convey the sense of solitude within the entire geographic area identified, otherwise boundary adjustments should be performed.

Geographic areas found to contain the presence of an opportunity for primitive and unconfined recreation must find these features within the entire area and provide analysis about the effect of the number of visitors to the geographic area upon the presence of primitive or unconfined recreation, otherwise boundary adjustments should be performed.

In addition to the actions required by the review for roads pursuant to the definitions of roads contained in BLM Manual H 6301, or any similar authority, the BLM should, pursuant to its authority to inventory, identify and list all roads or routes identified as part of a local or state governmental transportation system, and consider those routes or roads as qualifying as roads within the definition of the Wilderness Act of 1964.

The BLM should adjust the boundaries for a geographic area to exclude areas that do not meet the criteria of lacking roads, lacking solitude, and lacking primitive and unconfined recreation and the boundaries should be redrawn to reflect an area that clearly meets the criteria above, and which does not employ minor adjustments to simply exclude small areas with human intrusions.

The boundaries of a proposed geographic area containing lands with wilderness characteristics should not be drawn around roads, rights-of-way, and intrusions.

Lands located between individual human impacts that do not meet the requirements for lands with wilderness characteristics should be excluded.

Even if the BLM or Forest Service were to properly inventory an area for the presence of wilderness characteristics, those agencies still lack authority to make or alter project level decisions to avoid impairment of any wilderness characteristics without express congressional authority to do so.

Managing public lands for “wilderness characteristics” or "roadless characteristics" without express congressional authorization circumvents the statutory wilderness process and is inconsistent with the multiple-use and sustained-yield management standard that applies to all Bureau of Land Management and U.S. Forest Service lands that are not congressionally authorized wilderness areas, wilderness study areas or Forest Service roadless areas.

Wayne County's ongoing policy is to oppose wilderness proposals and proposals to de-facto manage land as wilderness or for wilderness characteristics unless it is clearly demonstrated for any proposal that:

- The duly adopted transportation plans of the state and county or counties within the planning area are fully and completely incorporated into the baseline inventory of information from which plan provisions are derived;
- Valid state or local roads and rights-of-way are recognized and not impaired in any way by the recommendations;

- The development of mineral resources by underground mining is not affected by the recommendations;
- The need for additional administrative or public roads necessary for the full use of the various multiple-uses, including recreation, mineral exploration and development, forest health activities, and grazing operations is not unduly affected by the recommendations;
- Analysis and full disclosure are made concerning the balance of multiple-use management in the proposed areas, and the analysis compares the full benefit of multiple-use management to the recreational, forest health, and economic needs of the state and the counties to the benefits of the requirements of wilderness management; and
- The conclusions of all studies related to the requirement to examine the wilderness option are submitted to the state for review and action by the legislature and governor, and the results, in support of or in opposition to, are included in any planning documents or other proposals that are forwarded to the United States Congress.

Wayne County's policy is to oppose any additional evaluation of national forest service lands as “roadless” or “unroaded” beyond the forest service’s second roadless area review evaluation of the 1980's and opposes efforts by agencies to specially manage those areas in a way that:

- Closes or declassifies existing roads unless multiple side-by-side roads exist running to the same destination and the State and Wayne County consent to close or declassify the extra roads;
- Permanently bars travel on existing roads;
- Excludes or diminishes traditional multiple-use activities, including grazing and proper forest harvesting;
- Interferes with the enjoyment and use of valid, existing rights, including water rights, local transportation plan rights, R.S. 2477 rights, grazing allotment rights, and mineral leasing rights; or
- Prohibits development of additional roads reasonably necessary to pursue traditional multiple-use activities.

The American Antiquities Act of 1906, 16 U.S.C. 431-433, is abused and violated both in the spirit and letter of that law, when it is used to designate large areas of land as national monuments. To quote the Antiquities Act itself, the designation is authorized only for *"historic landmarks, historic structures, and other objects for historic or scientific interest."* The limits of any land parcels reserved as part of those designations "*in all cases shall be confined to the smallest area compatible with proper care and management of the objects to be protected."* Wayne County finds that this language clearly restricts the President's lawful authority to declare and designate as national monuments only specific and pinpointed historic *landmarks*, and only specific and pinpointed historic and prehistoric *structures*, and only specific and pinpointed other

specific *objects* of historic or scientific interest.

From this language Wayne County finds that national monument designations under the Antiquities Act are not large area designations such as are involved with wilderness, NCA, ACEC and like designations. Rather, Antiquities Act national monuments are by law designations of minimal isolated locations with such additional land parcels, like parking lots, viewing turnouts, buffer areas for fencing and other security, as are minimally necessary to facilitate the public's viewing and appreciation of such items without destroying them, etc. Though not in Wayne County, it is observed that the size and extent of the Grand Staircase Escalante National Monument in Kane and Garfield Counties is a prime example of a blatant abuse and violation of the Antiquities Act. That designation entirely ignored the Act's language about landmarks, structures and objects.

*14.2.1 Wilderness Study Area (WSA) Designations in Wayne County*

Without Wayne County's involvement or approval, the U.S. Secretary of Interior acting pursuant to Section 603 of FLPMA, recommended the following areas of BLM lands in Wayne County to be designated as so-called Wilderness Study Areas (WSAs) until such time as Congress should enact legislation either to designate the WSAs as wilderness or to release the WSAs back to regular multiple use sustained yield management:

**Fremont Gorge WSA**. 2,540 acres. The 1976-1991 BLM Utah Wilderness Review conducted pursuant to Section 603 of FLPMA, recommended to Congress that zero acres in the Fremont Gorge WSA be designated as wilderness. Wayne County agrees. Zero acres of the Fremont Gorge WSA should be designated as wilderness. All 2,540 acres of the Fremont Gorge WSA should be released by Congress from WSA status and go back into multiple use – sustained yield FLPMA management.

**Mount Ellen-Blue Hills WSA**. Total acres: 81,726 acres, most of which is situated in Wayne County with a small fraction thereof situated in Garfield County. The 1976-1991 BLM Utah Wilderness Review conducted pursuant to Section 603 of FLPMA, recommended to Congress that 65,804 acres in the Mount Ellen-Blue Hills WSA be designated as Wilderness and 15,550 acres be returned to multiple use - sustained yield management under FLPMA. Wayne County's plan for this area is that all 81,726 acres should be released and returned to multiple use – sustained yield management.

**Bull Mountain WSA**. Total acres in Garfield and Wayne Counties: 13,620 acres. Part or all of 7 sections, located in Township 30 S Range 11 E, are in Wayne County. The 1976-1991 BLM Utah Wilderness Review conducted pursuant to Section 603 of FLPMA, recommended to Congress that 11,800 acres in the Bull Mountain WSA be designated as Wilderness (this includes all of the Wayne County portion) and 1,338 acres (all in Garfield County) be returned to multiple use – sustained yield management under FLPMA. Wayne County disagrees as far as the Wayne County portion of the Bull Mountain WSA is concerned. All of the Wayne County portion of the Bull Mountain WSA acreage in part or all of the seven sections in Wayne County in Township 30 S. Range 11 E. should

be released by Congress from WSA status and return the entire WSA back to multiple use – sustained yield FLPMA management.

**Dirty Devil WSA**. 61,000 acres. The 1976-199 BLM Utah Wilderness Review conducted pursuant to Section 603 of FLPMA, recommended to Congress that all acres in the Dirty Devil WSA be designated as wilderness. Wayne County disagrees. All 61,000 acres of the Dirty Devil WSA should be released from WSA status and return the entire WSA back to multiple use – sustained yield FLPMA management.

**Horseshoe Canyon North WSA**. Total acres in Emery County and Wayne County: 13,502 acres. A little over 3 sections of the WSA, located in Township 27 S Range 16 E, are in Wayne County. The 1976-1991 BLM Utah Wilderness Review conducted pursuant to Section 603 of FLPMA, recommended to Congress that all acres in the Horseshoe Canyon North WSA, including the little over 3 sections of that WSA situated in Wayne County, be designated as wilderness. Wayne County disagrees as far as the Wayne County portion of the WSA is concerned. The little more than 3 sections of the Horseshoe Canyon North WSA that are situated in Wayne County should be released from WSA status and return the entire WSA back to multiple use – sustained yield FLPMA management.

**Horseshoe Canyon South WSA**. 38,800 acres. The 1976-1991 BLM Utah Wilderness Review conducted pursuant to Section 603 of FLPMA, recommended to Congress that 36,000 acres in the Horseshoe Canyon South WSA be designated as wilderness, and that the remaining be released from WSA status back into standard multiple use – sustained yield management under FLPMA. Wayne County disagrees. All of the Horseshoe Canyon South WSA should be released from WSA status and put back into multiple use – sustained yield management under FLPMA.

**French Spring – Happy Canyon WSA**. 25,000 acres. The 1976-1991 BLM Utah Wilderness Review conducted pursuant to Section 603 of FLPMA, recommended to Congress that 11,000 acres in the French Spring – Happy Canyon WSA should be designated as wilderness and the remaining acres be released from WSA status back into standard multiple use – sustained yield management under FLPMA. Wayne County disagrees, because most of this WSA sits in an area known for its tar sands energy resources. Zero acres of the French Spring – Happy Canyon WSA should be designated by Congress as wilderness. Congress should release all 25,000 acres from WSA status and return it to standard multiple use – sustained yield management under FLPMA.

(See Map Appendix for BLM WSA's)

*14.2.2 WSA's Do Not Meet Standards and Criteria for Wilderness Designation*

None of the foregoing WSA areas on public lands in Wayne County completely meets the standards and criteria for wilderness designation, and the County prefers that all should be released by Congress back into regular multiple use and sustained yield management.

**Fremont Gorge WSA**. 2,540 acres. This WSA does not meet the standards and criteria for wilderness designation for the following reasons.

- It is not 5,000 acres in size.
- Contains visible roads, trails, and ways that have been used for years.
- There is a large active stone quarry about a half mile west of the western boundary which is noisy and dusty and prevents the primitive experience. It is also visible from high points inside the WSA. There is also a community stone quarry just west of the WSA boundary.
- It lies between two major state highways and the traffic noise can be heard in much of the WSA area preventing the primitive experience.
- There exists several cleared farming areas along Sulfur Creek just on the edge of this WSA.
- Is an active grazing area.

This WSA is nothing more than an attempt to expand the boundaries of Capitol Reef National Park. Wayne County is opposed to any further expansion of the Park.

*Looking Southeast across stone quarry and Fremont Gorge WSA*

*Community stone quarry just off the southwest corner of Fremont Gorge WSA*

**Mount Ellen-Blue Hills WSA.** Total acres: 81,726 acres, most of which is situated in Wayne County with a small fraction thereof situated in Garfield County. This WSA does not meet the standards and criteria for wilderness designation for the following reasons.

- Because virtually all of this WSA is situated in the Henry Mountains Coal Field. Designating this area as wilderness would permanently bar development of the coal resources in the Henry Mountains Coal Field. Zero acres of the Mount Ellen-Blue Hills WSA should be designated as wilderness. Congress should release all 81,726 acres from WSA status and return the entire WSA back to multiple use – sustained yield FLPMA management.

**Bull Mountain WSA**. . Total acres in Garfield and Wayne Counties: 13,620 acres. Part or all of 7 sections, located in Township 30 S Range 11 E, are in Wayne County. This WSA does not meet the standards and criteria for wilderness designation for the following reasons.

- It is bounded on the west by the saw mill basin road one of the major maintained roads in the area giving access to the Henry Mountains. Since this WSA is so narrow the existence of such an important road eliminates any chance for a primitive experience in this WSA.

**Dirty Devil WSA**. 61,000 acres. This WSA does not meet the standards and criteria for wilderness designation for the following reasons.

- Has intrusions vehicle routes both roads and substantially noticeable ways. There is a very visible road that parallels the Dirty Devil River for miles easily observed from Burr

Point and continues into the WSA. Angel Point road goes well into the WSA with a parking lot at the trail head. The road past Silver Tip Spring goes into the WSA north of Middle Fork Canyon ending at the Robbers Roost Overlook. A road between Pasture Canyon and White Roost Canyon goes into the WSA clear to the cliff overlooking the river. There are also several visible seismic lines in this area.

- Part of the Tar Sand Triangle lies under this WSA. This is the largest tar sand deposit in the United States (DOE, 1984).

**Horseshoe Canyon North WSA**. Total acres in Emery County and Wayne County: 20,500 acres. A little over 3 sections of the WSA, located in Township 27 S Range 16 E, are in Wayne County. This WSA does not meet the standards and criteria for wilderness designation for the following reasons.

- The natural character in many areas is impacted by vehicle routes, livestock facilities, and mineral exploration. Congress should release all the Wayne County portion of this from WSA status and return the entire WSA back to multiple use – sustained yield FLPMA management.

**Horseshoe Canyon South WSA**. 38,800 acres. This WSA does not meet the standards and criteria for wilderness designation for the following reasons.

- The natural character in many areas is impacted by vehicle routes, livestock facilities, and mineral exploration. Congress should release all of this from WSA status and return the entire WSA back to multiple use – sustained yield FLPMA management.

**French Spring – Happy Canyon WSA**. 25,000 acres. This WSA does not meet the standards and criteria for wilderness designation for the following reasons.

- The natural character in many areas is impacted by vehicle routes, livestock facilities, and mineral exploration. Also, most of this WSA sits in an area known for its tar sands energy resources. The Tar Sand Triangle is the largest known tar sand deposit in the U.S. (DOE, 1984).

### *14.2.3 BLM Wilderness Reinventory Areas in Wayne County*

Wilderness Reinventories were conducted during 1996-1999 and again in 2002. Wilderness characteristic areas were added both times. Without Wayne County's involvement or approval, the BLM designated the following areas of BLM lands in Wayne County as so-called Wilderness Reinventory Areas and purported to manage some or all of those areas as wilderness:

**Table 2-2: Acreage Summary (from BLM 2002)**

| **Inventory Areas** | **Wilderness Character *1999 Utah Wilderness Inventory*** | **Wilderness Character Forming the Acres Planning Baseline for the Richfield RMP Revision** |
|---|---|---|
| Bull Mountain | 3,800 | 3,821 |
| Bullfrog Creek | 29,900 | 29,660 |
| Dirty Devil-French Spring | 94,400 | 111,179 |
| Dogwater Creek | 3,500 | 3,466 |
| Fiddler Butte | 16,720 1 | 9,731 |
| Fremont Gorge | 14,600 | 14,941 |
| Horseshoe Canyon South | 19,800 | 20,665 |
| Jones Bench | 2,837* | 2,813 |
| Labyrinth Canyon** | 12,211 | 12,416 |
| Limestone Cliffs*** | 23,800 | 23,934 |
| Little Rockies | 24,200 | 23,288 |
| Long Canyon | 16,500 | 17,109 |
| Mount Ellen-Blue Hills | 32,600 | 48,283 |
| Mount Hillers | 1,290 | 1,057 |
| Mount Pennell | 61,880 | 59,662 |
| Muddy Creek-Crack Cany** | 63,230 | 61,896 |
| Notom Bench | 5,500 | 6,392 |
| Ragged Mountain | 25,900 | 25,487 |
| Red Desert | 31,800 | 30,939 |
| Wild Horse Mesa** | 26,748 | 35,035 |
| **Total** | 511,216 | 551,774 |

* The acreage figure for Jones Bench was incorrectly calculated in the *1999 Utah Wilderness Inventory*

** Acreage figures apply only to the lands administered by the Richfield Field Office

*** Includes 1,060 acres in Emery County/Price Field Office, which is included in this Richfield Revision Document

### *14.2.4 BLM Wilderness Reinventory Areas Do Not Meet Standards and Criteria for Wilderness*

None of the foregoing so-called wilderness reinventory areas on public lands in Wayne County meets the standards and criteria for wilderness designation, and all should be released by Congress back into regular multiple use and sustained yield management.

