

This resource assessment is designed to gather and display information specific to the Upper Virgin River eight digit HUC/watershed (#15010008). This report will highlight the natural and social resources present in the watershed, list some specific concerns, and be used to aid in resource planning and target conservation assistance needs. This document is dynamic and will be updated as additional information is available through a multi-agency partnership effort. The general observations and summaries are listed first, followed by the specific resource inventories.

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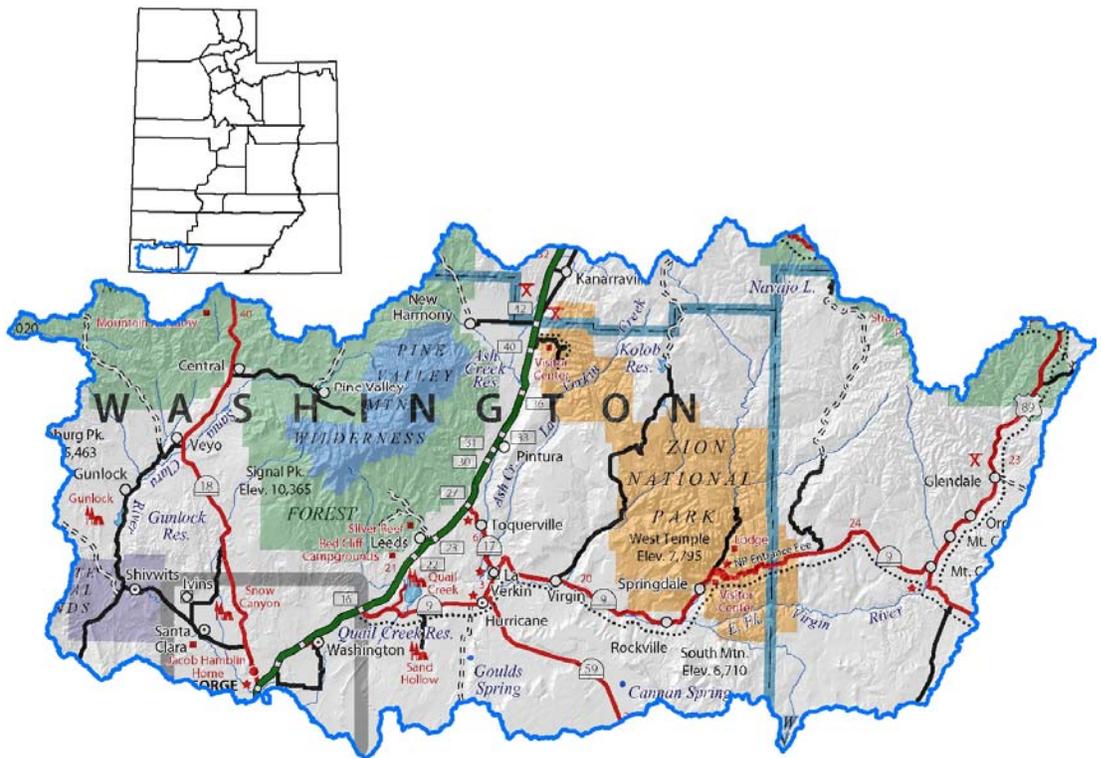
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Introduction

The upper Virgin River Basin is comprised of approximately 1.4 million acres and is in the Southwestern corner of Utah. The majority of the basin is public land or urban lands. The United States Bureau of Land Management (BLM) and National Parks Service (NPS) administer most of the Federal Public Land. The School and Institutional Trust Lands Administration (SITLA) and Utah Division of Wildlife Resources (DWR) administer much of the State Land.



Major land uses in the basin include range, alfalfa and grass hay, corn and small grains crops, fruit and nut orchards, forest production, and industrial and urban areas. Recreational uses are also common activities both on private and public lands.

Physical Description

Elevation and Land Cover are diverse within the basin. Elevations range from over 10,300 feet in the Pine Valley Mountains found on the Northern end of the basin down to 2,000 feet in the Beaver Dam Wash which is located in the most Southwest corner of the county. The basin includes the following mountain ranges: Pine Valley Mountains, Beaver Dam Mountains, Bull Valley Mountains, Vermilion Cliffs and Kolob Mountain. The valley areas in and around St George are within the Mohave Desert zone and are very hot during summer months. Due to the variability of elevation, precipitation, land cover and land uses are also quite variable.

Land Cover

The higher elevations support Conifer and Aspen Forests. These areas receive from 25 to 35 inches of precipitation annually. Middle elevations support Mixed Forest communities, Mountain Shrub lands and Pinion/Juniper forests. Precipitation in the Mixed Forest Communities ranges from 15 to 25 inches. Lower elevations support Semi-Desert, Hot Desert, and Salt Desert Rangelands and receive 7 to 15 inches of precipitation. It is in this lower elevation where irrigated cropland and irrigated pastures are found. There is also some Non irrigated croplands at some of the mid elevation areas on Smiths Mesa and in the New Harmony area. Irrigated lands utilize water from mountain stream runoff or from underground aquifers. The majority of land dependent upon aquifers for irrigation is found in the St George and the cities surrounding St George. All of the municipalities are thriving and growing at an alarming rate. The St. George metro area was recently deemed the fastest growing metro area in the country (April 2007). The farm ground and other available open space are under tremendous pressure for development.

Land Use

Farming operations are found in the remaining undeveloped lands where suitable water, productive soils and adequate growing season are found. Rangelands and pastures are prominent land uses where water, soils and growing season are not suitable for cropland. Urban and Industrial areas are major and important land uses. Recreational uses of public and private lands are also a major land use.

The population of southwestern Utah is increasing rapidly. In 1980 the population of Washington County was 26,000, whereas in 1997, the population was estimated to be 76,350 (Utah State Data Center, written commun., 1998) and is expected to continue increasing in the future. This growth is driving the need for further development of existing water resources and the search for additional potential ground-water sources. (Utah DNR, Tech Pub 116, 2000).

- Poor grazing management practices have reduced range and pasture productivity as well as creating other natural resource problems.
- Noxious and invasive plants are an ever increasing problem.
- The small, part-time hobby farms are increasing in number and may require different types of assistance.
- Water availability and efficient use of water is a concern.
- Urban build up is a concern.

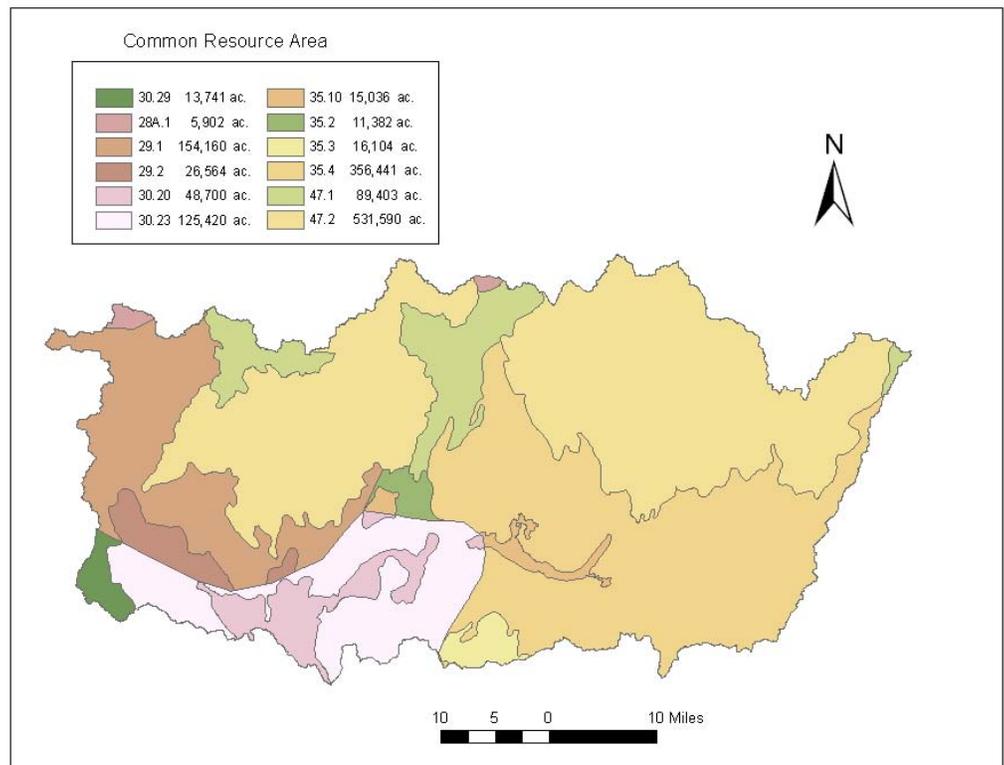
Common Resource Area

A Common Resource Area (CRA) map delineation is defined as a geographical area where resource concerns, problems, or treatment needs are similar. It is considered a subdivision of an existing Major Land Resource Area (MLRA) map delineation or polygon. Landscape conditions, soil, climate, human considerations, and other natural resource information are used to determine the geographic boundaries of a Common Resource Area

Upper Virgin Watershed

28A.1 Sagebrush Basins and Slopes

This unit consists of basins, fan piedmonts and low terraces that are often internally drained. Soil temperature regimes are mostly mesic, and soil moisture regimes are typically aridic bordering xeric with some xeric areas mainly in the urban and cropland zones along the western slopes and valleys of the Wasatch Mountains. Soils range from shallow to very deep. Lime- and silica-cemented hardpans are common on stable landscapes. Typical vegetation includes Wyoming big sagebrush, black sagebrush, winterfat, Indian ricegrass, with singleleaf pinyon and Utah juniper in some areas.



