

**WATERSHED RESTORATION ACTION PLAN  
SNOW CANYON WATERSHED**

**RESERVE, GLENWOOD and WILDERNESS RANGER DISTRICTS,  
GILA NATIONAL FOREST**

**September 30, 2011**



T Bar Grasslands near Feathery Hill, 2011

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## **1. Summary**

### **a. Watershed Name and HUC:**

The proposed watershed is Snow Canyon (150400010503), see Figure 1.

### **b. General Location:**

Snow Canyon watershed is located in the Reserve Ranger District and minor portions of the Glenwood and Wilderness Ranger Districts, of the Gila National Forest, within Catron County New Mexico. Catron County population is 3,750 (2010 census). The towns of Reserve and Glenwood are the largest in Catron County, with populations of 1,228 and 338, respectively. Silver City (population 9,882, in Grant County) is the largest community in the area, approximately 90 road miles from the watershed boundary. The watershed is accessible on Forest Road 141, approximately 29 miles from Reserve; and on Highway 180 and Forest Road 28 and NM 159, approximately 34 miles from Glenwood.

There are no permanently-occupied dwellings in the watershed. Buildings associated with the Forest Service campground at Snow Lake, and the Snow Lake dam are the only significant developments in the watershed.

### **c. Total Watershed Area: NFS area within watershed:**

The watershed is 31,354 acres. All but 6.6 acres, which are private land (0.02%), is managed by NFS.