**Bull Mountain**

Uranium exploration has occurred on the Morrison Formation within the inventory unit. Four wheel drive vehicles continue to use uranium roads and a 100 acre area above Butler Wash used by mining has lost its natural character.

**Dirty Devil-French Spring**

These re-inventoried areas or units contain extensive seismic survey lines, water developments, extensive evidence of oil and gas exploration, numerous ways, roads, drill pads, and mining disturbances. Several roads have been cherry stemmed out which is ridiculous, it does not simply make the roads disappear.

**Fremont Gorge**

This inventory unit contains many locations that are not natural appearing upon the landscape including the ridge tops and bench lands of Miner's Mountain which contain extensive impacts from firewood cutting, Christmas tree harvesting, chaining areas, seismic survey lines, mineral exploration roads and adits, and numerous fence lines. The area just east of the intersection of highways 12 and 24 contain old dump sites, a commercial quarrying operation and dispersed camping and recreation sites. On Beas Lewis Flat exists Torrey Allotment Reservoir No. 2 and associated road. Also, roads go to the confluence of Carcass Creek and the Fremont River and to and beyond Wide Hollow Reservoir. These roads and intrusions cannot simply be cherry stemmed out of existence.

**Horseshoe Canyon South**

The area in Unit 1 was initially found not to be natural in character during the 1996-1999 wilderness inventory because the inventory utilized a fence line as the boundary of wilderness character. The area west of Horseshoe Canyon in Unit 1 contains seismograph lines and range developments, and historic four wheel drive roads shown on USGS maps. A livestock reservoir Buffalo Pond and road leading to it are in the Unit 1 whether cherry stemmed out or not. The same goes for the road extending from the Hans Flat Road to a corral. Unit 1 also contains a two track fence access road and an old reroute section of County road, range developments, line shacks, troughs, tanks, and debris associated with Granary Spring in the upper Bluejohn Canyon area. This is all unnatural appearing (BLM, 1999).

Units 3 and 4 contain various scattered vehicle roads and tracks and grazing facilities. Although the roads and tracks are unmaintained they are used to access livestock developments, recreational lands, and viewpoints are important and visible. A road leading to a drill hole also exists in Unit 4 and cannot be made to disappear by cherry stemming it away.

**Labyrinth Canyon**

Portions of inventory units 1 and 4 are within Wayne County. Old seismic lines, drill holes, abandoned air strips and roads make these areas not have natural character. Cherry stemming a road out of unit 4 does not make it go away.

**Mount Ellen-Blue Hills**

Most of inventory units 1, 2 and 3 are within Wayne County. They contain scattered roads, livestock reservoirs, water pipelines, watering troughs, other range developments, and mining which results in loss of naturalness.

**Muddy Creek-Crack Canyon**

The portions of the inventory units located in Wayne County are north of Caineville and contain roads, mines, wells, mineral exploration, heavy OHV use, and range developments. An important and well used and maintained road along north Caineville Reef goes right through the area and the Salt Wash road also goes into it. Cherry stemming these roads do not make them go away. The area is also bordered on the west by the Cathedral Valley road. All of these intrusions, uses, and developments lead to a lack of naturalness for the inventory units located in Wayne County.

**Notom Bench**

The portion of this inventory unit in Wayne County is about 3 miles long and a little over a mile wide located along the Notom Road which is now paved. It is sandwiched between Captol Reef National Park on the west and the Notom Road on the east. It contains roads used to access park lands and dispersed camping sites. Several old mineral exploration roads and seismic lines. Treating this area as wilderness is just an attempt to expand the Park boundary. It does not have naturalness or solitude nor does it allow for primitive recreation.

**Red Desert**

This inventory area is all in Wayne County and sandwiched in between the Cathedral Valley Scenic Backway and Caneville Wash roads. These are well used and maintained roads. There are also several other roads in the area used by grazers, campers, and others. Some of them are access to Andrew Water, North Hartnet Pond, Guys Pond 1 & 2, Willow Seep, Seismo Spring and Meeks Pond. The roads just north and west of Caneville leading to water wells cannot be cherry stemmed out of existence. This area does not have naturalness.

**Wild Horse Mesa**

The portion of this inventory area in Wayne County is located north and west of the town of Hanksville. The area contains many roads, seismic lines, and coal mining disturbances. The north west portion of Middle Wild Horse Mesa contains extensive seismic lines and old roads. South both east and west of Goblin Valley State Park are roads leading to dispersed campsites, range developments, fences, stock ponds, and a dump. The road leading south into the area west of Goblin Valley cannot be cherry stemmed out of existence. The area does not have naturalness.

*14.2.5 Forest Service Roadless Area Designations in Wayne County*

Almost 160,080 acres or 10.14 % of land in Wayne County is under Department of Agriculture management administered by the Dixie and Fishlake National Forests. In March 2006 the Teasdale Ranger District of the Dixie National Forest and the Loa Ranger District of the Fishlake National Forest were consolidated into the Fremont Ranger District under the Fishlake administration.

The Forest Management Act of 1897 provided management provisions and defined the

purpose of the Forest Reserves (the precursor of National Forests) as forest protection, watershed protection and a source of timber supply for the nation. For approximately 20 years, the Forest Service has been moving away from the original mandate and has focused primarily on natural features, wildlife and recreation. This has resulted in negative economic and social impacts to the residents of Wayne County and increased burdens for public services. The Forests Service's inability to provide consistent timber sales has resulted in closures of local sawmills, devastating bug infestations, loss of natural resource based industries, and associated social and economic detrimental effects.

At the present time, Forests in Wayne County are generally classified as roaded natural or semi-primitive non-motorized with most areas having been noticeably impacted by man. Few areas qualify as primitive setting. Visitor use surveys conducted by the Dixie National Forest document more than 80 % of visitors are engaged in motorized activities and a minimal percentage are using the forests primarily for primitive recreation.

The Forest Service in the 1970s and early 1980s pursuant to the Federal Wilderness Act and the National Forest Management Act conducted a first evaluation and then by court order a second evaluation, each known as a "Roadless Area Review Evaluation" *(RARE I and RARE II),* to identify alleged "roadless" areas deemed suitable for proposal to Congress for wilderness designation and management. In the 1990s the Forest Service without any Congressional authority and without Wayne County's involvement or approval, purported to conduct yet another roadless area inventory by which they purported to identify additional acreage, above and beyond what was identified in the RARE II inventory, as so-called "roadless" and suitable for Congressional wilderness designation. Then by administrative fiat (*the so-called Clinton Forest Service Roadless Rule)* the Forest Service imposed management restrictions on these so-called inventoried "roadless" areas that took away traditional access and use and seriously impaired the multiple use and sustained yield protections and standards that once applied to these areas, even though Congress has yet to designate any of these areas as wilderness in Wayne County.

In 1972 an inventory was completed on the Dixie National Forest which identified 48 areas of 5,000 acres or more as roadless and undeveloped. The Boulder Mountain Planning Unit contains nine of these areas totaling 165,000 acres. A portion of 3 of these areas is located in Wayne County (USFS, 1975). These are Boulder Mountain, Boulder Top, and Happy Valley. The purpose of this study was to identify areas that might merit further study for wilderness designation (USFS, 1975). Two meetings were held in 1972, in which the public was invited to express its views as to management of these areas. None of these nine areas were selected by the Chief of the Forest Service as candidate study areas as published in the "Roadless and Undeveloped Area" final environmental statement of January 1973.

A portion of 3 inventoried roadless and undeveloped areas on the Fishlake Forest are in Wayne County. These are Thousand Lake Mtn., Lookout Peak, and Wayne Wonderland. The most recent inventory of undeveloped areas used in the analysis for a OHV designation project (Draper, 2006) incorporating the updated Region 4 Roadless Area Inventory and Evaluation

Protocol contains approximately 30 percent more total acres than that determined during RARE II.

The term "undeveloped area" (or roadless) refers to an area usually of at least 5,000 acres, without developed and maintained roads, and substantially natural that was initially inventoried as part of either the National Roadless Area Review Evaluation (RARE II) process or the Land and Resource Management Planning Process (36 CFR 219.17(a)(1)).

The Utah (1984) Wilderness Act released National Forest System lands within the Fishlake National Forest to other multiple use management until the next planning cycle. At the end of this period, and during forest plan revision (presently under way), this inventory of roadless or undeveloped areas and the need for additional wilderness is again being evaluated using the updated Roadless Area Inventory and Evaluation Protocol for Region 4 of the Forest Service.

The existing Fishlake Land and Resource Management Plan (1986) does not provide desired conditions, goals, or standards and guidelines to specifically address or maintain roadless or undeveloped character. However, some of the lands initially inventoried as roadless during the RARE II process were allocated in way coincident to generally maintaining potential wilderness characteristics, i.e., Research Natural Areas, critical wildlife winter range or habitat, and semi-primitive non-motorized areas. Other lands also inventoried earlier as roadless have been managed in ways that allowed road construction and other development such as timber harvest. The most recent inventory of undeveloped areas used in the analysis for this project incorporating the updated Region 4 Roadless Area Inventory and Evaluation Protocol contains approximately 30 percent more total acres than that determined during RARE II.

Overall, people and their associated activities have affected or influenced much of the project area (Fishlake National Forest). Particularly outside of the undeveloped area boundaries it is difficult to find areas of land that have not been impacted based on the measures described in this section. Generally, undeveloped character is largely the sense of remoteness and isolation a person may feel by the absence of people and their associated activities. Indicators of this condition are demonstrated by the presence or absence of motorized network densities (roads and trails), past and current harvest activities, improvements associated with cattle and sheep allotments and their use, and developed and dispersed recreation sites.

Presently there are 2,526 total miles of motorized roads and 1,014 miles of motorized trails distributed across the project area. There are 49 total miles of existing motorized roads and 482 miles of motorized trails contained within associated undeveloped areas. Additionally, relative to motorized use, a total of 502,386 acres or 54 percent of the undeveloped (roadless) areas in the project area is presently open to cross-country motorized travel (Draper, 2006).

Forest Roads typically have a 14 foot wide driving surface with an additional 4 feet of clearing of vegetation on each side of the roadway (cut and fill slopes are often associated with

these roads). Motorized trails are generally less than 5 feet in width, and minor cut and fill slopes may be associated with them.

Past and present timber sales are located in portions of the project area, however, no evidence (to the casual visitor) of timber sales exist or are currently planned in the designated undeveloped areas as determined during the undeveloped area evaluation conducted as part of forest present plan revision.

Although located within the area of the route designation project, there are no developed recreation sites within designated undeveloped areas. These developed areas are highly used from approximately July 1 through October. Dispersed recreation sites serving a variety of uses exist throughout the project area, with higher concentrations near water and along access routes. The limited winter recreational use of these areas is primarily snowmobiling. There are numerous livestock grazing allotments contained in the project area. These allotments encompass the entire forest except for a portion of the northwest face of Monroe Mountain within the Signal Peak Undeveloped Area. As also determined during the undeveloped area evaluation, major improvements are primarily limited to areas outside the undeveloped areas. However there are troughs, fences, water ponds, etc., located within these areas (Draper, 2006).

*14.2.6 Forest Service Roadless Areas Do Not Meet the Standards and Criteria for Wilderness*

None of the foregoing so-called Forest Service roadless areas on public lands in Wayne County meets the standards and criteria for wilderness designation. Therefore all should be abolished as so-called "roadless areas," all restrictions under any so-called "roadless rule " should be terminated, and those areas should go back into regular multiple use and sustained yield management.

**Boulder Mountain**

This area is not and has not been roadless for decades. The Boulder Mountain Area most of which has been logged, also contains several old sawmill sites, special use dams and ditches, watershed terracing, and range fences. Some of the old logging roads and jeep roads have been closed beginning in the 1970's.

**Boulder Top**

The Boulder Top Area in the early 1920's experienced a bark beetle epidemic that killed the majority of spruce on the top. Salvage logging took place over most of the top from the middle 1940's to the 1970's. Stumps and old sawmill sites are still evident. Many of the old roads have been closed, but are still evident. The top is grazed by cattle and sheep in the summer. The evidence of man's activities are prominent (USFS, 1975).

**Happy Valley**

One hundred and sixty acres of private land in Happy Valley lie adjacent to the area. The area lies below the Boulder-Grover road from Lion Mountain area south to Pleasant Creek.

Several hundred acres of pinyon-juniper covered benches have been chained and planted with grass. Most of the commercial ponderosa pine has been harvested. Man's activities such as old sawmill sites, corrals, fences, and power and telephone lines are very evident (USFS, 1975).

**Thousand Lake Mtn.**

This area is not and has not been roadless for decades. Generally, undeveloped character or roadless is largely the sense of remoteness and isolation a person may feel by the absence of people and their associated activities (Draper, 2006). Increase in OHV use, dispersed camping, snowmobiling, ongoing grazing, past and present timbering, hunting and general increase in use of the forest lands by people have eliminated the roadless or undeveloped character of the these lands.

**Lookout Peak**

This area is not and has not been roadless for decades. Generally, undeveloped character or roadless is largely the sense of remoteness and isolation a person may feel by the absence of people and their associated activities (Draper, 2006). Increase in OHV use, dispersed camping, snowmobiling, ongoing grazing, past and present timbering, hunting and general increase in use of the forest lands by people have eliminated the roadless or undeveloped character of the these lands.

**Wayne Wonderland**

This area is not and has not been roadless for decades. Generally, undeveloped character or roadless is largely the sense of remoteness and isolation a person may feel by the absence of people and their associated activities (Draper, 2006). Increase in OHV use, dispersed camping, snowmobiling, ongoing grazing, past and present timbering, hunting and general increase in use of the forest lands by people have eliminated the roadless or undeveloped character of the these lands.