29.1 Semiarid Uplands and Fans

This unit is dominated by low mountains and hills, and includes high elevation fans and intermontane valleys. Soil temperature regimes are mostly mesic. Precipitation ranges from about 8 to 16 inches. Elevations range from about 3,800 to 7,700 feet. Common vegetation includes juniper-pinyon woodland, with Wyoming big sagebrush, mountain big sagebrush and black sagebrush.

29.2 Southern Nevada Basin and Range - Eastern Mountains

This unit is in basins, narrow valleys and hills. Soils in the area are mostly aridic with thermic temperatures. Sparse stands of desert vegetation including yucca and cactus with creosotebush, annual forbs and grasses are common. Dominant use is low production range. Precipitation is less than 12 inches. Elevations are usually less than 3,100 feet.

30.20 Mojave Desert Basin and Range – Irrigated cropland

This unit is in small irrigated areas in narrow valleys and hills in the Sonoran Basin and Range MLRA. Soils are mostly aridic with thermic temperatures and have some salt concentrations that limit use. Elevations are less than about 3,100 feet.

30.23 Mojave Desert - Middle Mojave Desert

This unit is dominated by basins, fans and low uplands at elevations from 1200 to 3,200 feet, but range to more than 5000 feet in Nevada. Vegetation includes creosotebush, white bursage, yucca, prickly pear

and cholla species, Mormon tea, flattop buckwheat, ratany, winterfat, bush muhly, threeawns, and big galleta. Blackbrush and Wyoming big sagebrush occur at the higher elevations. The soil temperature regime is thermic and the soil moisture regime is typic aridic. Precipitation is usually less than 9 inches.

35.10 Colorado Plateau Irrigated Cropland

This unit occurs within the Colorado Plateau Physiographic Province and is characterized by warm desertic basins, and plateaus of irrigated cropland in the south and east portions of Utah. The soils are normally well drained, but are salt influenced by marine shale deposits. Elevations range from 4000 to 5000 feet. The soil temperature regime is mesic. The soil moisture regime is aridic. Irrigation is mostly for forage production and small grains.

35.2 Colorado Plateau Shrub - Grasslands

This unit occurs within the Colorado Plateau Physiographic Province and is characterized by gently dipping sedimentary rocks eroded into plateaus, valleys and deep canyons. Volcanic fields occur in places. Elevations range from 3500 to 5500 feet. Precipitation averages 6 to 10 inches per year. The soil temperature regime is mesic and the soil moisture regime is typic aridic. Vegetation includes shadscale, fourwing saltbush, mormon tea, Indian ricegrass, galleta, and blue and black grama.

35.3 Colorado Plateau Sagebrush – Grasslands

This unit occurs within the Colorado Plateau Physiographic Province and is characterized by gently dipping sedimentary rocks eroded into plateaus, valleys and deep canyons. Volcanic fields occur in places. Elevations range from 4500 to 6000 feet. Precipitation averages 10 to 14 inches per year. The soil temperature regime is mesic. The soil moisture regime is ustic aridic. Vegetation includes Wyoming big sagebrush, Utah juniper, cliffrose, Indian ricegrass, needle and thread, and blue grama.

35.4 Colorado Plateau Cold Sagebrush – Grasslands

This unit occurs within the Colorado Plateau Physiographic Province and is characterized by gently dipping sedimentary rocks eroded into plateaus, valleys and deep canyons. Volcanic fields occur in places. Elevations range from 4200 to 6600 feet. Precipitation averages 7 to 15 inches per year. The soil temperature regime is mesic. The soil moisture regime is aridic. Vegetation includes winterfat, fourwing saltbush, needlegrass, bottlebrush squirreltail, black grama, gyp dropseed, and galleta.

47.1 Low Mountains and Foothills; Utah, WY, and CO.

This unit is in the gently sloping to steep semiarid low mountains and hills in the Wasatch and Uinta Mountains. Soils have xeric or ustic moisture regimes with frigid or cryic temperature regimes. Precipitation ranges from 10 to about 18 inches. Elevations are about 5,000 to 8,000 feet. Range and cropland are the predominant land uses.

47.2 High Mountains

This area is in the higher elevations of the Wasatch and Uinta Mountains. Precipitation ranges from 16 to about 30 inches. Elevations are usually more than 6,000 feet and range to more than 10,000 feet. The mountains are covered in a mixture of mountain big sagebrush, mountain brush, and coniferous forests; with alpine vegetation on the highest mountain summits.

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Resource Assessment Summary

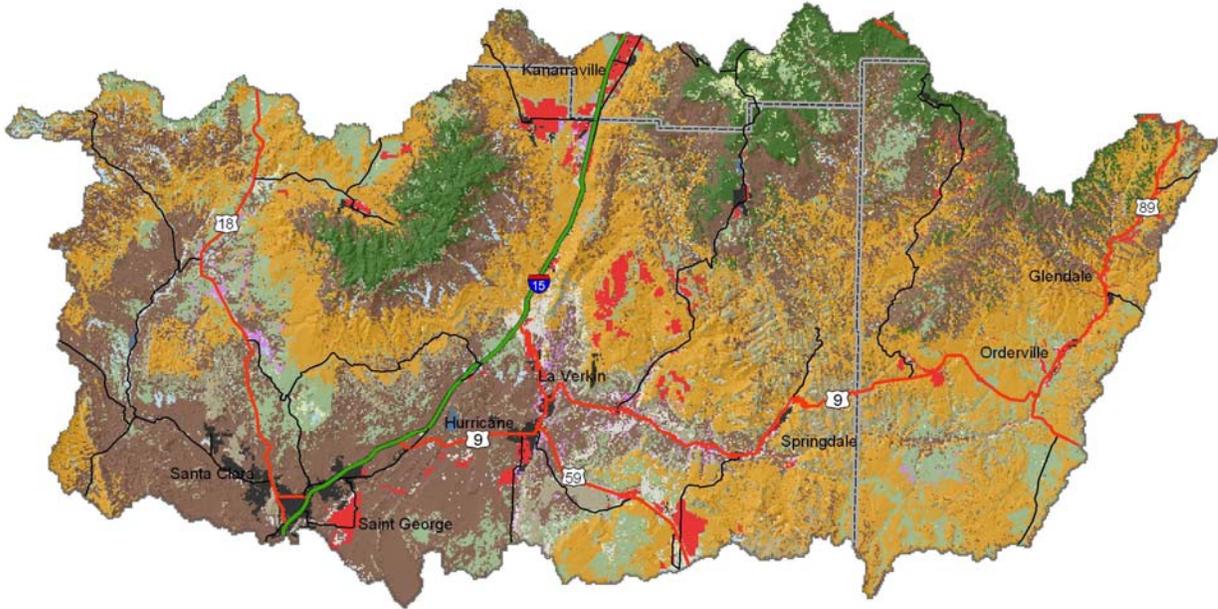
Categories	Concern high, medium, or low	Description and Specific Location (quantify where possible)
Soil	High	<p>Wind Erosion on Soil is a concern for much of the cropland in the Enterprise area as well as the non irrigated cropland in New Harmony and on Smiths Mesa. Winds are constant and strong in many of these locations. High wind conditions coupled with soils that are susceptible to wind erosion makes this a constant concern for human and safety as well as health to livestock, crops and environmental stability of the area. Soil Erosion from Water is a great concern generally within many areas of the county. The Virgin River, Ash Creek, Santa Clara and Shoal Creek near Enterprise have recently experienced severe stream bank and other water induced soil erosion problems. The winter of 2005 produced record precipitation events within the mountainous regions of the county. These events caused tremendous amounts of streambank erosion, sheet/rill erosion and deposition of sediments. Assessments were made of these events and they total in the hundreds of millions of dollars due to damages done to properties, structures, crops, roads and infrastructures. These river systems are vulnerable to destabilization from future events.</p>
Water Quantity	High	<p>In the Agrecultural area where deep wells supply water to fields the aquifer has been documented as reseeding for many consecutive years. Many operators have to deepen wells and increase pump size to obtain access to the available well water. This condition has decreased the economic viability of these farming and ranching operations. The use of larger engines and motors to drive the increased size in pumps has increased energy consumption and decreased air quality. In other areas of the county where surface water is utilized the concern for water quantity is related to the availability of water. Climate conditions can be variable and change the amount of water that is available for use. Due to these conditions reduce reservoir capacities and in turn reduce the amount of water the producers are able to utilize.</p>
Water Quality Ground Water	Medium	<p>The concerns for water quality are generally tied to surface water conditions and sediment loads explained in the Soil Erosion from Water category listed above.</p>