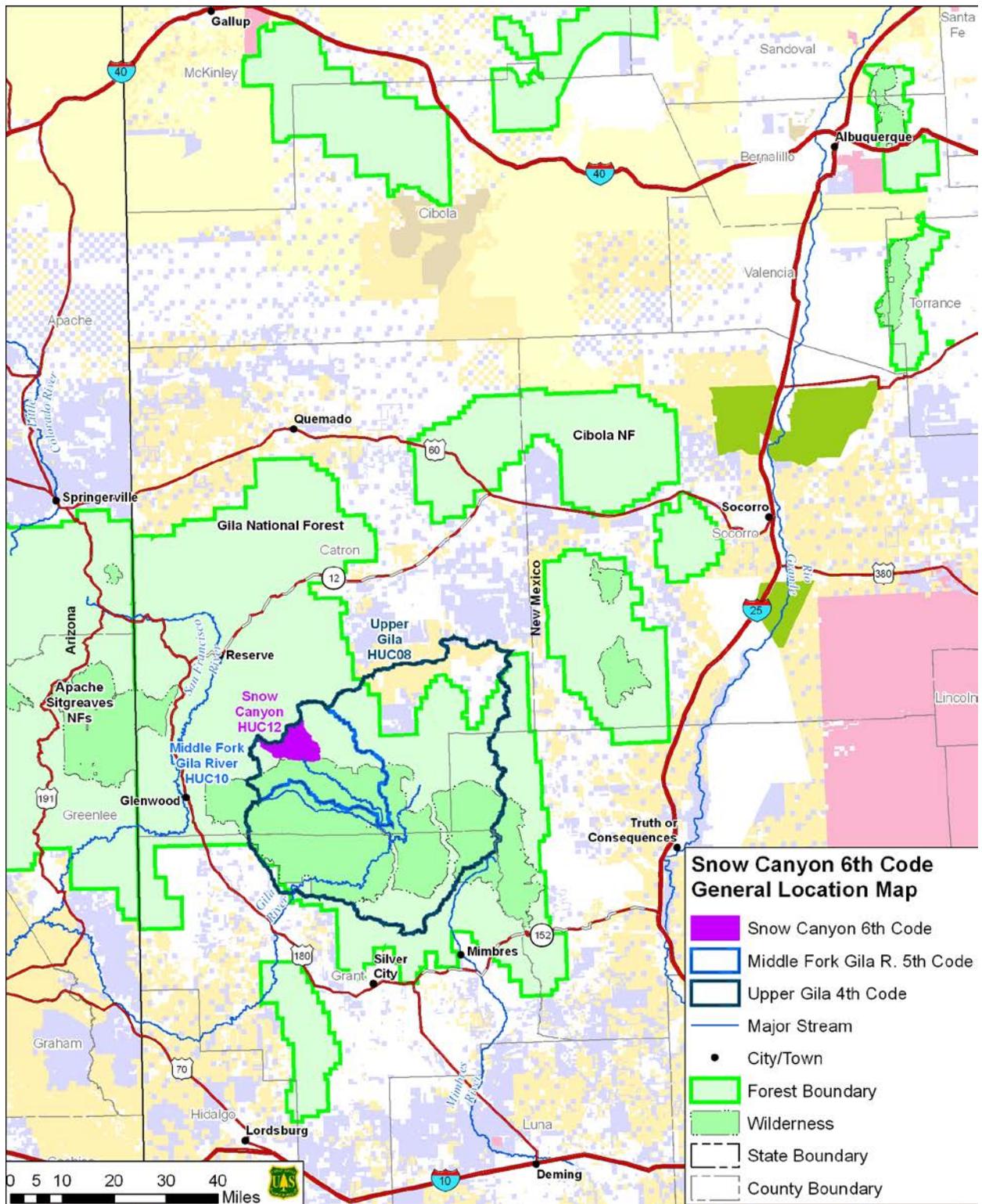


Figure 1. Snow Canyon Location Map

**d. Watershed Characterization:**

i. **General Physiography:**

The Snow Canyon watershed is located in the central highlands of the Gila National Forest. It is a high elevation watershed (average being greater than 8,000 feet) with comparatively subdued topography. Snow Canyon is within the larger Middle Fork Gila River fifth code watershed and provides controlled inflow to the river below Snow Lake.

The watershed supports significant stands of pine, mixed conifer, and expansive grasslands. Its relative remoteness, extensive rolling grasslands, camping and hiking opportunities, and year-round access to hunting and fishing, make the Snow Canyon watershed a very popular and heavily used region of the Gila National Forest. Snow Lake is one of only three fishing lakes in the Gila National Forest.

ii. **Land Use:**

The Snow Canyon watershed lies within the southern portion of Management Area 6B (MA6B) (Gila National Forest Plan, 1986 pp 178-185). The entire Management Area is 249,267 acres on the Reserve Ranger District. MA6B is bounded on the south by Snow Lake and the Gila Wilderness. Vegetation includes mixed conifer, Ponderosa pine, riparian, pinyon/juniper, and mountain grassland. The primary game species include elk, deer, turkey, and antelope. Other game and nongame species occupy the area, including those species associated with riparian habitats.

Management emphasis for MA6B is to manage the area to provide for a long-term increase of herbaceous forage for wildlife. Coniferous and woodland forest habitats will be managed to provide a quality and quantity of habitat that compliments the level of herbaceous forage and cover for this area. Management of the wilderness resource will be directed toward protecting and restoring natural conditions and maintaining the physical and biological characteristics of the wilderness environment. Suitable timber and fuelwood will be managed to provide sustained yields. Range activities will be managed in conjunction with maintaining other management emphases of the area.

Select Standards and Guidelines applicable to the Snow Canyon watershed area (Gila National Forest Plan, 1986):

- Planning emphasis is placed on big game and threatened and endangered (T&E) species. T&E species will receive priority over other species where needs are identified through approved recovery plans.
- Riparian treatments (planting, seeding, protection fencing, etc.) are applied to areas of low condition to meet Regional riparian goals.
- Habitat improvement emphasis is placed on game fish with maintenance of existing populations of native fish species.
- Habitat areas and primary species emphasized in MA6B associated with Snow Canyon is Snow Lake and trout species.
- Key habitat (Wildlife) areas include Gilita Ridge which provides key habitat within Snow Canyon watershed area.
- Unsatisfactory condition rangelands will be treated through implementation of approved allotment management plans.
- In addition to the non-structural range improvement work scheduled for accomplishment. 7,552 acres of new invasion pinyon/juniper and 9,658 acres of new invasion pine have been identified. The treatment of these additional acres can be accomplished if funding becomes available through other means.

- When fire management planning is completed, utilize unplanned ignitions when within established prescriptions to accomplish fuel management goals. Prescribed fires will be used to reduce natural fuels on at least 4,000 acres per decade.
- Prescribed fire will be used to control invasion of woody and tree species into natural openings, grasslands, and meadows. Unplanned ignitions when within the prescription will also be used.
- Gila Wilderness (Class I area) - Maintain high quality visual conditions. The form, line, texture, and color of characteristic landscapes will be clearly distinguishable when viewed as middle ground. Cultural resources and ecosystems will remain unmodified by air pollutants. Determine baseline information and the background condition of the above Air Quality Related Values and specify limits of acceptable change that will affirmatively protect these values in Class I areas (Approximately 8,400 acres are in Class I).