*14.2.7 Areas of Critical Environmental Concern (ACECs)*
*Standards and Criteria*

1. Federal law mandates that the BLM "shall manage the public lands under principles of multiple use and sustained yield, in accordance with land use plans ..., except where a tract of land has been dedicated to specific uses according to any other provisions of law it shall be managed in accordance with such law." 43 U.S.C. 1732(a). *See also* 43 U.S.C. 1701(a)(7) ("goals and objectives be established by law as guidelines for public land use planning, and that management be on the basis of multiple use and sustained yield unless otherwise specified by law") and 43 U.S.C. 1712(c)(1) (BLM in developing and revising land use plans "shall - use and observe the principles of multiple use and sustained yield set forth in this and other applicable law").

2. While the BLM must give priority to the designation and protection of areas of ACECs when developing and revising land use plans, 43 U.S.C. 1712(c)(1), *still Federal law gives the BLM no authority to designate an ACEC* unless it meets the definitional requirements of the Federal Land Policy Management Act of 1976 (FLPMA), 43 U.S.C. 1702(a), which states: The term "areas of critical environmental concern" means areas within the public lands where special management attention is required (when such areas are developed or used or where no development is required) to protect and prevent irreparable damage to important historic, cultural, or scenic values fish and wildlife resources or other natural systems or processes, or to protect life and safety from natural hazards.

3. The strict statutory criteria for specialized ACEC designation must be read in light of the fact that FLPMA already generally mandates protection of all public lands against "unnecessary or undue degradation:" In managing the public lands the Secretary [BLM] shall, by regulation or otherwise, take any action necessary to prevent unnecessary or undue degradation of the lands. 43 U.S.C. 1732(b).

4. FLPMA's "unnecessary and undue degradation" general protection standard, coupled with FLPMA's "sustained yield" general management standard, mean that an ACEC special designation is valid *only* "where special management attention is required" *above and beyond* application of those general standards. In short the area must *require* special management attention above and beyond the FLPMA general standards of protection mentioned above.

5. ACEC special designation is appropriate only if required to prevent not just any damage to relevant values, but damage that is "*irreparable.*" 43 U.S.C. 1702(a). Moreover the values to be protected must be *"important,"* on a regional scale, meaning they possess "qualities of more than just local significance and worth, consequence, meaning, distinctiveness, or cause for concern." 43 CFR 1610.7-2(a)(2).

6. Moreover ACEC special designation is appropriate in areas only "when such areas are developed or used or where no development is required." 43 U.S.C. 1702(a).

7. In support of the foregoing Federal statutory requirements, the State of Utah has adopted the following policy in Utah State Code regarding ACECs. Pursuant to Utah Code 63J-4-401(8)(c), the State does not support a proposed ACEC designation unless it is clearly demonstrated that:

a. All the definitional requirements of 43 U.S.C. 1702 are met;
b. The proposed designation and management prescriptions are limited in geographic size and scope to the minimum necessary to specifically protect and prevent irreparable damage to the relevant and important values identified;
c. The proposed area is either already developed or used or no development is required;
d. The proposed area contains relevant and important historic, cultural or scenic values, fish or wildlife resources, or natural processes which are unique or substantially significant on a regional basis;
e. The regionally important values, resources or processes have been analyzed for *irreparable damage* and the analysis describes the rationale for any special management attention required to protect, or prevent irreparable damage to the values, resources, processes, or hazards;
f. The proposed designation is consistent with the plans and policies of the state and of the county where the proposed designation is located;
g. The proposed designation will not be applied redundantly over existing protections provided by other state and federal laws, and will not be applied where not needed in addition to those specified by the other state and federal laws;
h. The difference between special management attention required for an ACEC and normal multiple-use management has been identified and justified, and any determination of irreparable damage has been analyzed and justified for short and long-term horizons; and
i. The proposed designation:
   - is not a substitute for a wilderness suitability recommendation;
   - is not a substitute for managing non-WSA areas inventoried for wilderness characteristics; and
   - it is not an excuse or justification to apply de facto wilderness management standards.

8. Without Wayne County's involvement or approval, ACEC public nominations in the Wayne County portion of the BLM Richfield Field Office have been made:

The Approved RMP designates one ACEC totaling 2,200 acres in Wayne County (Map 28):

• North Caineville Mesa (2,200 acres)

Relict vegetation was specifically identified as relevant and important in the ACEC. Management prescriptions for the ACEC include allowing no uses that will cause irreparable damage to the relevant and important values; and reducing surface-disturbing activities within those areas, thereby protecting vegetation and relevant and important values; restrictions will include closing the areas to OHV use; managing the areas as open to leasing subject to major constraints (NSO), making the areas unavailable for livestock grazing; and acquiring inholdings.

9. For the ACEC set forth above, Wayne County finds that it is unnecessary because it covers a flat topped mesa which has a nearly vertical ledge circumscribing its top. It is not accessible by OHV, is not grazed, and only visited by very able and fit hikers. It does not require a special designation.

*14.3 Objectives*

Wayne County's objectives regarding wilderness and related special designations on public lands in Wayne County are as follows:

*14.3.1 Wilderness Study Areas*

All existing WSAs in Wayne County, whether set forth in the above findings or otherwise, should be permanently discontinued and released by Congress back into regular multiple use and sustained yield management.

*14.3.2 BLM Wilderness Reinventory Areas*

All existing BLM Wilderness Reinventory Areas in Wayne County, whether set forth in the above findings or otherwise, should be permanently discontinued and placed by the BLM back into regular multiple use and sustained yield management with no special designations or restrictions.

*14.3.3 Forest Service Inventoried Roadless Area Designations*

All existing Forest Service Inventoried Roadless Area Designations in Wayne County, whether set forth in the above findings or otherwise, should be permanently discontinued and placed by the Forest Service back into regular multiple use and sustained yield management, with no special designations or restrictions.

*14.3.4 ACECs*

All pending nominated ACECs on public lands in Wayne County, whether set forth in the above findings or otherwise, should be permanently rejected and declined by the BLM, with no special ACEC designations.

*14.3.5 Special Recreation Management Areas (SRMA)*

All SRMA’s in Wayne County are an unnecessary administrative designation and should be revoked. The BLM has made five of these recent designations that are all or partly in Wayne

County totaling nearly 600,000 acres. This is about three times the amount of Park Service land in the county.

*14.4 General Policy Statements Concerning Wilderness and other Special Designations*

1. Wayne County supports and adopts as its own policy and guidelines all of the statutory and regulatory restrictions set forth in the above findings regarding wilderness, national conservation areas, BLM wilderness study areas, BLM wilderness reinventory areas, Forest Service inventoried roadless areas, citizens proposed wilderness areas, national monuments, non-WSA BLM lands with alleged wilderness characteristics, and areas of critical environmental concern (ACEC) designations.

2. It is Wayne County's policy and practice to oppose and terminate all designations and classifications referenced in the preceding paragraph, together with any other designation or classification that has the purpose or effect of reducing traditional multiple use and sustained yield and access to energy and mineral development, motorized travel, grazing, timber and other active vegetation management, or any other traditional multiple use on public lands, except as specified in the objectives above.

3. Under Wayne County's policies, standards and criteria, no showing has been made that any of the existing and proposed designations and classifications referenced above, except as specified in the objectives above, possess qualifying resource values or that such designation is necessary to protect against irreparable damage to such values.

4. These policies, standards and criteria are formally adopted by Wayne County through the adoption of this part of the County's Resource Management Plan (RMP). Wayne County's plan is to actively defend and pursue the objectives specified through all available means, including means of government-to-government coordination and cooperating agency relationships, lobbying administrative agencies and Congress, and resorting to court action when necessary, until all of the above objectives are realized.

*14.5 Policy Statements*

1. Land use classifications should not establish *de facto* wilderness areas outside of the already-identified WSAs.

2. Support the continuation or reinstatement of prior existing lease rights in WSAs as required by FLPMA.

3. Support the continued installment or maintenance of rangeland improvements in Wilderness Study Areas (e.g., fences and water developments) in order to maintain the prior existing rights in the area.

4. Remove or release all WSAs from consideration.

5. Special land use designations should only be used when they are consistent with surrounding management and contribute to the sound policy of multiple use, economic viability, and community stability.

6. No change in access to water developments, fences, or other infrastructure located within designated wilderness study areas, ACECs, roadless, and other special status areas should be allowed.

7. Accurately represent lack of wilderness characteristic areas by not mapping around existing, known infrastructure such as roads, seismic lines, or water tanks.

8. Support and encourage accurate, on-the-ground mapping of roads, fences, rangeland improvements and any other anthropogenic influence in lands under consideration for Lands with Wilderness Characteristics (LWCs) or WSA designations.

9. Remove duplicative unnecessary land use classifications which only amount to overlaying protections.

10. Encourage historical access and uses on lands already designated as ACEC or LWC. Ensure pre-FLMPA (October 21, 1976) valid existing rights are grandfathered and appropriately recognized and allowed in WSAs.

11. Support the inclusion by the BLM and USFS of County mapping efforts to document roads and range improvements in the County.

12. No actual or *de facto* buffer zones should be established around any special designation areas, parks or other government managed areas.

13. Viewsheds should not impact the use of private property.

14. Viewshed boundary designations should not adversely impact the multiple uses of BLM and USFS lands.

Chapter 15
# Wild and Scenic Rivers

## *15.1 Resource Findings*

No river segment in Wayne County should be considered eligible or suitable for inclusion in the National Wild and Scenic Rivers System, 16 U.S.C. Sec. 1271 et seq.

The 2008 BLM RMPs recommendation of a segment of the Fremont River and the Dirty Devil River Complex as suitable for inclusion in the Wild and Scenic Rivers System (NWSRS) is incorrect and bad policy, because the proposed inclusion is not outstandingly remarkable on a regional scale, and because the proposed inclusion threatens to adversely affect water rights and agricultural interests in Wayne County. A Wild and Scenic River designation threatens to interfere with the use and enjoyment of water rights on the Fremont and other river corridors upstream and downstream. In addition, it threatens to interfere with the ability of water rights holders upstream and downstream to use impoundment and other means to control the volume of flow in order to manage water resources throughout the growing season. Lastly, it threatens to imply a federal water right where none exists.

Inclusion in the Wild and Scenic Rivers System is also unnecessary because they are already protected by being in a WSA. Both the Fremont River Gorge and Dirty Devil River Complex are located within an existing WSA and were originally considered ineligible by the BLM. After further consideration and commenting the BLM changed their recommendation to include the Dirty Devil River and several of its tributaries. These segments are all within the Dirty Devil River WSA and are all mostly intermittent with flows that vary seasonally and from year to year and are completely dry in most upper segments.

Failure to include these river segments in the NWSRS would not necessarily diminish the values for which the river was determined eligible. The outstandingly remarkable values within these segments could be effectively managed through land use prescriptions contained in the Richfield PRMP/FEIS should congressional designation of wilderness not occur.

*15.2 Objective*

No river segment in Wayne County should be considered eligible or suitable for inclusion in the National Wild and Scenic Rivers System.

*15.3 Policy Statements*

1. No river segment in Wayne County shall be considered eligible or suitable for inclusion in the National Wild and Scenic Rivers System. Proposed inclusion threatens to adversely affect water rights and agricultural interests in Wayne County.

2. Prevent any designation of Wild and Scenic River inclusion within Wayne County.

3. No wild and scenic river designation in Wayne County should interfere in any way with established water rights.

4. Water rights holders should be free to build impoundments along any segment of a river despite any wild and scenic river designation.

Chapter 16
# Threatened, Endangered and Sensitive Species

## *16.1 Resource Findings*

The Endangered Species Act (ESA) was passed in response to concerns over possible extinction of species of plants or animals as a result of human actions. This is a laudable goal and one the County could support. However, the act has been interpreted by regulatory agencies and the courts in ways that have served to eliminate, reduce, delay or prevent all manner of sound land management practices at a tremendous expense to the taxpayers and local communities. More often than not, these actions do not have any appreciable or detectable impact on the survival of the subject species, and may even be detrimental to their survival. The Act has become an instrument used by special interests, including some government entities, to thwart sound land management. The County believes that both the Act and the regulations must be revised to put them on a solid scientific and realistic basis.

The term "endangered species" is defined by the Endangered Species Act of 1973 (ESA) as a species which is in danger of extinction throughout all, or a significant portion of its range (Utah Division of Wildlife Resources, 1998). Likewise, a "threatened species" is considered any species which is likely to become an endangered species in the near future.

As habitat and environmental conditions continually change, the list of federally protected endangered or threatened species must be regularly updated by the U.S. Fish and Wildlife Service, and by the Utah Division of Wildlife Resources. The loss of habitat and habitat disturbance is the primary reason for listing a species as endangered or threatened, which in turn results in population declines. Other causes of population declines can be attributed to deaths triggered by the collection of a species by humans, or deaths as a result of pests and predators, natural diseases, the introduction of non-native (exotic) species, over harvest, pollution and pesticides (Utah Division of Wildlife Resources, 1998).

The social economic impacts of Endangered Species Act with its associated Special Status Species are complex because the ESA set a value of an endangered species as infinite, as species are to be saved at all cost and in all locations. No single piece of legislation has had a greater negative impact on rural counties in the West. Environmental groups have used the ESA and the courts to stop commercial logging and new mining and reduce grazing throughout the western U.S. including Wayne County.

The costs and benefits of ESA and Special Status Species are not quantified in this report. Agencies and others are always concerned about the costs expect for enforcing ESA. The benefits of saving a particular specie is more difficult to identify at the county level. The costs of enforcing ESA are disproportionally carried by the local communities and counties while the benefits disproportionally go to distant beneficiaries. If the focus of the ESA was changed from population protection to habitat restoration and development the long run viability of the specie

would be greatly improved. A specie prospers in a healthy habitat and declines in a deteriorating habitat. Habitat restoration and development shall be based on scientific research completed under similar geography and climate conditions and not on other dissimilar studies, untested theories, beliefs or hopes.

### *16.1.1 The Federal Endangered Species Act of 1973 (ESA)*

The U.S. Fish and Wildlife Service administers the ESA program, which aims to recover endangered and threatened species through conserving and protecting vulnerable species and the natural environments (ecosystems) which they rely upon (Utah Division of Wildlife Resources, 1998). Through this process, the U.S. Fish and Wildlife Service identifies which species may become susceptible to extinction due to natural causes, or human activities disturbing their habitats. Species that are significantly low in numbers, or have limited distributions may be listed as endangered or threatened, however a review of all the available information about the species must include: (1) the potential for threatened destruction, modifications, or curtailment of its habitat or range; (2) over-utilization for commercial, recreational, scientific, or educational purposes; (3) disease or predation; (4) inadequacy of existing regulatory mechanisms; and (5) other natural or manmade factors affecting its continued existence (Utah Division of Wildlife Resources, 1998).