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Resource Assessment Summary Continued

Categories	Concern high, medium, or low	Description and Specific Location (quantify where possible)
Water Quality Surface Water	Medium	The concerns for water quality are generally tied to surface water conditions and sediment loads explained in the Soil Erosion from Water category listed above.
Air Quality	High	Air Quality due to rangeland fires is a growing concern. Air Quality was diminished for hundreds of miles from the fire locations. This is a temporary situation unless the burned rangelands are rehabilitated properly. (See Plants Section for further explanation) Air Quality concerns is also related to the description of Soil Erosion due to Wind and Water Quantity sections as listed above.
Plant Suitability	High	The major concern in this category relates to the evasion of unwanted and unproductive plant species on rangelands and fields. Pinion/Juniper encroachments, as well as evasion of Cheatgrass, Red Brome and other noxious weeds have decreased productivity of many rangelands and cropland. Some of these stands of Cheatgrass and Red Brome have exasperated the wildfire danger and situation within the county. As of Mid July of 2005 approximately 100,000 acres of rangeland burned in Washington Co. These fires have reduced range productivity and without proper revegetative practices these land will perpetuate additional stands of annual grasses and weeds thus increasing the potential for future fires.
Plant Condition	Low	
Fish and Wildlife	High	Concerns in this category are related to regulations and restrictions that are brought upon producers by the Endangered Species Act. The species of most concern within the county are the Desert Tortoise, Southwest Willow Flycatcher, Virgin River Chub, Woundfin, Pigmy Rabbit, and Mexican Spotted Owl. Although the some of these sisted species have not been federally listed, the potential for it to be listed has caused much conern.
Domestic Animals	Low	These concerns are related to sufficient feed on rangelands. This related directly to those conditions listed in the Plants category.
Social and Economic	High	Encroachment from urban development is a major concern. The farming areas around the communities is St. George, Santa Clara, Hurricane, Washington, Veyo, La Verkin and New Harmony are at greatest risk to development pressures. Land values for housing and business developments are at record highs and climbing each month. The economics of remaining in farming and ranching businesses is reduced with time. During the summer of 2005 some agricultural lands were being sold for \$190,000/ac. The ability to maintain a way of life has been a great concern in the area. There are many pressures and influences thast are making it hard to maintain some types of traditional lifestyles.

Land Cover



Landcover

- Agriculture - 32,577 acres
- Developed - 19,519 acres
- Forestland - 110,505 acres
- Pinyon-Juniper Woodland - 470,403 acres
- Sagebrush - 160,015 acres
- Other Shrublands - 445,140 acres
- Grassland - 8,249 acres
- Salt Desert Shrubland - 21,833 acres
- Invasives - 9,038 acres
- Rock\Barren\Sand Dune - 94,341 acres
- Riparian Area - 24,429 acres
- Open Water - 1,345 acres

Land Cover/Land Use		
	Acres	%
Agriculture	32,577	2.3%
Developed	19,519	1.4%
Forestland	110,505	7.9%
Grass/Pasture/Haylands	470,403	33.7%
Pinyon-Juniper Woodland	160,015	11.5%
Sagebrush - Other scrublands	445,140	31.9%
Grassland	8,246	0.6%
Salt Desert Shrubland	21,833	1.6%
Invasives	9,038	0.6%
Rock-Barren-Sand Dune	94,341	6.8%
Riparian	24,429	1.7%
Open Water	1,345	0.1%
Upper Virgin HUC Totals	1,397,391	100%
<i>Cover types from updated GAP data - 2006</i>		

Special Considerations for the Upper Virgin River basin:

- Surface and Ground Water use has and will continue to be a critical consideration within the basin, especially with the continued development and growth of the urban centers in the area.
- Recreational uses of private and federal lands are very high and result in its own resource concerns.
- Most crop rotations consist of Alfalfa Hay followed by Corn and Small Grains.
- Shrub/rangelands consist of oak savannahs, Pinion/Juniper, Mesquite and Blackbrush areas.
- Orchards/Vineyards/Nurseries include other perennial crops such as nursery stock.
- Much of the county consists of federal National Parks, US Forest Service, and Bureau of Land Management.
- **Proposed Lake Powell pipeline:** The Lake Powell Pipeline project was originally proposed by the Washington County Water Conservancy District and the district has paid for the preparation of an engineering feasibility report. Since the report has been available, several other entities have expressed some interest in participating in the project, including St. George City, the Hildale & Colorado City communities, the Kaibab Band of Paiutes (at Moccasin), the Kane County Water Conservancy District, Kanab City, and the State & Institutional Trust Lands Administration (owns several blocks of potential development land along Hwy. 89 between Lake Powell and Kanab). There have been no firm decisions made regarding financing of the project, but it would be expected that all participants would bear a share of the costs based on their share of use. The two conservancy districts have made application to the State Board of Water Resources for a total of 75,000 acre-feet of water rights (rights originally approved for use at Flaming Gorge Reservoir but never developed) to provide water for the Lake Powell project. The Board has set aside 73,000 acre-feet with a comment that, ". . .the Lake Powell Pipeline will probably be a state project," thus implying that the Division of Water Resources will provide some funding (low interest loans and/or grants) for the project.

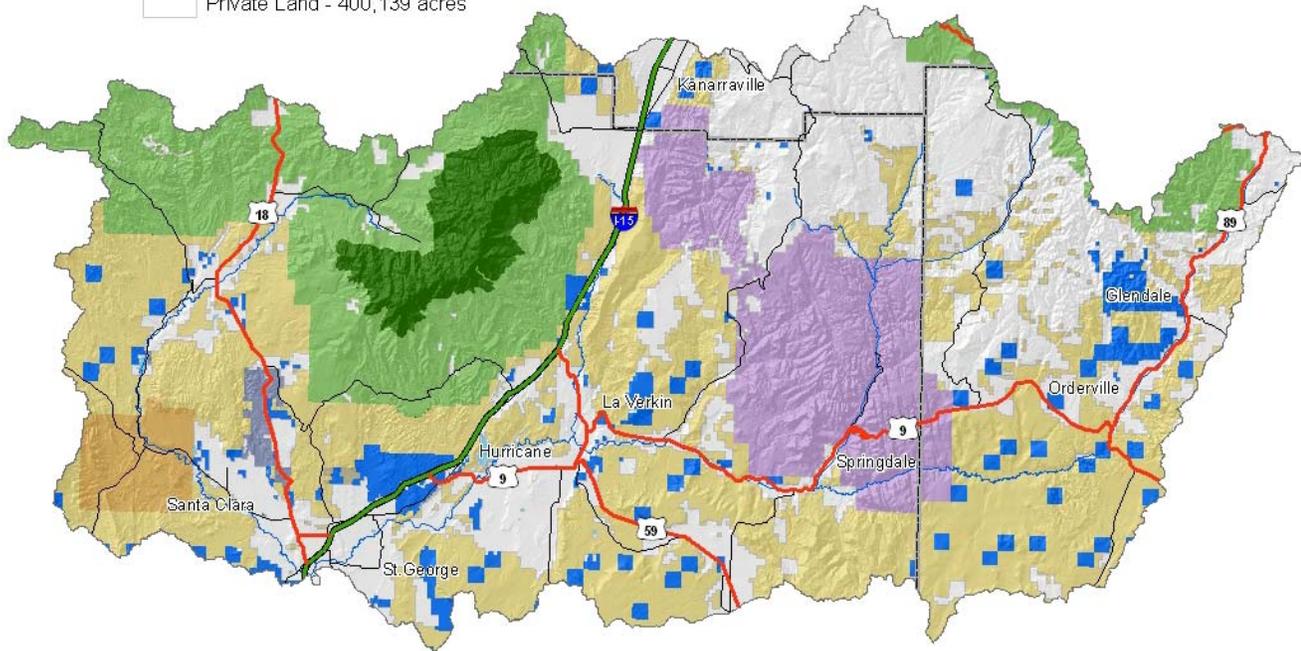
The feasibility report indicated that the water would require pumping from Lake Powell but, after reaching a certain point, would gravity flow to the proposed Sand Hollow Reservoir site south of Quail Lake. The pipeline would develop enough pressure to operate a hydropower turbine generator at the Sand Hollow site and much of the pumping cost recovered thru the sale of electricity. Source: <http://www.sgcity.org/wp/water/sgnew.php>

- **Urban Growth:** St. George is located within the watershed and was recently rated the fastest growing metro area in the country. This growth is associated with numerous natural resource issues one of which is flood control from the sub-watersheds that encircle St. George.
- **Flood Control:** The flood of 2005 where 20+ homes were lost to accelerated erosion of the Santa Clara and Virgin Rivers highlights a continued need for vigilance and knowledge of flood and erosion control along the water courses in the watershed. The NRCS installed 10 flood control structures (debris basins) within the upper virgin basin under the Public Law 566 Small Watersheds Program. Assessments of the structures have been completed which outline the purpose and need for the structures for flood control. The assessments detail operation and maintenance needs and outline measures needed to upgrade/rehab the structures to meet current dam safety performance criteria. Most of the structures were built in the 1960's to 1970's. NRCS does not own these structures. The structures and owned and operated by the sponsors of the Warner Draw Watershed effort. More information is available from the sponsors.