In addition, the U.S. Fish and Wildlife Service must identify if existing or potential threats are present to both the species and its habitat. If threats are identified, the federal agency then publishes a notice of review for the species considered a candidate for listing in order to obtain more biological information and input to then determine a final decision (Utah Division of Wildlife Resources, 1998). Once this comprehensive review of scientific and public comment is completed, a species can be added to the list. Removal of species from the list may occur if further research demonstrates that the species is no longer in danger of extinction.

### *16.1.2 Legal Implications*

The plants and animals listed under the ESA are legally protected and "no one can kill, harm, harass, possess, or remove protected animals from the wild (Utah Division of Wildlife Resources, 1998). Additionally, it is illegal to possess, take or transport the parts or products of listed animals and plants without first obtaining special permission by the U.S. Fish and Wildlife Service. The ESA contains several sections which pertain to state conservation efforts, specifically sections 6, 7, 9, and 10.

#### *Section 6*

Section 6 describes the state's responsibilities while completing provisions of the ESA. This section requires the Secretary of the Interior to cooperate with states before obtaining any land or water in order to conserve endangered or threatened species. Cooperative agreements among states and the federal government are permitted for the purposes of administering programs and managing areas set aside for listed species. Under this section, the federal

government is authorized to allocate funding to the states in order to complete these mandates (Utah Division of Wildlife Resources, 1998).

*Section 7*

All actions completed by federal agencies, including regulatory agencies (e.g., Environmental Protection Agency (EPA)) are required under section 7 to not interfere, or threaten the existence of endangered or threatened species (Utah Division of Wildlife Resources, 1998). Federal agency involvement on lands owned by the federal government, as well as state and private lands must consider both the impacts to the endangered or threatened species, and its critical habitat. Federal involvement typically consists of any activities or programs authorized, funded, or carried out in whole or in part by a federal agency. Additionally, the U.S. Fish and Wildlife Service management must be contacted if landowners perform management activities that have federal involvement or affect a listed species. Cost-share activities, or activities that are associated with a federal program must follow the same procedures. In cases where a listed species occupies private land, the U.S. Fish and Wildlife Service will offer alternative management options (Utah Division of Wildlife Resources, 1998).

*Section 9*

Section 9 prohibits "taking" of any endangered or threatened species, which applies to both private and public actions and activities. The term "take" refers to actions that harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in such behavior (Utah Division of Wildlife Resources, 1998). In addition, "taking" also includes actions that willfully harm an endangered or threatened animal, as well as habitat destruction or degradation that inhibits breeding, feeding or seeking shelter.

*Section 10*

Under section 10, non-federal entities are allowed to apply for permission to incidentally take a listed species during lawful activities. In order for an application to be considered for an incidental take permit, the applicant must provide an approved Habitat Conservation Plan, or HCP. An HCP is similar to an environmental assessment, which is completed on private land and involves a public notice and review process (Utah Division of Wildlife Resources, 1998). The contents of a HCP must explain how the proposed activity will affect a species and the actions or activities being implemented to decrease these impacts. The review process for an incidental take permit under a HCP may take over a year to be approved.

*16.1.3 Critical Habitat*

Areas of habitat that are essential to the continued existence of an endangered or threatened species are designated as critical habitat. Critical habitat is defined as a specific area where the physical and biological features are present that are: (1) essential to the conservation of a species, and (2) requires special management considerations or protection (Utah Division of Wildlife Resources, 1998). This includes habitat which is occupied by a species, as well as areas outside of the species range if the area is important for survival and recovery.

Federal, state or private lands may contain areas of critical habitat. The ESA does not restrict activities on state or private lands unless the activities directly harm the listed species or federal involvement occurs (discussed in section 7). The U.S. Fish and Wildlife Service is required to evaluate the economic impacts of designating an area as critical habitat. Certain areas may be excluded from this designation if the economic benefits outweigh the benefits of conserving the area. Although, areas may not be excluded if the outcome is extinction of the species (Utah Division of Wildlife Resources, 1998).

*16.1.4 A list of Threatened, Endangered and Sensitive Species within Wayne County:*

**Common Name, Scientific Name, Status**
Ute Ladies'-tresses *Spiranthes diluvialis* T
Barneby Reed-mustard *Schoenocrambe barnebyi* E
Winkler Pincushion Cactus *Pediocactus winkleri* T
Wright Fishhook Cactus *Sclerocactus wrightiae* E
Last Chance Townsendia *Townsendia aprica* T
San Rafael Cactus *Pediocactus despainii* E
Humpback Chub *Gila cypha* E
Razorback Sucker *Xyrauchen texanus* E
Bonytail *Gila elegans* E
Colorado Pikeminnow *Ptychocheilus lucius* E
Greater Sage-grouse *Centrocercus urophasianus* C
Mexican Spotted Owl *Strix occidentalis lucida* T
Yellow-billed Cuckoo *Coccyzus americanus* C
Utah Prairie-dog *Cynomys parvidens* T

*Mexican Spotted Owl*

The Mexican spotted owl was listed as an endangered species on March 16, 1993 due to habitat loss associated with human disturbance, and past and current timber harvest activity (BLM, 2008). Mexican spotted owls prefer habitat that contains steep slopes and canyons with rocky cliffs throughout the southern Rocky Mountains in Colorado, and the Colorado Plateau in central and southern Utah, as well as in Arizona and New Mexico (BLM, 2008).

Designated critical habitat for nesting and foraging was established in 2001 and later revised in 2004 to include specific characteristics for canyon and forest habitats. The Mexican spotted owls that reside in the RFO planning area are located in the Colorado Plateau Recovery Unit (BLM, 2008).

*Western Yellow-billed Cuckoo*

Population status and trends of the western yellow-billed cuckoo within the RFO planning area are unknown, although calls from a pair were observed during the breeding season

of 1983 (BLM, 2008). More recent breeding has been documented outside of the planning area. Threats to this species include disturbance to riparian corridors from invasive species, livestock use and development (UDWR, 2005a; NatureServe, 2004).

Of the migrant birds arriving in Utah, the western yellow-billed cuckoo is one of the latest migrants to settle and breed in the area. The birds arrive in late May, or early June, and breed in late June to July within riparian habitats of dense cottonwood and willow vegetation (below 33 feet in height). Nesting locations can be found in these riparian lowland habitats of dense subcanopy and shrub layered vegetation, typically in areas of abundant food, and within 33 feet of water (BLM, 2008).

*Utah Prairie Dog*

The Utah prairie dog was listed as an endangered species on June 4, 1973. Subsequent recovery efforts made it possible to downlist the species to threatened on May 29, 1984 (BLM, 2008). In the past, the Utah prairie dog was found in southwestern and central Utah within prairie habitats of continuous grassland vegetation. Today, the Utah prairie dog can be found in colonies consisting of mounds and holes in Iron County at elevations 5,400 feet, and in Wayne County at elevations of 9,500 feet. Three recovery areas exist for the Utah prairie dog and include: The Paunsaugunt Plateau, and the Awapa Plateau (both of which are located in the RFO), and the West Desert.

Rapid population declines, and even the disappearance of whole colonies can occur in response to habitat loss (from development and drought), poisoning, and the plague, or other diseases (BLM, 2008). In 1991, a recovery plan was established for the Utah prairie dog and was later followed by an Interim Conservation Strategy in 1997 (IM-UT 2002-040). The species is currently being managed through a translocation program under ESA authority through the U.S. Fish and Wildlife Service (BLM, 2008). Critical habitat for the Utah prairie dog has not been designated in Utah.

*Colorado River Fish*

Four species of fish endemic to the Colorado River Basin are listed as endangered under the ESA and include: The Bonytail Chub, Colorado Pikeminnow, Humpback Chub, and the Razorback Sucker (BLM, 2008). Historical habitat for these species was found on the Dirty Devil River, although modern changes to the flow of the river has made it unsuitable habitat. Because of this, none of these fish species or their designated critical habitat are present in the RFO planning area. Although, these endangered fish are relevant to Wayne County management practices due to the presence of the fish, and their critical habitat located downstream from the RFO (BLM, 2008). In addition, tributaries of the Colorado River Basin cross into the RFO planning area.

*Wright Fishhook Cactus*

Wright fishhook cactus is a federally listed endangered plant that grows in Emery, Sevier and Wayne Counties (BLM, 2008). The plant is found in areas with well-developed biological

soil crusts, typically in soils that range from clays, to sandy silts, to fine sands (Clark and Clark, 1999). Wright fishhook cactus grows at elevations of 4,280 to 6,440 feet in salt desert shrub and broadly scattered pinyon-juniper woodlands (Utah Native Plant Society, 2004).

*Barneby Reed-Mustard*

Barneby reed-mustard is a federally listed endangered plant that occurs only in Emery and Wayne Counties (BLM, 2008). The species grows in red clay soils enrich with selenium and gypsum that are superimposed with sandstone talus from the Moenkopi and Chinle geologic formations (USFWS, 1994a). Barneby reed-mustard grows at elevations ranging from 4,788 to 6,510 feet in sparsely vegetated sites of mixed desert shrub and pinyon-juniper woodlands (Clark and Clark, 1999).

*San Rafael Cactus*

San Rafael cactus is a federally listed endangered plant that is found in Emery and Wayne Counties (BLM, 2008). The plant grows in fine-textured soils that are rich in calcium from the Carmel Formation and the Sinbad Member of the Moenkopi Formation. The species can be found in pinyon-juniper woodlands and mixed desert shrub-grassland communities on benches, hilltops and gentle slopes at elevations of 4,756 to 6,822 feet (Utah Native Plant Society, 2004; USFWS, 1995c).

*Winkler Cactus*

Winkler cactus is a federally listed endangered plant that occurs in Emery and Wayne Counties (BLM, 2008). The plant can be identified by the crown of the stem, which is positioned at or very near ground level (Utah Rare Plant Society, 2004). The cactus is found on benches, hilltops and gentle slopes in fine-textured soils originating from the Dakota Formation, and the Brushy Basin Member of the Morrison Formation (Utah Native Plant Society, 2004). The Winkler cactus grows on barren, open sites in salt desert shrub communities at elevations ranging from 4,888 to 6,592 feet (USFWS, 1995c).

*Last Chance Townsendia*

Last Chance townsendia is a federally listed endangered plant that grows in Emery, Sevier and Wayne Counties (BLM, 2008). The species grows in clay, clay-silt, or gravely soils derived from the Mancos Formation. These soils are typically covered with biological soil crusts. Last Chance townsendia is found at elevations ranging from 5,531 to 8,396 feet in salt desert shrub and pinyon-juniper woodlands (USFWS, 1985).

*Ute Ladies' Tresses*

Ute ladies' tresses was listed as threatened on January 17, 1992 and is currently listed as threatened across its entire range of Colorado, Idaho, Montana, Nebraska, Utah, Washington and Wyoming (USFWS, 1992). The threatened plant is a perennial herb of the orchid family with a flowering stem (8-20 inches tall) that rises from a basal rosette of grass-like leaves (BLM, 2008). The ivory-colored flowers form a spike at the top of the stem and typically bloom in late July through August.

Ute ladies' tresses grows in sandy or loamy soils mixed with gravels and can be found in moist to extremely wet meadows, along streams, in abandoned stream meanders, and near springs, seeps, and lake shores (BLM, 2008). In Utah, the species occurs at elevations of 4,301 to 7,001 feet. Populations of the plant have been documented near Utah Lake in northern Utah (2 populations), and in the Colorado River drainage in eastern Utah (6 populations) (USFWS, 1992). The species can also be found in Garfield and Wayne Counties, specifically on lands managed by the Fish Lake National Forest and the Capitol Reef National Park. Very few locations exist in the RFO planning area that could support suitable habitat conditions for the Ute ladies' tresses. Threats to the species include loss of habitat from land fragmentation caused by suburban and urban development, as well as management of water and stream systems for municipal, agricultural and recreation uses (USFWS, 1995b).

*Greater sage-grouse (Centrocercus urophasianus)*

This species inhabits sagebrush plains, foothills, and mountain valleys. Sagebrush is the predominant plant of quality habitat. The largest population of Greater sage-grouse in Utah is found in Wayne County. The species is also distributed throughout Sanpete, Sevier, Piute, and Garfield counties in areas dominated by sagebrush. An understory of grasses and forbs, as well as wet meadow areas, are essential elements of sage-grouse habitat, especially for survival of young chicks. The Greater sage-grouse is an herbivore, and insectivore and is associated with both tall and short sagebrush types. Sage-grouse use the same breeding grounds, or "leks," over several consecutive breeding seasons. Greater sage-grouse are ground nesters and are susceptible to predators and human disturbance. Greater sage-grouse rely entirely on sagebrush for their winter diet and are found in sagebrush habitats during the winter months where the sagebrush remains above the level of the snow, or on windswept ridges where sagebrush is available as both forage and cover. Additional threats to the species include habitat loss, invasive plants, and conversion of large areas from shrub steppe to nonnative grasslands (UDWR 2005a, NatureServe 2004). Several research projects targeting the Greater sage-grouse population in the Parker Mountain area indicate that the population has increased from about 600 birds in 1997 to about 6,000 birds in 2007 (Guttery et al. 2007). The vitality of the Parker Mountain sage-grouse population is evidenced by the fact that this population is one of the few areas in Utah where sufficient numbers of breeding individuals are present to allow a limited annual harvest. (UDWR 2007).

*16.2 Objective*

To work cooperatively with U.S. Fish & Wildlife Service, Utah Division of Wildlife Resources and other state and federal agencies in the management of Threatened, Endangered and Sensitive Species to best reduce negative impacts to the County and its citizens from the management of these species and their habitats.

*16.3 Policy Statements*

*16.3.1 (For Sensitive Species/Species of Concern)*

1. Support creating a unified (cross-agency) definition for "species of concern".

2. Support the use of credible data or information BLM and USFS can use on which to base a decision that a species should be designated a "species of concern" or "sensitive" beyond criteria provided in their respective handbooks.

3. Oppose the management of non-ESA listed species (e.g., species of concern, species of special concern, or any other non-ESA designation) as though they are protected by the rules of the Endangered Species Act.

4. Support delisting of any species with insufficient, unsupported, or questionable data not meeting the minimum criteria for its listing or protection level.

5. Management plans should not be created for single species and should be consistent with multiple use mandates.

6. The County should be involved in the species of concern and sensitive species review process, including in the determination of what should be included as a species of concern or sensitive species.

7. The County should be involved in the establishment of recovery objectives for species of concern (e.g. Greater Sage-grouse) and the development of management actions to move species off the list of concern. Once recovery objectives have been reached, support moving species off of the list of concern.

*16.3.2 (For Threatened or Endangered Species)*

1. Support the participation of the County as cooperating or coordinating agency in federal rulemaking, including any NEPA analysis related to the designation of critical habitat and development of recovery plans.

2. Require the full analysis of the economic impacts on all proposed critical habitat designations or species management plans, and the inclusion of the County in this analysis.

3. Support cooperation between private landowners and federal agencies to reduce the risk of listing under ESA.

4. Oppose the introduction or reintroduction of listed species into Wayne County, unless the County deems no harm will come to the County, or the County consents to terms and conditions or standard operating criteria that avoid disrupting current land uses.

5. Should an agreement not be reached on the potential introduction or reintroduction, and the species is introduced anyway, support it being introduced only as a non-essential or experimental population.

6. Support participation as cooperating or coordinating agencies in all decisions and proposed actions which affect the County regarding sensitive, threatened or endangered species; the reintroduction or introduction of listed species; habitat conservation plans; conservation agreements or plans; and candidate conservation agreements.

7. Support the development of recovery plans within 18 months of listing that includes clear objectives to reach for delisting to occur; for species already listed support the development of a recovery plan within 18 months of adoption of this document.

8. Require the petition of the immediate delisting of a species when population or recovery plan objectives have been met.

9. Support the development of local solutions (e.g., habitat management plans, conservation plans or conservation plans with assurances) to keep a species from being listed under ESA or as species of concern or species of special concern.

10. Include consideration of management activities on federal lands as part of the local solutions to keep a species from being listed under ESA or as a species of concern or species of special concern.

11. Require the avoidance of single-species management in all planning efforts and require multiple uses of lands and resources as required by federal law.

12. Require the data used in any listing decision meet the minimum criteria defined in (Bureau of Land Management 2006) Data Administration and Management and FS Handbooks FSH 1909.12, (United States Forest Service 2013) Supporting Land Management Planning.

13. Support control of predators and zoonotic and vector borne diseases negatively impacting special status, candidate, or listed species.

14. Support involvement of the County in discussions and decisions regarding any proposed introduction of experimental populations.

15. Oppose management actions increasing the population of any listed species in the County without an approved recovery plan. Without a recovery plan, management cannot focus on increasing the species population or habitat, and cannot move closer to a potential delisting.

16. Support returning to existing approved management document(s) when litigation is pursued (e.g., revert to the State or local plan rather than the BLM/USFS Sage-Grouse Land Use Plan Amendment).

17. Require the continued use of existing valid permits and lease rights on lands with listed species wherever possible.

18. At a minimum, provide copies of legal descriptions showing the exact boundaries of all designated critical habitat to local government entities in Wayne County.

19. Oppose the designation of potential habitat as critical habitat unless quantifiable data showing when and how features necessary for species recovery will be achieved on the property.

20. Require completion of exclusion analysis for all lands within Wayne County.

Chapter 17
# Law Enforcement

## *17.1 Resource Findings*

Wayne County believes that law enforcement is a local responsibility other than in the special circumstances involving some interstate or international offenses. They do not believe that land management agencies should have law enforcement responsibility. Local law enforcement on federal lands should be the responsibility of county law enforcement agencies on federal land and all other land ownerships within the county.

The Sheriff's Office has deputies who enforce a wide range of laws in the prevention, detection, and investigation of crimes affecting Wayne County. These crimes include theft and vandalism; traffic violations; hazardous materials dumping; cultivation, manufacture, smuggling, and use of illegal drugs; off-highway vehicle use; alcohol related crimes; arson; and domestic disputes to name a few. Because of the great distance between some towns in the county, multiple distant responses can be a serious problem.

Wayne County's powers as a political subdivision of the State of Utah derive from the United States and Utah Constitutions, the Utah Code, the common law, and Wayne County ordinances and resolutions.

The State of Utah, of which Wayne County is a part, has general powers of jurisdiction unless expressly assigned to the government of the United States in the United States Constitution.

The government of the United States, on the other hand, has only those powers expressly delegated to it in the United States Constitution, as expressly exercised by the Congress of the United States.

Planning and zoning authority for all lands within its borders is a prerogative of Wayne County as expressed through its duly appointed planning and zoning commission and elected board of county commissioners.

Law enforcement authority for all lands within its borders is a prerogative of Wayne County as expressed through its duly elected Sheriff and duly hired and appointed and contracted deputy law enforcement agents.

Law enforcement officials and other officials of federal land management agencies such as the BLM and the US Forest Service, have no authority, right or permission to enforce state and local criminal and civil laws except as authorized by and consistent with the Federal Assimilative Crimes Act, 18 U.S.C. § 7(3).

The Federal Assimilative Crimes Act permits federal officers to enforce state and local laws by reference (assimilation) only on federal lands that are under either exclusive U.S. jurisdiction or concurrent U.S/State jurisdiction.

On federal lands under mere federal proprietary jurisdiction, which is virtually all BLM and Forest Service lands in Utah, federal agents may not rely on the Federal Assimilative Crimes Act as a basis to enforce state or local laws.

In Wayne County, all BLM and Forest Service lands are mere proprietary jurisdiction lands, not concurrent or exclusive jurisdiction lands. Therefore, federal agents are NOT permitted by the Federal Assimilative Crimes Act to enforce state and local laws on those lands.

*17.2 Objectives:*

It is the objective of the Sheriff's Office is to protect the lives, property, and rights of all people, to maintain order, and to enforce the law. This objective is achieved through the efforts of experienced and well trained officers and staff of the Wayne County Sheriff's Office who strive to improve and maintain the quality of life enjoyed in the County and make it a safe place to live, work, and visit.

It is Wayne County's objectives as to law enforcement to maintain current staffing levels and seek reasonable compensation for law enforcement services provided on USFS and BLM lands as required under Federal Land Policy Management Act (FLPMA). The county prefers not to have federal law enforcement officers patrolling USFS and BLM lands and instead encourages federal land management agencies to fund additional county sheriff office personnel to patrol these lands. The county also prefers that offenders on these lands go to the local and state courts instead of going straight to a federal magistrate.

*17.3 Policy Statements*

1. Wayne County law enforcement personnel provide many law enforcement services on BLM administered land without compensation. BLM administered lands comprise 56 % of the land in Wayne County. Wayne County will continue to actively seek reasonable compensation for law enforcement services provided on BLM lands as required under Federal Land Policy Management Act (FLPMA). Compensation can be provided through agreements or memorandums of understanding (MOU's) with the BLM.

2. Wayne County law enforcement personnel provide many law enforcement services on USFS administered land without compensation. USFS administered lands comprise 10.14 % of the land in Wayne County. Wayne County will continue to actively seek reasonable compensation for law enforcement services provided on USFS lands as required or allowable under Federal law. Compensation can be provided through agreements or memorandums of understanding (MOU's) with the USFS.

3. Wayne County believes that the county Sheriff is the principal law enforcement authority in the county and prefers not to have federal land management rangers patrolling and performing arrests within in the county. Any made arrests in the county, with the exception of some interstate and international crimes, should be made and or coordinated by the Sheriff. This includes Utah Division of Wildlife Resources arrests.

4. Wayne County believes that anyone arrested within the county deserves a quick local trial and sentencing unless there are circumstances which make it impossible or inappropriate. Especially Wayne County residents deserve a trial before a jury of their peers.

5. It is the policy of Wayne County, in the interest of the health, safety and welfare of its citizens, to not recognize any attempt by a federal official to try to enforce state or local criminal or civil laws on any lands in the County, including any BLM and Forest Service lands in Wayne County, and to declare that all criminal and civil state and local laws shall be enforced in Wayne County only by the Sheriff and Board Of County Commissioners. This applies to all land within the boundaries of Wayne County, including federal lands whether mandated for disposal or not, and whether such duty for disposal has been fulfilled or not.

6. It is the policy of Wayne County that the right of the County Sheriff to exclusively and primarily exercise all law enforcement powers to police and enforce all state and local criminal and civil laws upon any lands within Wayne County, federally owned or otherwise, shall be held inviolate. Any such attempted exercise of law enforcement powers by an official of a federal land management agency is not recognized by Wayne County, and shall be deemed an imminent threat to the health, safety and welfare of the citizens of Wayne County, unless properly exercised under an exception codified under Utah Code 53-13-101.1 through 106.10. 1

7. It is the policy of Wayne County that any official of any federal land management agency who is situated within the County who intends to exercise any law enforcement powers of any kind against any person or entity which may result in the deprivation of property or personal liberty, regardless of whether the action may take place on federal lands or otherwise, and any such official not already within Wayne County who intends to enter into the County for such purpose, shall first declare his presence and intended action to the Sheriff of Wayne County and seek permission from the Sheriff to pursue such intended action.

8. It is the policy of Wayne County to continue to support any and all actions to legally relieve the Federal Government of ownership, control and jurisdiction over public lands in Wayne County, and demand the Federal Government dispose and convey all right, title and interest thereto to the State of Utah. This transfer of land to the State will resolve the law enforcement jurisdiction issues stated above.

Chapter 18
# Air Quality

## *18.1 Resource Findings*

This section outlines the existing condition and management of air quality in the County. Air quality is impacted by several resources and potential resource uses. Visibility, air quality standards, and sources of pollution will be addressed in this section. This section will provide decision makers with a better understanding of the air quality in Wayne County and how air resources could be impacted from land use decisions. This section also identifies direction and information that serves as a baseline for consistency and coordination with Wayne County's plan. This section contains the latest and best data available as of May, 2016.

The Utah Division of Air Quality is responsible for regulating and monitoring air quality in Utah, except where local regulations mandate more stringent standards. Measurements are typically taken only in urban areas where ambient pollution levels are expected to be the highest and where data is required to assess attainment status. No air quality monitoring stations are located in or near Wayne County. The closest monitoring station is a recently developed site in Hurricane, Utah. Even in areas where air quality data is collected, the variability of site specific conditions creates uncertainty, subjectivity and generalizations regarding air quality over larger areas. Air quality can be impacted by precipitation, wind, temperature, topography along with a host of biogenic and human influenced factors.

The Utah Division of Air Quality creates and maintains a triennial Statewide Emissions Inventory Report disclosing total emissions for particulate matter 10 micrometers or less in diameter (PM10), particulate matter 2.5 micrometers or less in diameter (PM2.5), Sulfur Oxides (SOx), Nitrogen Oxides (NOx), Volatile Organic Compounds (VOC), and Carbon Monoxide (CO).

The existing air quality in the County is typical of undeveloped regions in the western United States. Ambient pollutant levels are usually near or below measurable limits. Regional concentrations of SO2, PM10, and nitrogen oxides (NOx) are generally well below the National Ambient Air Quality Standards (NAAQS); and air quality in Wayne County is most significantly impacted by regional drift from federal lands. No major air pollution sources or polluted airsheds have been identified in Wayne County.

The greatest sources of pollutant emissions in Wayne County are biogenic sources, prescribed fire and native fugitive dust from federal lands. Locations vulnerable to decreasing air quality include the immediate operation area associated with prescribed fire and surface disturbing activities that have not been properly re-vegetated. Area sources, small mobile sources, stationary sources, and on-road mobile sources contribute a relatively small component of the total emissions.

Atmospheric visibility is generally quite good. Visual-range estimated measurements made by the NPS and BLM and disclosed in the Richfield RMP show a mean visual range of 125 to 175 miles. The mean annual visual range is about 150 miles; however, visual ranges can vary extremely from 0.25 to more than 300 miles during the year. The good visibility is the result of low regional SO2, and ambient suspended particulate concentrations.

The County is designated as either attainment or unclassified with respect to National Ambient Air Quality Standards for all criteria pollutants. Most of Wayne County and the surrounding area has been designated as a Prevention of Significant Deterioration (PSD), Class II Airshed. This classification permits moderate deterioration that normally accompanies well-controlled growth. Two mandatory Class I designated areas are also located in Wayne County these are the two national parks, Capitol Reef and Canyon Lands. Class I areas are those in which practically any air quality deterioration would be considered significant.

The social economic impacts of air quality are complex because the monetary costs of pollution control are easily calculated but the benefits are not easily calculated. The reason is the benefits take place over a much longer time period and over a large diverse population of beneficiaries that are difficult to identify.

*18.1.1 Existing Management*

Private lands are managed under the Utah Division of Air Quality's program for Ambient Air Quality Standards. No areas in the County exceed acceptable limits. Federal agencies and their authorized activities are also managed to maintain air quality within the thresholds established by the State of Utah Ambient Air Quality Standards and to ensure that those activities continue to: a) keep the area as attainment, b) meet PSD Class II standards, and c) protect any Class I airshed. Prescribed burns, fugitive dust and biogenic VOCs generated on federal lands significantly impact air quality in Wayne County. The BLM and the Forest Service recently adopted sage grouse planning amendments that increase sagebrush, the largest single contributor to VOC's in the County. Table 2.2.2 depicts National and Utah Ambient Air Quality Standards.

Table 2.2.2. National and Utah Ambient Air Quality Standards

| Pollutant | Standard Value* | Standard Type |
|---|---|---|
| **Carbon Monoxide (CO)** | | |
| 8-hour Average [a] | 9 ppm (10 mg/m3) | Primary |
| 1-hour Average [a] | 35 ppm (40 mg/m3) | Primary |
| **Nitrogen Dioxide (NO2)** | | |
| Annual Arithmetic Mean | 0.053 ppm (100 µg/m3) | Primary & Secondary |
| **Ozone (O3)** | | |
| 1-hour Average [b] | 0.12 ppm (235 µg/m3) | Primary & Secondary |
| 8-hour Average** | 0.08 ppm (157 µg/m3) | Primary & Secondary |
| **Lead (Pb)** | | |
| Quarterly Average | 1.5 µg/m3 | Primary & Secondary |
| **Particulate Matter (PM 10) Particles with diameters of 10 micrometers or less** | | |
| Annual Arithmetic Mean | 50 µg/m3 | Primary & Secondary |
| 24-hour Average [c] | 150 µg/m3 | Primary & Secondary |
| **Particulate Matter (PM 2.5) Particles with diameters of 2.5 micrometers or less** | | |
| Annual Arithmetic Mean** | 15 µg/m3 | Primary & Secondary |
| 24-hour Average** | 65 µg/m3 | Primary & Secondary |
| **Sulfur Dioxide (SO2)** | | |
| Annual Arithmetic Mean | 0.03 ppm (80 µg/m3) | Primary |
| 24-hour Average [a] | 0.14 ppm (365 µg/m3) | Primary |
| 3-hour Average [a] | 0.50 ppm (1300 µg/m3) | Secondary |
| * Parenthetical value is an approximately equivalent concentration | | |
| ** The ozone 8-hour standard and the PM 2.5 standards are included for information only. | | |
| A −Maximum concentration not to exceed more than once per year<br>B−Expected number of exceedance days shall not be more than one per year (3 year average) as determined by Appendix H of 40 CFR Part 50.<br>C−Expected number of exceedance days shall not be more than one per year (3 year average) as determined by Appendix H of 40 CFR Part 50. | | |

Source: 40 CFR Part 50, July 2000

The prevention of significant deterioration of air quality applies to Wayne County and other areas of the State designated as attainment or unclassifiable for particulate matter ($PM_{10}$), sulfur dioxide ($SO_2$), and nitrogen dioxide ($NO_2$). Significant deterioration is defined in terms of a system of area classifications and permissible concentration increases called increments. The maximum allowable increases in concentrations in Class I, Class II, and Class III areas are those

increments specified in Utah Air Conservation Rule R307-405-4. In Class I areas, which are the most highly protected areas, only small increases in predicted $PM_{10}$, $SO_2$, and $NO_2$ concentrations are permitted. In Class II areas, larger concentration increases would be permitted. Class III areas, which are the least protected, assure that any increase will not result in concentrations that are higher than the lowest applicable NAAQS. Table 2.2.3 depicts Allowable PSD increments.