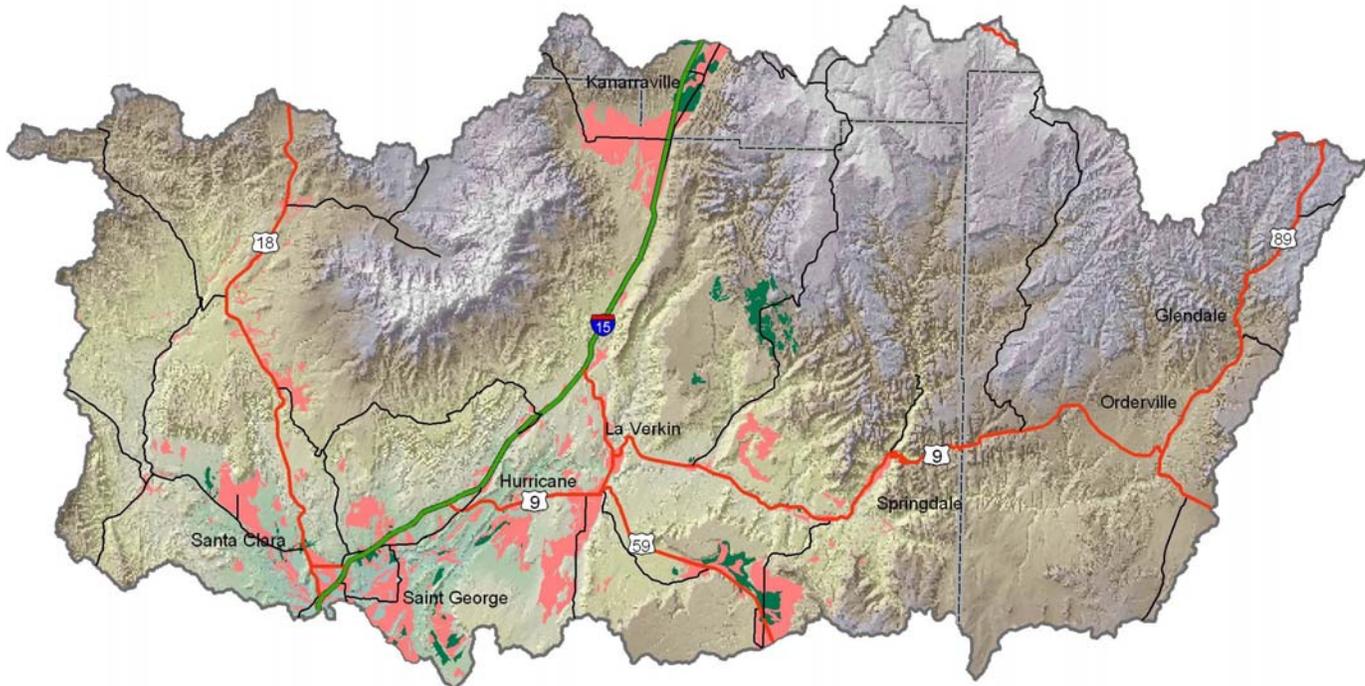
Ownership

Land Ownership

 State Trust Land - 71,601 acres	 National Park Service - 144,191 acres
 Bureau of Land Management - 467,942 acres	 State Parks and Recreation - 7,516 acres
 US Forest Service - 225,823 acres	 State Wildlife Reserve/Management Area - 826 acres
 USFS Wilderness Area - 50,237 acres	 Other State Land - 3 acres
 Indian Reservation - 28,050 acres	 Water - 1,113 acres
 Private Land - 400,139 acres	



Prime & Unique Farm Land



Farmland Classification

- Farmland of statewide importance - 12,114 acres
- Prime farmland if irrigated - 65,437 acres

Prime farmland

Land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor, and without intolerable soil erosion.

Unique farmland

Land other than prime farmland that is used for the production of specific high-value food and fiber crops...such as, citrus, tree nuts, olives, cranberries, fruits, and vegetables

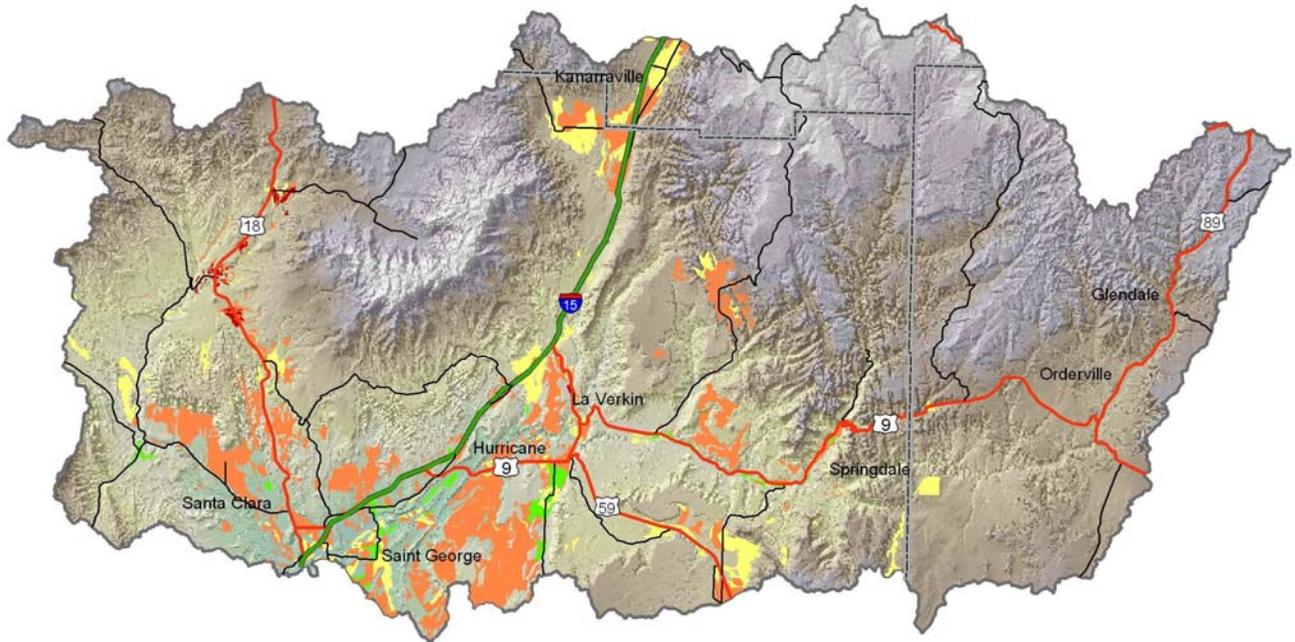
Additional farmland of statewide or local importance

Land identified by state or local agencies for agricultural use, but not of national significance

Resource Concerns – SOILS

Categories	Specific Resource Concern / Issue	Crop	Hay	Pasture	Grazed Range	Grazed Forest	Pasture Native/Naturalized	Wildlife	Watershed Protection	Forest	Headquarters	Urban	Recreation	Water	Mined	Natural Area
Soil Erosion	Sheet and Rill	x			x			x	x			x	x		x	x
	Wind	x	x		x			x				x			x	x
	Ephemeral Gully	x						x								
	Classic Gully	x			x	x	x	x	x	x		x	x		x	x
	Streambank	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Shoreline															
	Irrigation-induced	x	x	x												
	Mass Movement	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Road, roadsides and Construction Sites											x	x			
Soil Condition	Organic Matter Depletion	x														
	Rangeland Site Stability				x	x	x	x		x						x
	Compaction	x	x	x			x									
	Subsidence															
	Contaminants: Salts and Other Chemicals	x	x	x			x									
	Contaminants: Animal Waste and Other OrganicsN															
	Contaminants: Animal Waste and Other OrganicsP	x	x									x				
	Contaminants: Animal Waste and Other OrganicsK															
	Contaminants : Commercial FertilizerN															
	Contaminants : Commercial FertilizerP															
	Contaminants : Commercial FertilizerK															
	Contaminants: Residual Pesticides															
	Damage from Sediment Deposition	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