Table 2.2.3. Allowable PSD Increments (µg/m3)

| **Pollutant** | **Time Period** | **Class I** | **Class II** | **Class III** |
|---|---|---|---|---|
| PM10 | Annual Arithmetic Mean | 4 | 17 | 34 |
| | 24-Hour Maximum | 8 | 30 | 60 |
| SO2 | Annual Arithmetic Mean | 2 | 20 | 40 |
| | 24-Hour Maximum | 5 | 91 | 182 |
| | 3-Hour Maximum | 25 | 512 | 700 |
| NO2 | Annual Arithmetic Mean | 2.5 | 25 | 50 |

Source: UACR R307-405-4

PSD requires that certain new, major stationary sources and major modifications be subject to a preconstruction review, which includes an ambient air quality analysis. The process of reviewing proposals to construct major new sources or modifications is the principal means of carrying out the PSD program. Sources having emissions below the PSD major source threshold are subject to New Source Review (NSR) permitting with the State of Utah. Such sources are required to demonstrate that they will not cause or contribute to a violation of the ambient air quality standards (Utah Air Conservation Rule R307- 405-6).

*18.1.2 Sources of Air Pollution*

The most recent UDAQ Annual Report (2015) and the most recent (2011) UDAQ Annual Inventory Summary were examined to determine the sources of pollution as well as current emission rates for Wayne County. The report provided the following observations:

- There are no major sources of air pollution in Wayne County.
- The greatest amount of air pollution emissions in the area result from biogenic VOC emissions and prescribed fires.
- There is only one point source listed for Wayne County.
- The primary air pollutant in Wayne County is volatile organic compounds (VOC).
- Area sources and biogenic emissions account for the most emissions in the Wayne County.

*18.1.3 Air Quality Modeling Requirements*

Utah Air Conservation Rule R307-410-4 requires new sources, or modifications to existing sources, proposing increase of hazardous air pollutants (HAP) emissions to submit HAP emission levels and pollutant release information for their facility. The information submitted

must include the emission threshold value (ETV). The ETV is the emission level above which a dispersion modeling analysis is required as part of a complete NOI. No source in Wayne County is generating a HAP.

New PSD or major modifications to PSD sources are required to conduct plume visibility modeling if they are deemed as having a significant impact in a Class I area. PSD sources that propose to permit any net emissions increase and are located within 10 km of a Class I area are also required to conduct plume visibility modeling.

*18.1.4 Need for Change in Management*

Wayne County should develop an air quality ordinance to assist land managers in protecting air quality and to serve as a detailed standard for project evaluation.

No empirical site specific data exists for air quality in Wayne County. The Statewide Triennial Emissions Inventory is based on modeling and may not be applicable to site specific conditions. Land managers should be required to develop accurate, objective background data for lands within their jurisdiction. Those findings should be submitted to the Utah Division of Air Quality for inclusion in the Statewide Triennial Emissions Inventory.

The Statewide Triennial Emissions Inventory is based on modeling and does not accurately depict $PM_{10}$ and $PM_{2.5}$ emissions associated with native fugitive dust, drift and other site specific factors. The 2011 inventory indicates there are no naturally occurring $PM_{10}$ or $PM_{2.5}$ emissions. However, native fugitive dust is irrefutable as evidenced by the presence of dust in the air in remote areas and variable fugitive dust conditions associated with changing weather events. Land managers should develop ambient background levels for $PM_{10}$ or $PM_{2.5}$ emissions within their jurisdictions and for drift from their adjacent lands outside Wayne County. Projects on private lands should continue to be managed under existing air quality laws and regulations.

The Statewide Triennial Emissions Inventory is based on modeling and does not accurately depict potential emissions from wildland and prescribed fire or from such emissions that occurred outside the inventory period. The inventory indicates there were no wildland or prescribed fire events in Wayne County during the reporting period. However, review of the inventory for areas that experienced fires indicates wildland and prescribed fire are significant contributors to an area’s air quality. Federal agencies need to control emissions from wildland and prescribed fire on their own lands prior to implementing regulations that impact projects deemed to promote socio-economic stability in the County.

Revised regulations regarding air quality are under consideration by the federal government. Compliance with these potential regulations is significantly impacted by emissions from biogenic sources, soils, wildfires, and prescribed fires on federal lands in Wayne County and in the region. Federal agencies need to control emissions from sources on their own lands prior to implementing regulations that impact areas of Wayne County under state and local management and prior to impacting federal land projects deemed to promote socio-economic stability in the County.

PSD requires that certain new, major stationary sources and major modifications be subject to a preconstruction review, which includes an ambient air quality analysis. Federal

agencies do not have accurate, site specific ambient air quality inventories. Such inventories are needed to accurately assess programs associated with wildland and prescribed fires.

*18.1.5 Smoke Management*

Smoke emissions resulting from prescribed burning projects or treatments are conducted and managed in compliance with guidelines found in the Utah Smoke Management Plan (SMP) an interagency group program. The purpose of the program and the SMP is to ensure that mitigation measures are taken to reduce the impacts on public health, safety and visibility from prescribed fire and wildland fire used for resource benefits (UDAQ 2004). Compliance with the SMP is the primary mechanism for land managers to implement prescribed burns, but it is insufficient to protect air quality in Wayne County. Often fire management plans cannot adapt to changing conditions fast enough to protect air quality. The SMP and interagency group program needs to be improved to reduce fire related emissions and protect air quality in Wayne County.

Past practices of extinguishing every fire combined with possible impacts related to climate change are leading to larger, more intense, more frequent wildfires that threaten life, safety, and property. Wildfire smoke can result in significant air quality impacts to public health, particularly for at-risk groups, and impacts to safety and transportation through diminished visibility on roads and aviation corridors.

As wildfires and impacts of smoke have increased, there has been proactive response to this air quality impact to the health and safety of the public and fire personnel. The U.S. Forest Service (USFS) with many interagency partners such as the U.S. National Park Service (NPS) has developed the Wildland Fire Air Quality Response Program which directly addresses these risks posed by wildfire smoke. The Program has developed a national cache of smoke monitoring equipment that can be deployed to incidents to understand the magnitude of smoke impacts. The monitors were heavily used in western wildfires in 2014 and 2015. Smoke monitors which measure fine particulate matter, PM2.5 are tied into the GOES satellite system similar to Remote Automated Weather Stations (RAWS). The near-real time data is available to the public via the U.S. Environmental Protection Agency's (EPA's) AirNow website as well as smoke monitor data display systems developed by the Pacific Northwest Research Station's AirFire Team to support operational smoke forecasting. Generally, orders for monitors are tied to the overall emergency response to a wildfire and the interagency systems which support incident management teams.

Regional haze has been an issue of growing concern throughout the west. Regional haze causes visual impairment by obscuring the clarity, color, texture, and form of what can be seen. Haze is significantly impacted by the reaction of VOCs with other air pollutants. The largest source of VOCs in Wayne County is biogenic generation on federal lands, and the largest potential sources of other pollutants are wildland and prescribed fires - also on federal lands. Federal agencies need to minimize regional haze on their own lands while advancing projects deemed to promote socio-economic stability in the County.

Atmospheric deposition of air pollutants can increase acidity of soils and water resources. Measurements of atmospheric deposition are currently being taken in Class I areas of Grand Canyon National Park, Bryce Canyon National Park, and Canyonlands National Park by the National Acid Deposition Program. The 2004 Annual Performance Report on Air Quality Goals

at National Parks indicates rates of atmospheric deposition of nitrogen and sulfur in rain is relatively low in Bryce Canyon National Park, but elevated above natural conditions. Trend analysis shows that nitrogen deposition has slightly increased while sulfur deposition has slightly decreased. Federal agencies in Wayne County should develop similar data, so depositon of air pollutants can be properly analyzed.

Ambient air quality in Wayne County is not exceeding standards; visibility is typical of clear skies associated with remote areas in the western United States; and atmospheric deposition levels are below Federal levels of concern. However, the lack of available data limits forecasting trends of air quality. Future changes to air quality conditions will occur according to the intensity and expansion or reduction of activities that produce air pollutants. However, the use of air pollution mitigation techniques can reduce emissions from sources, and in some cases, also minimize air quality impacts. At this time, future impacts to air quality within the planning area from non-BLM sources (such as power plants and fireplaces) are uncertain; however, emissions from these existing sources are not anticipated to increase.

Potential adverse impacts are often mitigated through site-specific measures identified in NEPA documents prepared at the time an action in the area is proposed. Mitigation needs to be developed as part of the State permitting process and PSD review. However, federal agencies have excluded County participation in these processes. Federal agencies should include impacted local governments as cooperating agencies in the NEPA process and should coordinate with Wayne County in accordance with federal law.

*18.1.6 Prescribed Burning*

The EPA notes in the Regional Haze Regulations (Federal Register/Vol. 64, No. 126) that fire emissions have a natural and a manmade component. The EPA also recognizes that all kinds of fire (wildfire, prescribed fire, etc.) contribute to regional haze, and a complex relationship exists between what is considered a natural source of fire versus a human-caused source of fire. For example, the increased use of prescribed fire in some ecosystems may lead to PM emissions levels lower than those that would be expected from catastrophic wildfire. Given that the purpose of prescribed fire in many instances is to restore natural fire cycles to ecosystems, the EPA believes it would be appropriate to consider some portion of prescribed fire as "natural."

The EPA agrees that fire is an important emission source to include in air quality impact analysis, but current data do not show that fire is the predominant source of visibility impairment in any Class I area.

*18.1.7 Visibility*

Visual resources are one of the most socially and economically important resources in the area. In August 1977, the Congress amended the CAA to establish as a national goal "the prevention of any future and remedying of any existing impairment of visibility in mandatory Class I Federal areas, which impairment results from manmade air pollution" (Title I Part C Section 169A, U.S.C.[1990]). The 1977 Amendments also included provisions requiring applicants for new major source permits to assess the potential for their projects to cause adverse impacts on the air quality-related values, including visibility, in nearby Class I areas.

In July 1999, the EPA published the Regional Haze Rule. This regulation established a program for the improvement and protection of visibility in the 156 protected Class I parks and wilderness areas, including the establishment of baseline and current visibility conditions and the tracking of changes in visibility conditions over time.

Utah Air Conservation Rule R307-406 defines an adverse impact on visibility as "visibility impairment which interferes with the management, protection, preservation, or enjoyment of the visitors' visual experience of a mandatory Class I area." Any new major source or major modification must be reviewed for the impact of its emissions on visibility in any mandatory Class I area. The State of Utah has a Regional Haze State Implementation Plan (SIP) that addresses visibility impacts to Class I airsheds. The Regional Haze SIP was adopted in 2003 then updated in 2008, 2011 and most recently updated in 2015.

*18.1.8 Criteria Pollutant Impacts Dispersion Modeling in Attainment Areas*

The Colorado Plateau in the Four Corners States of the Southwest is one of the most intensively monitored areas in the NPS' IMPROVE Network. Based on data from the IMPROVE Network, the Colorado Plateau portions of the RFO are one of the regions with the lowest amounts of haze.

Data reported by the NPS IMPROVE Network indicated the following clear days (natural background) Standard Visual Ranges (km) for the following national parks in Utah.

Table 3.1-3. NPS IMPROVE Network Standard Visual Ranges

| **National Park** | **Spring** | **Summer** | **Autumn** | **Winter** |
|---|---|---|---|---|
| Arches National Park1 | 182 | 152 | 177 | 150 |
| Canyonlands National Park | 160 | 149 | 161 | 167 |
| Capitol Reef National Park2 | 160 | 149 | 161 | 167 |

1 - Monitoring at Arches National Park was discontinued in May 1992.

2 - Standard visual range has not been recorded at Capitol Reef National Park; however, past studies and analysis have estimated SVR values for Capitol Reef to be the same as Canyonlands National Park.

Near-field visibility could be impacted by suspended PM10 that would be generated by construction activities, vehicles traveling on access roads, off-highway vehicles (OHV), and wind-blown dust over exposed areas and smoke from fires and prescribed burns.

Vehicle use on unpaved roads would result in localized increases in fugitive dust that would be temporary and would not exceed air quality standards. Although temporary, area emission of fugitive dust is not subject to State air quality permitting procedures and would not constitute any threat to human health and safety. However, such emissions are subject to control measures to prevent public nuisance under Utah Air Conservation Rule 307-205-3. Utah Air Conservation Rule 307-205-4 does not require dust control on unpaved roads when the average daily traffic level does not exceed 150 vehicles averaged over a five day period.

Although fugitive dust would cause some localized visible dust clouds, the emissions are expected to have minimal effect on regional haze. PM smaller than 2.5 microns is the primary contributor to visual haze and adverse health effects. Less than 30 percent of the fugitive dust generated from unpaved roads is below 2.5 microns.

New sources, or modifications to existing sources, whose total controlled emission increase levels are greater than those listed in the following Table, are required to submit a dispersion modeling analysis as part of a complete Notice of Intent (NOI).

Table 3.1-4. Modeling Requirements for Criteria Pollutants in Attainment Areas

| **Pollutant** | **Emissions (Tons/Year)** |
|---|---|
| Sulfur Dioxide | 40 |
| Nitrogen Oxides | 40 |
| PM10 Fugitive Emissions and Fugitive Dust | 5 |
| PM10 Non-Fugitive Emissions or Non-Fugitive Dust | 15 |
| Carbon Monoxide | As required Under UACR307-405-6 |
| Lead | 0.6 |

*18.2 Objective*

It is Wayne County's objective to maintain clean air in accordance with applicable state and federal laws and regulations. It is not Wayne County's objective to maintain clean air at the expense of economically viable and sustainable communities.