Land Capability Class on Cropland and Pastureland

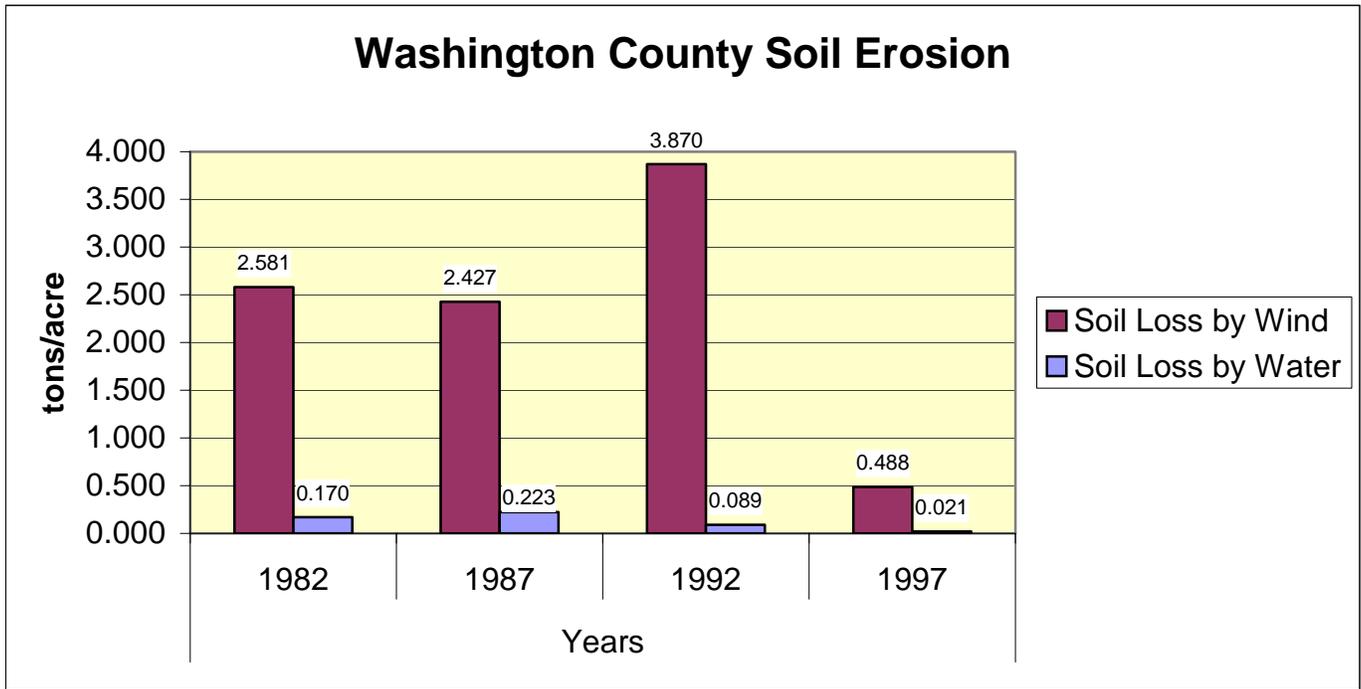


Land Capability Class

Class I - 5,344 acres Class II - 28,746 acres Class III - 76,470 acres Class IV - 1,675 acres

		Acres	Percentage
Land Capability Class (Irrigated Cropland & Pastureland Only)	I - slight limitations	5,344	4%
	II - moderate limitations	38,609	32%
	III - severe limitations	76,470	63%
	IV - very severe limitations	1,675	1%
	V - no erosion hazard, but other limitations	0	0%
	VI - severe limitations, unsuited for cultivation, limited to pasture, range, forest	0	0%
	VII - very severe limitations, unsuited for cultivation, limited to grazing, forest, wildlife	0	0%
	VIII - misc areas have limitations, limited to recreation, wildlife, and water supply	0	0%

Soil Erosion

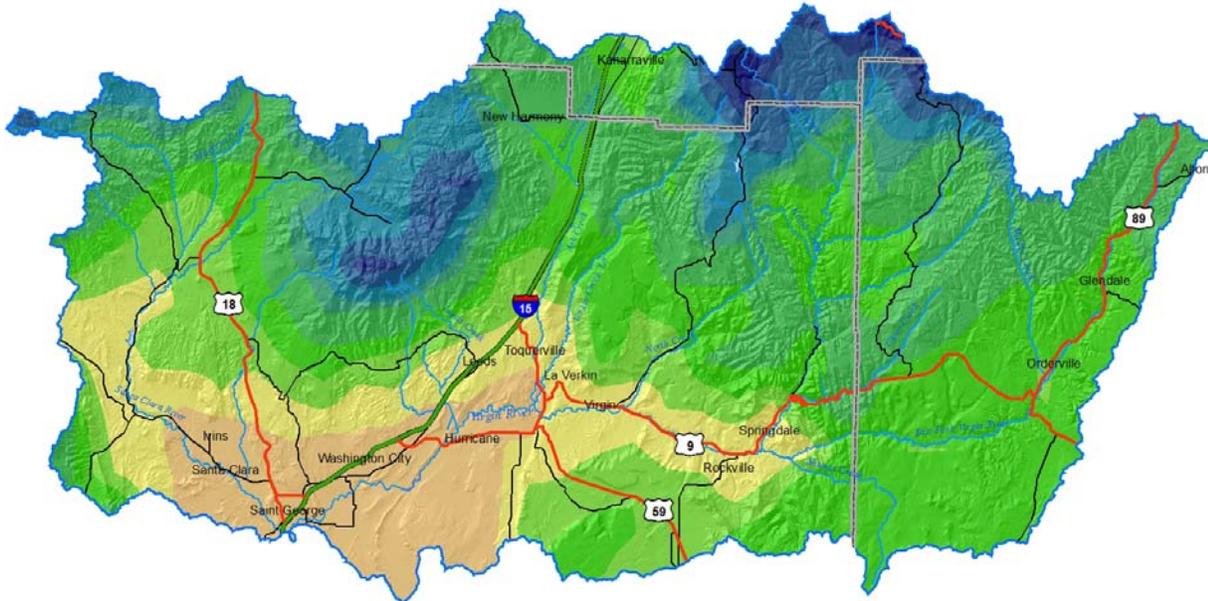


- ❖ Controlling erosion not only sustains the long-term productivity of the land, but also affects the amount of soil, pesticides, fertilizer, and other substances that move into the nation's waters.
- ❖ Through NRCS programs many farmers and ranchers have applied conservation practices to reduce the effects of erosion by water.

Resource Concerns – WATER

Categories	Specific Resource Concern / Issue	Crop	Hay	Pasture	Grazed Range	Grazed Forest	Pasture Native/Naturalized	Wildlife	Watershed Protection	Forest	Headquarters	Urban	Recreation	Water	Mined	Natural Area
Water Quantity	Water Quantity – Rangeland Hydrologic Cycle				X	X	X	X	X	X			X			X
	Excessive Seepage											X				
	Excessive Runoff, Flooding, or Ponding	X	X	X	X	X	X	X	X	X	X	X	X		X	X
	Excessive Subsurface Water															
	Drifted Snow															
	Inadequate Outlets		X									X				
	Inefficient Water Use on Irrigated Land	X	X	X												
	Inefficient Water Use on Non-irrigated Land	X														
	Reduced Capacity of Conveyances by Sediment Deposition	X	X	X												
	Reduced Storage of Water Bodies by Sediment Accumulation													X	X	
	Aquifer Overdraft	X	X													
	Insufficient Flows in Watercourses	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Water Quality, Groundwater	Harmful Levels of Pesticides in Groundwater															
	Excessive Nutrients and Organics in Groundwater															
	Excessive Salinity in Groundwater															
	Harmful Levels of Heavy Metals in Groundwater															
	Harmful Levels of Pathogens in Groundwater															
	Harmful Levels of Petroleum in Groundwater															
Water Quality, Surface	Harmful Levels of Pesticides in Surface Water															
	Excessive Nutrients and Organics in Surface Water	X	X											X		
	Excessive Suspended Sediment and Turbidity in Surface Water													X		
	Excessive Salinity in Surface Water															
	Water Quality – Colorado River Excessive Salinity													X		
	Harmful Levels of Heavy Metals in Surface Water															
	Harmful Temperatures of Surface Water													X		
	Harmful Levels of Pathogens in Surface Water															
Harmful Levels of Petroleum in Surface Water																