*18.3 Policy Statements*

1. Support implementation of the Clean Air Act Amendments of 1990 that must be balanced with economically viable and sustainable communities.

2. Support quantitative analysis of any reasonably foreseeable significant impacts to air quality for proposed projects.

3. Support consultation and coordination with the County in the development of mitigation strategies to reduce air quality impacts, particularly where NAAQS are being exceeded.

4. Support consultation and coordination with the County when federal agencies are developing permitting or leasing stipulations (including enforcement protocols and exceedance levels) for proposed activities that may impact air quality.

5. Support the Utah Smoke Management Program and encourage enforcement of regulations and policies that apply to smoke emissions from wildland fire. All land managers must manage smoke in accordance with the Clean Air Act and the regulations and policies of the Environmental Protection Agency (EPA).

6. Encourage development and use of alternative methods to burning for disposing of or reducing the amount of wildland fuels on lands in the County.

Chapter 19
# Economic Considerations

## *19.1 Resource Findings*

All economic activity in the arid and semiarid western United States depends on adequate dependable water supplies. Wayne County is just as dependent on water availability as the rest of the interior West. Wayne County's water supply is dependent upon the health of the watersheds in the County. The watersheds are almost exclusively on Federal Lands managed by the US Forest Service, Bureau of Land Management, or National Park Service. Therefore, how these watersheds are managed determines the long run sustainability of Wayne County and the rest of the arid and semiarid West.

Wayne County's remote location, small population, and limited resources have precluded the development of an industrial base or large businesses. 3.65% of the land is privately owned, land use issues loom large as residents try to maintain a cherished rural lifestyle while seeking job opportunities for their children.

- BLM- 891,978 acres or 56.54 %
- Forest Service- 160,080 acres or 10.14 %
- National Park Service- 199,589 acres or 12.65 %
- National Recreation Area- 88,170 acres or 6.22 %
- State of Utah- 169,159 acres or 10.72 %
- Private Lands- 57,721 acres or 3.65 %

Rural communities are critical for our economic future. We need to implement strong policies and investment strategies that unlock the potential of economic growth and an improved quality of life for rural children and families. This includes partnerships to promote job growth, access to health care, and quality education.

There has been a systematic effort by federal land management agencies and the Park Service through administrative processes for over the last 40 plus years to eliminate use of public lands in the County for any industry or livelihood purposes except those that are tourist or recreation oriented. The use of the County for tourism and recreation continues to increase while other historical occupations and land uses continue to decline. While tourism and recreation does bring money to the County coffers in the form of sales, restaurant, and hotel taxes, the jobs it brings are almost all low paying, seasonal and with no benefits. Also, with the influx of visitors come increase in demand for services such as emergency, medical, law enforcement, fire, search and rescue, roads maintenance, culinary water and waste disposal. The additional taxes received by the County from tourism and recreation do not begin to offset the additional cost to the County for these services and the systems that provide them. The only help the County gets in this regard is from Mineral Lease funds that come back to the State from production on federal lands to offset impacts from this production to the State, Counties and local communities. Even though Wayne County is not a producer of these minerals the State does share a small percentage

of the proceeds with us through the Special Service Districts and Community Impact Fund Board (CIB).

The County also receives a small amount of Payment In Lieu of Taxes (PILT) money from the federal government. This is supposed to offset the inability of the County to collect property tax on the public lands. Unfortunately, the amount the County receives is limited by its small population (a maximum per person) and does not include the National Park acreage. This formula should be adjusted to reflect the actual area that is un-taxable because it brings in visitors that require unfunded services and has no relation to the population of the County. If anything it should pay more to lower populated counties because they don't otherwise have the means to supply needed services.

*19.1.2 Industries in Wayne County*

The industries in Wayne County are dependent upon the natural resources in the County. This dependence may be from the direct use of resources or service of public lands, the indirect use or service by suppling goods and services to those who directly use the resources or services, or from the induced effects of the money generated in the county by direct, indirect and other induced economic activities.

*19.1.2.1 Agricultural Industries*

The agricultural sector in 1994 was composed of 12 different industrial classifications producing output valued at $15,182,000 in 2015 dollars. Agricultural operations employed 240 people. By 2015 the agricultural sector was composed of 10 different industrial classifications producing output valued at $30,022,000 and employed 198 people. In Wayne County agriculture is dominated by cattle and hay production with output valued at $22 million and employing 169 people. The county's social, cultural and character has its foundation in agriculture and natural resources. Agriculture and natural resources has provided for community stability and resilience throughout the history of Wayne County. Wayne County was settled because of its natural resources that could maintain them and their families for generations.

*19.1.2.2 Tourist Industries*

Tourist industries have been a minor part of the Wayne County economy. Although there are National Parks, State Parks, National Monuments, Wilderness Areas and a National Recreation Area in Wayne County and nearby counties tourism is a minor part of the Wayne County economy. In 1994 tourist industries accounted for about $6.6 million in 2015 dollars and employed about 150 people. By 2015 tourist industries account for about $12.7 million and employed about 215 people. Tourism in Wayne County is natural resource based. Tourist industries depend upon the quality and scenic values of nature.

Tourism in Wayne County as it is in 2015 is not the basis for a viable sustainable economy. This is demonstrated by adding $1,000,000.00 to the revenues of tourist industries, $1,000,000.00 cattle ranching and $1,000,000.00 to petroleum exaction industry. Though tourist industries employee more people and labor income per employee is approximately $20,000 per year. For ranch employees labor income is approximately $26,000 per year. For petroleum

exaction workers it is approximately $57,000 per year. Most tourist industry jobs in Wayne County are seasonal not stable year around jobs.

During fiscal year 2015 the county received only $57,822 in restaurant tax and $270,502 in transient room tax amounting to about 11% of total revenue.

It will take many millions of dollars both private and public investment to upgrade tourism to year around destination experiences. Most communities would need to install sanitary sewer systems, upgrade culinary water systems and enhance other public services. The private sector would need to invest in accommodations, year round activities-experiences and other support services.

*19.1.2.3 Service Industries*

Since 1994 service industries have grown the most in Wayne County. In 1994 service industries accounted for about $25.6 million in 2015 dollars and employed about 270 people. By 2015 this had grown to about $61 million and employment grew to about 670 people. Included in service industries are Banking, Credit Agencies, Security and Commodity Brokers, Insurance Carriers, Insurance Agents and Brokers, Owner-occupied Dwellings, Real Estate, Laundry, Cleaning, Shoe Repair, Portrait and Photographic Studios, Beauty and Barber Shops, Funeral Service and Crematories, Miscellaneous Personal Services, Advertising, Other Business Services, Photo-finishing, Commercial Photography, Services To Buildings, Equipment Rental and Leasing, Personnel Supply Services, Computer and Data Processing Services, Detective and Protective Services, Automobile Rental and Leasing, Automobile Parking and Car Wash, Automobile Repair and Services, Electrical Repair Service, Watch, Clock, Jewelry and Furniture Repair, Miscellaneous Repair Shops, Motion Pictures, Theatrical Producers, Bands Etc., Bowling Alleys and Pool Halls, Commercial Sports Except Racing, Racing and Track Operation, Amusement and Recreation Services, N.E.C., Membership Sports and Recreation Clubs, Doctors and Dentists, Nursing and Protective Care, Hospitals, Other Medical and Health Services, Legal Services, Child Day Care Services, Social Services, N.E.C., Residential Care, Other Nonprofit Organizations, Business Associations, Labor and Civic Organizations, Religious Organizations, Engineering, Architectural Services, Accounting, Auditing and Bookkeeping, Management and Consulting Services, Research, Development & Testing Services, and Domestic Services. Service industries cover many types of businesses many which are not in Wayne County.

Chapter 20
# Broadband

## *20.1 Resource Findings*

### *20.1.1 Purpose and Need*

As high speed Internet connections become an increasingly critical asset for economic development, education, healthcare, public safety, and general quality of life, it is essential that future management plans address the development of broadband infrastructure throughout the county. The need for reliable and redundant broadband is growing as rapidly as the tech industry, and governments must work with broadband providers collaboratively to prepare for the growing need. Broadband infrastructure needs to be deployed with the capacity to adapt for evolving technologies.

### *20.1.2 Current Conditions in Wayne County*

Currently, only 1.7% of addressed properties in Wayne County have access to speeds greater than 100 Mbps. Comparatively, approximately 90% of addressed properties along the Wasatch Front have access to speeds greater than 100 Mbps. Out of 1903 addressed properties in the county, 885 properties do not have access to broadband speeds that meet the 25 Mbps upload and 3 Mbps download federal definition for broadband. For mapped address points and service tiers, see the Map Appendix "Maximum Advertised Download Speeds at Utah Addresses: Wayne County." Below are the coverage levels for all addressed properties in Wayne County:

| Wayne County | | |
|---|---|---|
| Highest Speed Range | Addressed Properties | Percentage Covered |
| 100-999 Mbps | 33 | 1.73% |
| 50-99 Mbps | 985 | 51.76% |
| 25-49.9 Mbps | 0 | 0 |
| 10-24.9 Mbps | 775 | 40.73% |
| 6-9.9 Mbps | 12 | 0.63% |
| 3-5.9 Mbps | 44 | 2.31% |
| 1.5-2.9 Mbps | 37 | 1.94% |
| Unserved | 17 | 0.89% |

To see a visual reference of the coverage tiers listed above, see the Map Appendix - "Maximum Advertised Download Speeds at Utah Addresses: Wayne County," "Wayne County: Fixed Residential Broadband Coverage," and "Wayne County: Mobile Broadband Coverage."

Also in the Map Appendix, "Wayne County: Land Ownership & Communication Towers," and "Wayne County: Mobile Broadband Coverage," show where current towers are located in the context of where broadband is offered. The maps also show areas that the BLM has designated as communications sites where new towers can be built. The eastern portion of the county should be a focus for additional mobile broadband deployment to ensure that residents who visit these areas can access service, particularly if they need to contact emergency services.

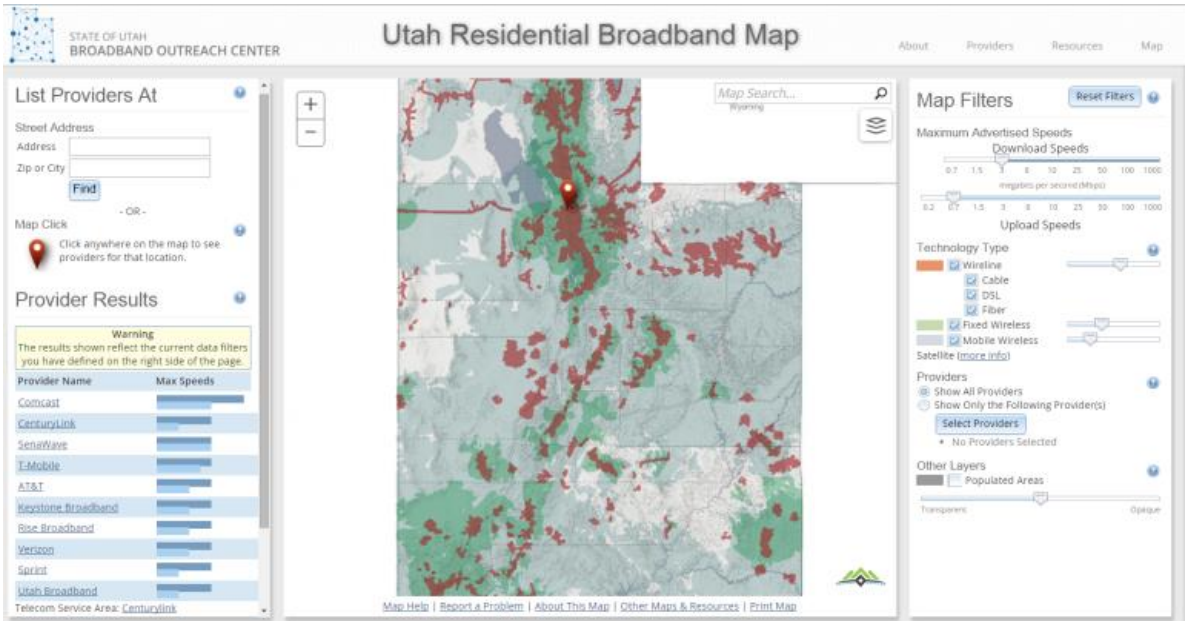
*20.2 Recommendations*

Local communities play an important role in whether or not broadband networks get built. Cities and counties can encourage development by following a few best practices to help streamline the process and create a business-friendly environment for broadband providers to help improve access for citizens.