Precipitation and Streams



Annual Precipitation in Inches



		ACRES	ACRE-FEET
Irrigated Adjudicated Water Rights	Surface	30,515	
	Well	5,385	
	Total Irrigated Adjudicated Water Rights	35,900	0.00
Stream Flow Data	USGS 09408135 Virgin River AB Quail Creek near Hurricane, Utah	Total Avg. Yield	69,000
		MILES	PERCENT
Stream Data	Total Miles - Major (100K Hydro GIS Layer)		
	303d (DEQ Water Quality Limited Streams)		

		Irrigation Efficiency:		
		<40%	40 - 60%	>60%
Percentage of Total Acreage	Cropland	30%	30%	40%
	Pastureland	40%	40%	20%

Watersheds & Total Maximum Daily Load (TMDL)

Watershed Projects, Plans, Studies and Assessments			
NRCS Watershed Projects		NRCS Watershed Plans, Studies & Assessments	
Name	Status	Name	Status
Warner Draw	Evaluation for Watershed Rehabilitation	Washington Co. EWP	In Construction
		Warner Draw PL566 Watershed Plan - 1968	Complete-Flood Control - 10 dams
Washington Co. EWP	Complete	Virgin River Watershed Plan	Completed Plan and ready for implementation.
DEQ TMDL's		NRCS Comprehensive Nutrient Management Plans	
Name	Status	Number	Status
Virgin River TMDL	2005	1 0	Currently being planned Implemented

AFO/CAFO

Animal Feeding Operations (AFO)						
Animal Type	Dairy	Feed Lot (Cattle)	Poultry	Swine	Horses	Other
No. of Farms	0	35	0	0	11	11
No. of Animals						

Potential Confined Animal Feeding Operations (PCAFO)						
Animal Type	Dairy	Feed Lot (Cattle)	Poultry	Swine	Horses	Other
No. of Farms	0	3	0	0	2	2
No. of Animals						

Confined Animal Feeding Operations - Utah CAFO Permit					
Animal Type	Dairy	Feed Lot (Cattle)	Poultry	Horses	Other
No. of Permitted Farms	0	1	0	0	0
No. of Permitted Animals					

Resource Concerns – AIR, PLANTS, ANIMALS

Categories	Specific Resource Concern / Issue	Crop	Hay	Pasture	Grazed Range	Grazed Forest	Pasture Native/Naturalized	Wildlife	Watershed Protection	Forest	Headquarters	Urban	Recreation	Water	Mined	Natural Area
Air Quality	Particulate matter less than 10 micrometers in diameter (PM 10)	x	x									x	x			x
	Particulate matter less than 2.5 micrometers in diameter (PM 2.5)	x	x									x	x			x
	Excessive Ozone															
	Excessive Greenhouse Gas: CO2 (carbon dioxide)															
	Excessive Greenhouse Gas: N2O (nitrous oxide)															
	Excessive Greenhouse Gas: CH4 (methane)															
	Ammonia (NH3)											x				
	Chemical Drift															
	Objectionable Odors					x										
	Reduced Visibility															
	Undesirable Air Movement															
	Adverse Air Temperature		x	x	x								x			
Plant Suitability	Plants not adapted or suited				x	x	x	x		x						x
Plant Condition	Plant Condition – Productivity, Health and Vigor	x	x	x	x	x	x									
	Threatened or Endangered Plant Species: Plant Species Listed or Proposed for Listing under the Endangered Species Act				x	x		x		x						
	Threatened or Endangered Plant Species: Declining Species, Species of Concern				x	x		x		x						
	Noxious and Invasive Plants	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Forage Quality and Palatability	x	x	x												
	Plant Condition – Wildfire Hazard				x	x		x	x				x			x
Fish and Wildlife	Inadequate Food				x	x		x	x							
	Inadequate Cover/Shelter															
	Inadequate Water				x	x		x	x				x			x
	Inadequate Space															
	Habitat Fragmentation				x	x		x						x		
	Imbalance Among and Within Populations				x	x		x						x		
	Threatened and Endangered Species: Species Listed or Proposed for Listing under the Endangered Species Act				x	x		x						x		x
Domestic Animals	Inadequate Quantities and Quality of Feed and Forage		x	x	x	x			x							
	Inadequate Shelter															
	Inadequate Stock Water				x	x			x							
	Stress and Mortality															

Noxious Weeds

Utah Noxious Weed List

The following weeds are officially designated and published as noxious for the State of Utah, as per the authority vested in the Commissioner of Agriculture under Section 4-17-3, Utah Noxious Weed Act:

- Bermudagrass** (cynodon dactylon)
- Canada thistle (cirsium arvense)
- Diffuse knapweed (centaurea diffusa)
- Dyers woad (isatis tinctoria L)
- Field bindweed (Wild Morning Glory) (convolvulus arvensis)
- Hoary cress (cardaria drabe)
- Johnsongrass (sorghum halepense)
- Leafy spurge (euphorbia esula)
- Medusahead (taeniatherum caput-medusae)
- Musk thistle (carduus mutans)
- Perennial pepperweed (lepidium latifolium)
- Perennial sorghum (sorghum halepense L & sorghum alnum)
- Purple loosestrife (lythrum salicaria L.)
- Quackgrass (agropyron repens)
- Russian knapweed (centaurea repens)
- Scotch thistle (onopordum acanthium)
- Spotted knapweed (centaurea maculosa)
- Squarrose knapweed (centaurea squarrosa)
- Yellow starthistle (centaurea solstitialis)

** Bermudagrass shall not be a noxious weed in Washington County and shall not be subject to provisions of the Utah Noxious Weed Act within the boundaries of the county.

Additional noxious weeds declared by Washington County (2003): Poison Milkweed, Silverleaf Nightshade

Wildlife

The Utah Comprehensive Wildlife Conservation Strategy (CWCS) prioritizes native animal species according to conservation need. At-risk and declining species in need of conservation were identified by examining species biology and life history, populations, distribution, and threats. The following table lists species of greatest conservation concern in the county.

AT-RISK SPECIES				
	Common Name	Group	Primary Habitat	Secondary Habitat
FEDERALLY-LISTED				
Endangered:	California Condor (experimental)	Bird	Cliff	
	Virgin River Chub	Fish	Water - Lotic	Lowland Riparian
	Woundfin	Fish	Water - Lotic	
	Brown (Grizzly) Bear (extirpated)	Mammal	Mixed Conifer	Mountain Shrub
	Gray Wolf (extirpated)	Mammal	Mountain Shrub	Mixed Conifer
	Southwestern Willow Flycatcher	Bird	Lowland Riparian	Mountain Riparian
Threatened:	Mexican Spotted Owl	Bird	Cliff	Lowland Riparian
	Bald Eagle	Bird	Lowland Riparian	Agriculture
	Desert Tortoise	Reptile	Low Desert Scrub	
Candidate:	Relict Leopard Frog (extirpated)	Amphibian	Wetland	Water - Lotic
	Yellow-billed Cuckoo	Bird	Lowland Riparian	Agriculture
Proposed:	(None)			
STATE SENSITIVE				
Conservation Agreement Species:	Northern Goshawk	Bird	Mixed Conifer	Aspen
	Bonneville Cutthroat Trout	Fish	Water - Lotic	Mountain Riparian
	Bluehead Sucker	Fish	Water - Lotic	Mountain Riparian
	Virgin Spinedace	Fish	Water - Lotic	Lowland Riparian
	Flannelmouth Sucker	Fish	Water - Lotic	

Upper Virgin River HUC - # 15010008

Rapid Watershed Assessment

March 2007

Species of Concern:	Allen's Big-eared Bat	Mammal	Lowland Riparian	Pinyon-Juniper
	American White Pelican	Bird	Water - Lentic	Wetland
	Arizona Toad	Amphibian	Lowland Riparian	Wetland
	Big Free-tailed Bat	Mammal	Lowland Riparian	Cliff
	Black Swift	Bird	Lowland Riparian	Cliff
	Bobolink	Bird	Wet Meadow	Agriculture
	Burrowing Owl	Bird	High Desert Scrub	Grassland
	Common Chuckwalla	Reptile	High Desert Scrub	Low Desert Scrub
	Desert Iguana	Reptile	Low Desert Scrub	
	Desert Night Lizard	Reptile	Low Desert Scrub	Pinyon-Juniper
	Desert Springsnail	Mollusk	Wetland	
	Desert Sucker	Fish	Water - Lotic	
	Ferruginous Hawk	Bird	Pinyon-Juniper	Shrubsteppe
	Fringed Myotis	Mammal	Northern Oak	Pinyon-Juniper
	Gila Monster	Reptile	Low Desert Scrub	
	Greater Sage-grouse	Bird	Shrubsteppe	
	Kit Fox	Mammal	High Desert Scrub	
	Lewis's Woodpecker	Bird	Ponderosa Pine	Lowland Riparian
	Long-billed Curlew	Bird	Grassland	Agriculture
	Mojave Rattlesnake	Reptile	Low Desert Scrub	
	Pygmy Rabbit	Mammal	Shrubsteppe	
	Short-eared Owl	Bird	Wetland	Grassland
	Sidewinder	Reptile	Low Desert Scrub	
	Speckled Rattlesnake	Reptile	Low Desert Scrub	
	Spotted Bat	Mammal	Low Desert Scrub	Cliff
	Three-toed Woodpecker	Bird	Sub-Alpine Conifer	Lodgepole Pine
	Townsend's Big-eared Bat	Mammal	Pinyon-Juniper	Mountain Shrub
	Western Banded Gecko	Reptile	Low Desert Scrub	Pinyon-Juniper
	Western Red Bat	Mammal	Lowland Riparian	
	Western Threadsnake	Reptile	Lowland Riparian	Low Desert Scrub
Western Toad	Amphibian	Wetland	Mountain Riparian	
Wet-rock Physa	Mollusk	Cliff	Wetland	
Zebra-tailed Lizard	Reptile	Low Desert Scrub	Shrubsteppe	

*Definitions of habitat categories can be found in the Utah Comprehensive Wildlife Conservation Strategy.

The Utah CWCS also prioritizes habitat categories based on several criteria important to the species of greatest conservation need. The top ten key habitats state-wide are (in order of priority):

- 1) **Lowland Riparian** (riparian areas <5,500 ft elevation; principal vegetation: Fremont cottonwood and willow)
- 2) **Wetland** (marsh <5,500 ft elevation; principal vegetation: cattail, bulrush, and sedge)
- 3) **Mountain Riparian** (riparian areas >5,500 ft elevation; principal vegetation: narrowleaf cottonwood, willow, alder, birch and dogwood)
- 4) **Shrub steppe** (shrubland at 2,500 - 11,500 ft elevation; principal vegetation: sagebrush and perennial grasses)
- 5) **Mountain Shrub** (deciduous shrubland at 3,300 - 9,800 ft elevation; principal vegetation: mountain mahogany, cliff rose, bitterbrush, serviceberry, etc.)
- 6) **Water - Lotic** (open water; streams and rivers)
- 7) **Wet Meadow** (water saturated meadows at 3,300 - 9,800 ft elevation; principal vegetation: sedges, rushes, grasses and forbs)
- 8) **Grassland** (perennial and annual grasslands or herbaceous dry meadows at 2,200 - 9,000 ft elevation)
- 9) **Water - Lentic** (open water; lakes and reservoirs)
- 10) **Aspen** (deciduous aspen forest at 5,600 - 10,500 ft elevation)

Federally Listed Plants

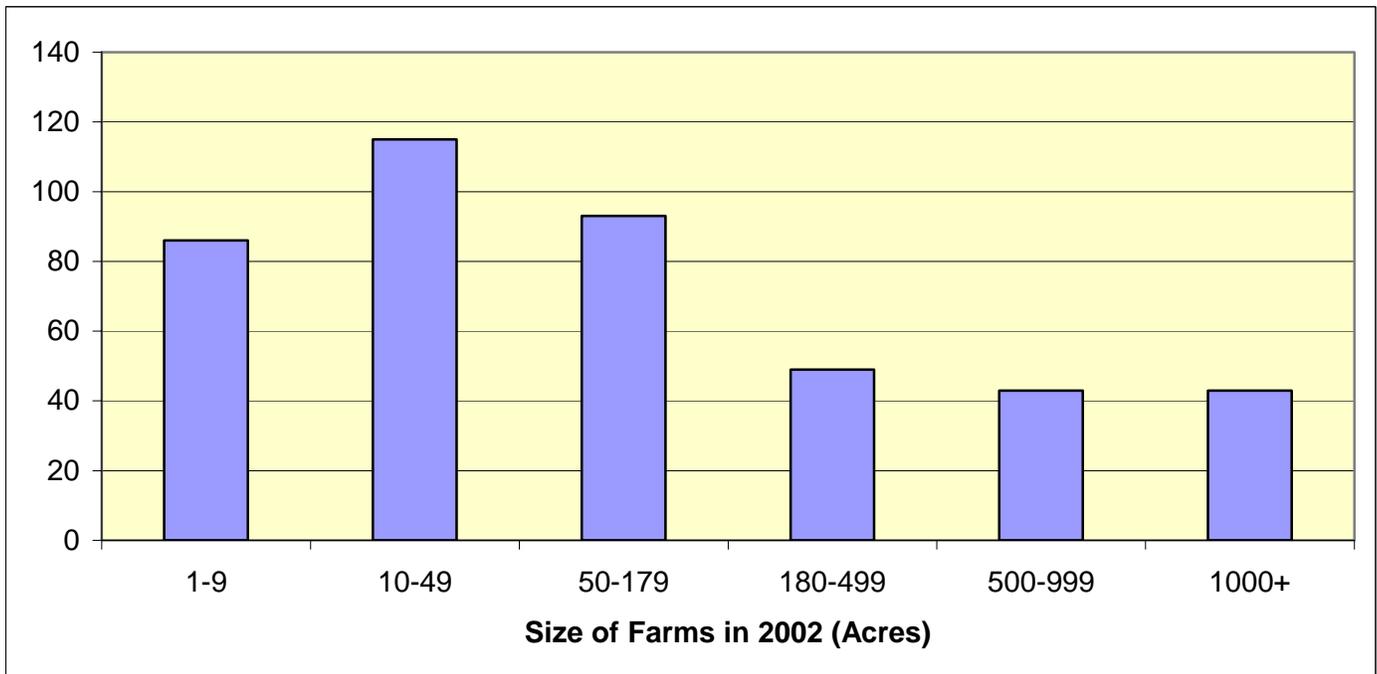
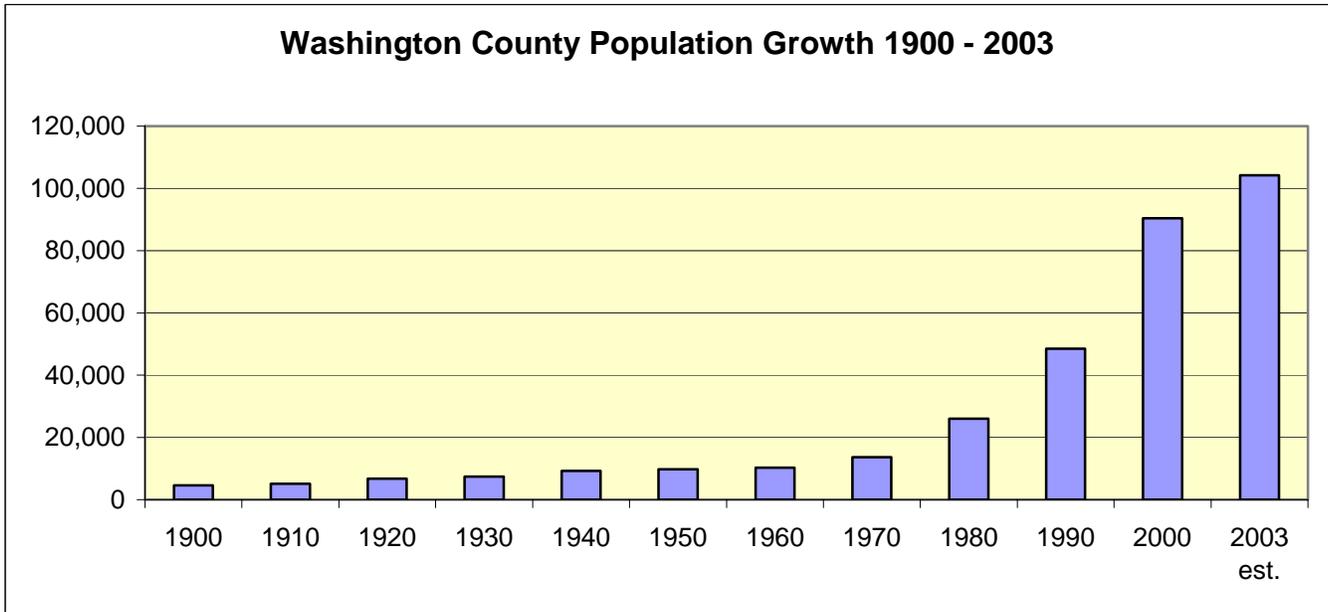
According to the Utah Division of Wildlife Resources (9/19/2006), there are records of occurrence for the following federally listed plants:

- Dwarf bear-claw poppy
- Paradox milkvetch
- Shivwits milkvetch
- Siler pincushion cactus
- Welsh's milkvetch