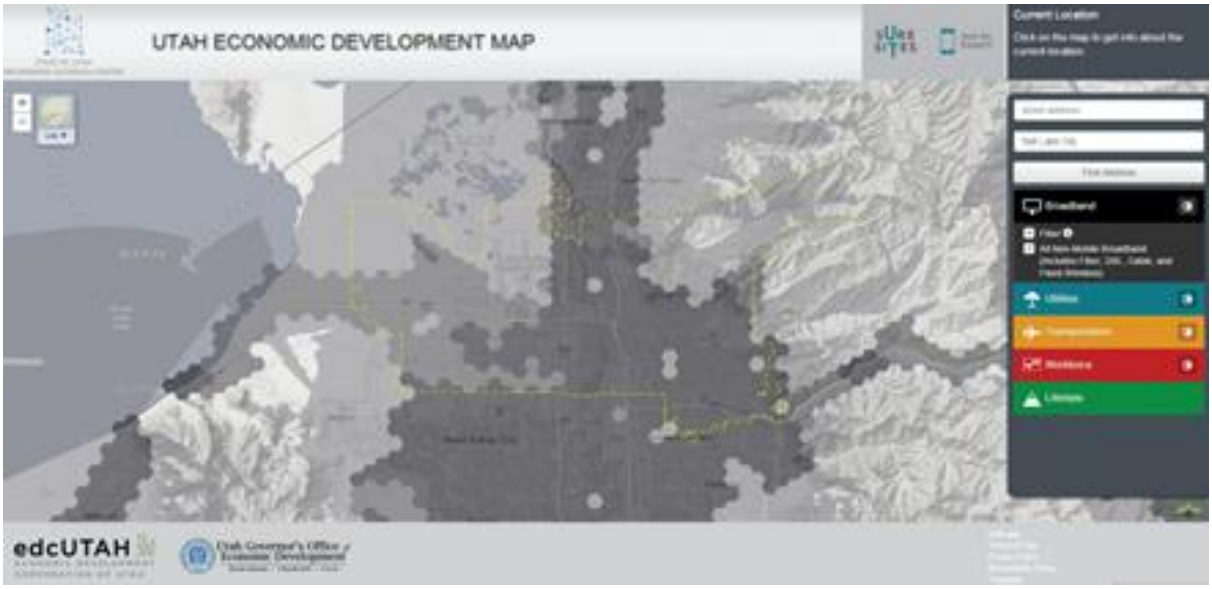
*20.2.1 Utilize Current Broadband Data in the Planning Process*

The Utah Broadband Outreach Center in the Governor's Office of Economic Development is a state program focused on mapping available broadband services and promoting the development of additional infrastructure in Utah. The county can work with the Utah Broadband Outreach Center as a resource for planning assistance. The Center can provide supporting informational data and resources to implement favorable policies into practice and can assist with planning activities. The Outreach Center maintains two interactive broadband maps that show the current state of broadband availability:

- The Utah Residential Broadband Map (broadband.utah.gov/map) displays residential broadband speeds throughout Utah. The Residential Broadband Map indicates where coverage is offered by service providers, and can be filtered by:
    - Individual provider
    - Speed
    - Technology type
    - Populated areas




- The Broadband Outreach Center also maintains an Economic Development Map (locate.utah.gov) that allows users to explore the state in detail. Businesses can use this map to scout for locations using interactive data on:
    - Broadband availability
    - Utility information (natural gas, electricity, culinary water)
    - Transportation (rail lines, airports, major roads)
    - Workforce (higher education institutions)
    - Recreation (state and national parks, ski areas, golf courses)
    - Health Care Facilities



Both maps can be used as a resource in planning efforts, particularly for expanding coverage in underserved areas. Data for these maps is provided by broadband providers and updated by the Broadband Outreach Center every six months. Additionally, the Outreach Center can work with county stakeholders to fulfill custom mapping requests.

*20.2.2 Implement County Best Practices that Encourage Broadband Investment*

The following best practices are recommended to facilitate timely and cost-efficient broadband deployment:

- Use the residential and economic development maps available through the Utah Broadband Outreach Center to help assess community wide access and identify areas of need.
- Set goals to prioritize communities with the lowest business and residential average speeds and work with broadband providers in those areas to determine strategies to improve services. These areas should be evaluated in terms of wired (cable, DSL, fiber), fixed wireless and mobile broadband coverage.
- Implement best practices to save time and money, such as:
    - Identify which existing poles and conduits are owned by local governments and which existing poles and conduits have other owners and make them easily available to providers when possible.
    - Ensure broadband providers access to existing publically owned infrastructure.
    - Work with broadband providers to coordinate fiber installation with regular utility and road maintenance by informing them of opportunities where they can install services.
- Identify likely corridors to connect underserved areas and powered cellular communications sites to expand mobile service and create a streamlined process to allow providers to install services.
- Coordinate with key stakeholders on infrastructure deployment, which can be achieved using the following strategies:
    - Form a Joint Utility Committee (JUC) where county and city officials, developers and other utilities meet with broadband providers to coordinate planning efforts. For example, providers should be given the opportunity to incorporate broadband infrastructure into future developments as part of the approval process.
    - Designate a broadband development liaison to notify providers of opportunities to install services.
    - Create a permitting or public works department database to track projects and notify providers of opportunities to access poles, open trenches, and conduits.
    - Hold regular meetings with local leaders and telecommunications companies to discuss projects. Public officials should consider asking providers about future areas of development and collaborate on reducing barriers to entry.
    - Maintain open and friendly relationships with providers.
- Create broadband-friendly policies and planning documents, with considerations including:
    - Zoning laws that encourage deployment, with added requirements for broadband consideration during new construction and new developments.
    - Codified collaboration between public agencies, private providers, and end users.

- Standards of construction that can assist with issues that arise based on unknown variables in the right-of-way.
- Streamlined local permitting with predictable timelines, reduced regulatory barriers, and centralized communication between local planning offices.
- Less expensive rights-of-way fees in areas lacking sufficient broadband in order to incentivize broadband providers into underserved areas.

*20.2.3 Recommendations for Federal Land*

Federal land management agencies also play a critical role in successful broadband deployment. It is critical for these agencies to approach planning in a methodical and efficient way so that underserved county residents gain access to broadband, public lands are minimally disturbed, and service providers can engage in deploying services that benefit the county. In considering future resource management planning, we recommend the following priorities to further the growth of broadband services.

*20.2.3.1 Make Federal Data Relevant to Broadband Planning Projects Readily Available to States, Counties, Local Governments and Broadband Providers*

Crossing federal lands can often be expensive and time consuming as service providers try to identify appropriate corridors and areas to install infrastructure. Making data publically accessible, such as the locations of federal assets, tower locations, and areas which have undergone environmental review under the National Environmental Policy Act (NEPA), will assist in this effort. We recommend the following actions:

- Maintain an online inventory and map of federal assets that the county can utilize in broadband planning efforts. This recommendation has been supported by several key stakeholders. Following President Obama's 2012 Executive Order No. 13616, "Accelerating Broadband Infrastructure Deployment," federal coalitions have worked to discuss administrative reforms that would encourage timely infrastructure growth. The Broadband Deployment on Federal Property Working Group, comprised of representatives from 14 federal agencies responsible for managing federal lands, determined that, "although the Federal Government owns or administers nearly 30 percent of all land in the United States and owns thousands of buildings, information about Federal assets and administered lands is not readily available." The Broadband Opportunity Council, created by President Obama's 2014 Presidential Memorandum, "Expanding Broadband Deployment and Adoption by Addressing Regulatory Barriers and Encouraging Investment and Training," recommended executive actions for existing agencies that would increase broadband deployment and encourage competition. In its August 2015 report titled, "Broadband Opportunity Council Report and Recommendations Pursuant to the Presidential Memorandum on Expanding Broadband Deployment and Adoption by Addressing Regulatory Barriers and Encouraging Investment and Training," the Council promoted expanding access to federal assets as one of its overarching recommendations.

- In accordance with NEPA standards, federal land management agencies have already reviewed lands within the county to approve proposed utility infrastructure projects. These same corridors are likely to be targeted for future broadband deployment. A regularly updated and publically available map or a website with downloadable GIS shapefiles showing previously reviewed and cleared locations is a necessary tool for broadband providers and municipalities. This mapping data will help providers target areas for development that are likely to pass environmental review, and limit the burden on public lands.
- GIS shapefiles of areas that have undergone NEPA environmental review and previously disturbed areas should also be sent to or made available online to state, county, and local GIS departments so they can use this information in planning efforts. These agencies may serve as a repository by creating a local database and map tools of this information for future planning efforts. If land management agencies do not make this data readily available, the county may consider undertaking an effort to identify and inventory assets, communications sites, and corridors that could play a role in expanding broadband.
- Since there are many recreation areas that can track visitation based on fees or permits, we recommend visitation rates be used in conjunction with broadband coverage data to prioritize high user areas. Areas where visitors cannot be tracked but are known to have high usage should also be included. These areas may include locations where agriculture, grazing, fishing, hunting, hiking, rock climbing, cycling, ATV use, industry exploration and other activities are known to occur.

While some agencies are making progress centralizing this information, providers still lack a complete inventory they can access for planning purposes. Making this data publicly available is a necessary step so that providers and communities can undertake meaningful broadband planning efforts.

*20.2.3.2 Encourage Utilization of and Access to Federally Designated Communications Sites and Work with Providers to Designate New Sites*

Federally designated communications sites are used to facilitate orderly development of telecommunications to benefit the public's demand. Uses include radio and television transmission, as well as low power uses like two-way radio, microwave, cellular, and broadcast translators. Authorities can also authorize construction of new buildings and towers, including the necessary generators, grounding systems, access ways, and parking areas needed to operate at the site. Sites must be managed based on a current site management plan, and authorities can issue special use authorizations for each site based on the plan. Management plans can indicate priority uses for each communications site. Where appropriate, new facilities must be constructed and management plans created that authorize the site for telecommunications use.

Chapter 90 of the Forest Service Handbook addresses communications site management. According to the handbook, a plan "should reflect the complexity of the current situation and the anticipated demand for the site," including the goal to, "consider anticipated changes and trends in technology, current demand, and projected future demand for the site in the next five to ten years." Given that broadband demand is expected to increase rapidly in the

next five to ten years, we recommend all federal agencies that manage land use adapt and adhere to policies that support broadband deployment. In particular, we recommend the following:

- As mentioned previously, map and evaluate designated communications sites that can be used for telecommunications infrastructure, and work with providers to identify future communications sites.
- Prioritize designated communications sites for development based on need in the area.
- Form collaboration between the county governments, other local governments, and land management agencies to designate broadband corridors that would connect communications sites, communities, cell tower sites, schools, libraries, government facilities and other areas of economic activity.
- Once corridors are established, federal and state agencies must actively collaborate to encourage providers into underserved areas by streamlining, accelerating, and consolidating permitting for designated locations. County leaders, with the help of the State of Utah Broadband Outreach Center, can help recruit providers to build infrastructure in these prioritized areas.

Communications site management, broadband corridor designation, and planning efforts should also consider how to best leverage different existing facilities. Wireless broadband, or "over the top" broadband, in combination with wired connections greatly increase the broadband capacity in any given area. Wireless towers and access points are also a necessary feature for emergency communications on federal lands. Wireless towers must be connected with fiber, so concurrent planning is necessary. The following considerations should be made when planning for wireless broadband on public lands:

- Plan to integrate fiber and wireless broadband by deploying fiber to the edge of wilderness areas to maximize coverage.
- Plan for inconspicuous wireless tower locations that won't intrude on views or add additional intrusion to views.
- Feed fiber to tower locations or future tower locations when deploying fiber for other projects (e.g., highway construction and maintenance, new developments, etc.) to save costs and time.

*20.2.3.3 Streamline Permitting to Encourage Broadband Deployment*

There is significant value for quick approvals for fiber and conduit expansion projects within the constructed or disturbed portion of the federal and state highway systems, and along the federal aid-eligible (FAE) local roads and their rights-of-way. All of these highways and FAE roads are, at a minimum, improved road surfaces with significant pre-existing ground disturbance for the roadway itself, and possibly shoulder and drainage features.

President Obama's Executive Order No. 13616 addressed the challenges related to broadband infrastructure deployment. The Working Group assembled to respond to the order recommended changes to ensure coordination and streamlining of procedures, requirements, and policies related to deployment. While progress has been made in some areas, the county recommends continued work that would remove administrative barriers, reduce duplicative studies and documentation, and shorten waiting periods for permitting.

Permitting policies that allow broadband providers access to open conduits will reduce infrastructure costs related to broadband expansion. For policies to be successful, federal land management agencies need to be involved in projects so that rights-of-way can be established in a timely manner. Providers across Utah have expressed concern about extensive waiting periods when working with federal land management agencies. We are concerned this will become a barrier and deter providers from expanding into areas that require passage through federal lands.

- The county recommends public landholding agencies identify areas where permitting could be streamlined, particularly easing permitting restrictions in previously disturbed areas. Proposed fiber installation along existing highways should be permitted on an accelerated pace. These disturbed corridors would face only minor temporary impacts. Such corridors often already have underground and overhead utility lines, making fiber deployment even less impactful.
- Allow for state Departments of Transportation to permit the installation of fiber optic lines or empty conduit within the constructed roadway prism (to include the improved surface, shoulder, and immediate constructed drainage) of any federal or state highway, or local road that qualifies and receives maintenance funding under the Federal Highway Administration (FHWA) federal-aid program. These qualifying projects should be exempted from NEPA review or granted categorical exclusions.
- Highway easements across federal lands should be defined to include broadband service providers. Establishing this public-private partnership, with the public partner as the highway owner, would make the Utah Department of Transportation (UDOT) the permitting agency for providers wishing to build or access conduits along the highway. UDOT has already successfully partnered with providers in this way by establishing internal policies to build conduits that can be used by providers, and by notifying them about upcoming projects. Establishing UDOT as the single point of contact would limit confusion on permitting requirements and fees and would clarify the role of both agencies, resulting in considerable cost and time savings. In the past, these issues have resulted in delays that have sometimes lasted more than a year. Giving this authority to transportation agencies would expedite the process by limiting the time consuming and redundant reviews currently performed by federal land management agencies.

*20.2.3.4 Increase Agency Capacity in Order to Prioritize Telecommunications and Broadband Permitting*

In addition to adopting streamlining procedures that could free up the capacity of federal agencies, such as allowing UDOT to assist in permitting, the county also believes it is necessary to hire additional staff responsible for telecommunications permitting. Processing times need to be reduced for broadband expansion to take place with reasonable cost and time commitments. Increasing the capacity of the Bureau of Land Management (BLM) should coincide with the establishment of a standard processing time for permitting (less than one month) so providers can schedule construction in a timely manner.

*20.3 Objective*

It is Wayne County's objective to plan for and encourage the development of broadband infrastructure throughout the county, this will help economic development, education, healthcare, public safety, and general quality of life. The need for reliable and redundant broadband is growing as rapidly as the tech industry and to be competitive the county and other governments must work with broadband providers collaboratively to prepare for the future.

*20.4 Policy Statements*

1. This and future county plans will address the development of broadband infrastructure throughout the county.

2. The county will encourage collaboration between broadband providers, the county and other governments and management agencies to meet the future needs of broadband.

3. The county will encourage local communities to develop best practices to help streamline processes and create a business-friendly environment for broadband providers to help improve access for citizens.

4. The county will utilize the Utah Broadband Outreach Center to help promote development of additional broadband infrastructure throughout the county.

5. The county will use best practices that encourage Broadband investment.

6. The county encourages federal land management agencies to approach planning in a methodical and efficient way so that underserved county residents gain access to Broadband.

7. The county encourages federal land management agencies to make federal data relevant to Broadband planning projects readily available to states, counties, local governments and Broadband providers.

8. The county encourages federal land management agencies to encourage utilization of and access to federally designated communications sites and work with providers to designate new sites.

9. The county encourages federal land management agencies to streamline permitting to encourage Broadband deployment.

10. The county encourages federal land management agencies to increase agency capacity in order to prioritize telecommunications and Broadband permitting.

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# List of Appendices

Forest Management - James N. Long, PhD, CF.

Range Management - Edwin Lamar Smith, Jr., PhD.

Sage & PJ Interfaces - E. Durant McArthur, PhD. & David C. Anderson, PhD.

Economics - Gilbert Miller, PhD.

Wilderness – Man's Disturbances within WSA's and Lands with Wilderness Characteristics Areas, produced by Wayne County's GIS personnel.

List of Maps