Resource Concerns – Social and Economic

Categories	Specific Resource Concern / Issue	Crop	Hay	Pasture	Grazed Range	Grazed Forest	Pasture Native/Naturalized	Wildlife	Watershed Protection	Forest	Headquarters	Urban	Recreation	Water	Mined	Natural Area
Social and Economic	Non-Traditional Landowners and Tenants	X	X	X	X	X	X	X		X				X		
	Urban Encroachment on Agricultural Land	X	X	X	X	X	X	X	X	X			X	X		X
	Marketing of Resource Products															
	Innovation Needs	X	X	X	X	X		X					X			X
	Non-Traditional Land Uses	X	X	X	X	X		X					X			X
	Population Demographics, Changes and Trends										X	X	X	X		
	Special Considerations for Land Mangement (High State and Federal Percentage)				X	X	X	X	X	X			X			X
	Active Resource Groups (CRMs, etc)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Full Time vs Part Time Agricultural Communities	X	X	X	X	X	X					X				
	Size of Operating Units	X	X	X												
	Land Removed from Production through Easments															
	Land Removed from Production through USDA Programs															
	Other															

Census and Social Data



Number of Farms: 481

Number of Operators:

- Full-Time Operators: 224
- Part-Time Operators: 257

Ft. Pierce Wash sub-watershed – potential practices to reduce loadings & impacts (TMDL Study-Virgin River Watershed, 2004)

Practice Name	Intensity Level
Construction Site Management	Passive Management
Irrigation Water Management	Passive Management
Nutrient Management	Passive Management
Residue Management	Passive Management
Cover Crop	Active Management
Exotic Removal	Active Management
Seeding	Active Management
Filter Strip	Active Management
Pole/Post Plantings	Active Management
Waste Utilization	Active Management
Erosion Control Fabric	Mild Engineering
Silt Fence	Mild Engineering
Straw Bale	Mild Engineering
Detention Basin	Moderate Engineering
Rock Vane	Moderate Engineering
Rock Weir	Moderate Engineering
Toe Rock	Moderate Engineering
Irrigation Pipeline	Moderate Engineering
Irrigation Sprinklers	Moderate Engineering
Irrigation Tail water Recovery	Moderate Engineering
Cross-Vane Weir Diversion	Intense Engineering
Rock Rip-Rap	Intense Engineering
Stream Channel Stabilization	Intense Engineering

Estimated Load reductions to Virgin River – Washington Fields area to Arizona state line (UTDEQ, TMDL study – Virgin River, 2004)

Practice Name	Extent of Practice	Estimated Impact to Source Categories	Resulting Load Reduction (kg/yr)
Load reduction resulting from Santa Clara River TMDL			1,911,820
Water Conservation	Continued water conservation efforts to reduce urban runoff and dry weather flows	25 percent reduction from urban dry weather and storm flows	1,003,628
Pole/Post Plantings	Targeted restoration of poor streambank conditions	1 percent reduction in streambank erosion	944,678
Exotic Removal	Remove salt cedar to improve instream flows and reduce loadings	Improve flow conditions, resulting in decreased TDS concentrations equivalent to a 2 percent reduction in overall load	3,473,000
Detention Basin	Install detention basins in targeted locations to capture urban dry weather and storm flows	25 percent reduction from urban dry weather and storm flows	1,003,628
Irrigation Pipeline	Install additional irrigation pipeline to increase efficiencies by reducing the number of open conveyances (ditches, canals, etc.)	Improving efficiencies by 5 percent will reduce load from irrigation return flows by 15 percent	522,317
Total Estimated Load Reduction			8,859,071
Total Necessary Load Reduction (from TMDL Analysis)			8,640,720

Public Survey/Questionnaire Results:

**Washington County Resource Assessment Survey Project
Dixie Soil Conservation District
July 20, 2005**

The E&I Soil Conservation District received 73 resource assessment surveys from citizens/stakeholders in Iron County from;

1. Dixie SCD Resource Assessment Meeting/Tour/Barbeque
2. Dixie SCD Conservation Tree Program
3. Color Country RC&D Meeting

Top Five Concerns that should be addressed immediately:

- | | |
|--|-----|
| 1. Soil Loss/Erosion on Land/Stream Channels | 72% |
| 1. Wildfire Hazard | 72% |
| 2. Loss of Open Space or Agricultural Lands | 68% |
| 3. Urban/suburban growth | 60% |
| 4. Adequate Water Supply for Desired Uses | 56% |
| 4. Ground Water Quality & Quantity | 56% |
| 5. Storm Water Runoff & Flooding | 48% |

Top Five Concerns that should be addressed in the future:

- | | |
|--|-----|
| 1. Air Quality, Including dust, Pollutants | 60% |
| 1. Recreational Opportunities | 60% |
| 2. Plant Health, Production, and Adequate Quantities | 48% |
| 3. Soil contamination due to salts, chemicals, and other | 44% |
| 4. Adequate Food, Water and Cover for Livestock | 40% |
| 4. Adequate Support of Historic/Prehistoric Resources | 40% |
| 5. Adequate Marketing for Ag Products | 36% |
| 5. Adequate Energy Sources Available | 36% |
| 5. Storm runoff or flooding | 36% |
| 5. Soil Condition Due to Compaction or Other Changes | 36% |

Washington County Survey Demographics:

Gender – 22 Responses

Male - 73%
Female – 27%

Age – 25 Responses

18-24 – 0%
25-38 – 24%
39- 50 – 20%
51-65 – 40%
65+ - 16%

Race/Ethnicity – 23 Responses

European/Caucasian – 91%
Native American – 4%
Other – 4%
Hispanic – 0%

13 Responses

Ag Producers - 67%
Non-Ag Producers – 33%

Footnotes / Bibliography

1. Location and land ownership maps made using GIS shape files from the Automated Geographical Reference Center (AGRC), a Utah State Division of Information Technology. Website: <http://agrc.utah.gov/>
2. Land Use/Land Cover layer developed by the Utah Department of Water Resources. A polygon coverage containing water-related land-use for is used on all 2003 agricultural areas of the state of Utah. Compiled from initial USGS 7.5 minute Digital Raster Graphic water bodies, individual farming fields and associated areas are digitized from Digital Orthophotos, then surveyed for their land use, crop type, irrigation method, and associated attributes.
3. Prime and Unique farmlands derived from SURGO Soils Survey UT607 and Soil Data Viewer. Definitions of Prime and Unique farmlands from U.S. Geological Survey, http://water.usgs.gov/eap/env_guide/farmland.html#HDR5
4. Land Capability Classes derived from SURGO Soils Survey UT607 and Soil Data Viewer.
5. Tons of Soil Loss by Water Erosion data gathered from National Resource Inventory (NRI) data. Estimates from the 1997 NRI Database (revised December 2000) replace all previous reports and estimates. Comparisons made using data published for the 1982, 1987, or 1992 NRI may produce erroneous results. This is due to changes in statistical estimation protocols, and because all data collected prior to 1997 were simultaneously reviewed (edited) as 1997 NRI data were collected. In addition, this December 2000 revision of the 1997 NRI data updates information released in December 1999 and corrects a computer error discovered in March 2000. For more information: <http://www.nrcs.usda.gov/technical/NRI/>
6. Precipitation data was developed by the Oregon Climate Service at Oregon State University using average monthly or annual precipitation from 1960 to 1990. Publication date: 1998. Data was downloaded from the Resource Data Gateway, <http://dgateway-wb01.lighthouse.itc.nrcs.usda.gov/lighthouse>
7. Irrigated Adjudicated Water Rights obtained from the Utah Division of Water Rights.
8. Stream Flow data from NRCS Snow Survey Stream flow forecast data.
10. Stream length data calculated using ArcMap and 100k stream data from AGRC and 303d waters from the Utah Department of Environmental Quality.
11. Watershed information from NRCS data.
12. The 2003 noxious weed list was obtained from the State of Utah Department of Food and Agriculture. For more information contact Steve Burningham, 801-538-7181 or visit their website at http://ag.utah.gov/plantind/noxious_weeds.html
13. Wildlife information derived from the Utah Division of Wildlife Resources' Comprehensive Wildlife Conservation Strategy (CWCS) (<http://wildlife.utah.gov/cwcs/>) and from the Utah Conservation Data Center (<http://dwrcdc.nr.utah.gov/ucdc/>).
14. County population data from the U.S. Census Bureau, Utah Quick Facts, <http://www.fedstats.gov/qf/states/49/49053.html>

15. Farm information obtained from the National Agricultural Statistics Service, 2002 Census of Agriculture. <http://www.nass.usda.gov/census/census02/volume1/index2.htm>
16. Information adapted from the County Resource Assessment initiative, 2005, Utah Department of Agriculture and Food (UDAF), NRCS, and the Utah Association of Conservation Districts. <http://www.ut.nrcs.usda.gov/technical/nri/RA-county.html>
17. Virgin River Watershed Management Plan, February 2006 - <http://www.google.com/search?hl=en&rls=GGLR%2CGGLR%3A2005-44%2CGGLR%3Aen&q=virgin+river+tmdl+2004+utah+pdf>
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