Most of the Snow Canyon watershed is utilized for cattle grazing, with 97% of the watershed included in the T Bar allotment, and minor portions of the Deep Creek, Y Canyon, and Corner Mountain allotments. The T Bar allotment is grazed yearlong with yearlings, with recent monitoring information indicating that authorized numbers are in balance with available forage. The moderate and high severity burned areas of the Bear Fire area were rested for three consecutive growing seasons immediately following the fire.

Some areas in the watershed are occasionally logged. A privately-run saw mill in the town of Reserve is partly supported from trees removed from Snow Canyon.

Recreational activities enjoyed by the public include boating, fishing, camping, picnicking and hiking. Many of these activities also occur within the nearby Gila Wilderness. The Snow Canyon watershed supports significant game populations. Both bow and rifle hunts for deer, elk, turkey, and other game are popular activities.

Snow Lake is one of only 3 fishing lakes in the Gila National Forest. The lake is currently stocked with rainbow trout on an annual basis. Number of fish stocked in recent years has declined due to poor water quality in the lake. Fishing activity projections by the New Mexico Department of Game and Fish for Snow Lake indicate that approximately 9,621 fish are harvested during 3,718 angler/days per year (Trout Unlimited, 2001).

Snow Lake Dam was constructed in the 1960s to provide fishing and recreational activities. Originally the lake had a permanent capacity of 570 acre feet over 55 acres. A maximum of 1,500 acre feet and 100 acre area would occur at the principal spillway level. An evaporation consumptive use water right of 129.8 acre feet per year was granted based on the 55 acre permanent pool. Lake expansions in the 1970s to 1,500 acre feet and 100 acres resulted in the requirement of an additional 105.8 acre feet evaporation water right.

There are two Northern Goshawk Post-Fledgling Family Areas (PFAs) within the watershed. Both these areas were burned in the 2006 Bear Fire.

Mexican spotted owls, threatened, are common in the watershed. Over 50% of the watershed is designated Mexican Spotted Owl critical habitat, with portions of twelve Primary Activity Centers (PACs) located within the watershed. Many of these were negatively impacted during the Bear Fire.

iii. **General Overview of Concerns:**

Portions of the Snow Canyon watershed were burned in the 2006 Bear Fire, with high to moderate burn severity throughout much of the watershed. Natural resource conditions diminished immediately after the fire, but have been on a slow upward trend. Monsoonal precipitation events on burned areas led to onsite degradation of many stream channels within the watershed and loss of soil in the uplands. While the area was seeded within days of the fire's suppression, slow germination processes led to excessive runoff and erosion occurring during the first 2 to 3 years. This watershed is currently rated as impaired with the primary drivers being degraded watershed and riparian conditions, negative impacts to water quality and negative impacts to the Snow Lake recreation area and sport fishery. Negative effects are primarily attributed to the Bear Fire. With a limited amount of projects improving watershed function, riparian condition, and water quality in drainages and Snow Lake, this watershed is expected to move upward to Functional – At Risk Condition within 3-5 years. While the watershed is moving in the direction of Functional – At Risk as a function of time following the Bear Fire, projects targeted at improving resource concerns should further guarantee an upward advancement in condition class.

iv. **Important Ecological Values:**

- **Outstanding Natural Resource Waters (ONRW)**—The Middle Fork Gila River is an ONRW and is located immediately downstream of Snow Lake, beginning at the confluence of Snow Canyon and Gilita Creek. All perennial and intermittent waters in the Gila Wilderness are considered ONRWs.
- **Stronghold native fish habitat** – Loach minnow and spikedace are found in the Middle Fork Gila River immediately downstream of the Snow Canyon watershed. These species are both considered threatened under the Endangered Species Act, and are both proposed to be reclassified to endangered. Critical habitat for both species has been designated downstream of the watershed. Activities impacting water quality will have direct effects downstream to their critical habitat.
- **Class I airshed** – The Gila Wilderness is immediately adjacent to the south of Snow Canyon watershed and is a Class I airshed.
- **Fishery**: Snow Lake is one of only three recreational fishing lakes within Gila National Forest. It is being considered as a future site for Gila trout (threatened) introduction.
- **Sensitive species** – The narrowheaded garter snake is found within the watershed just below Snow Lake and is on the Regional Forester's sensitive species list. The headwater chub, candidate for Endangered Species Act listing, is found downstream of the watershed.
- **Special Trout Waters** – Gilita Creek upstream of its confluence with Snow Canyon is designated as Special Trout Waters. Many recreationists park at the Snow Lake Trailhead to reach this unique fishing opportunity in the immediate vicinity of the Snow Canyon Watershed.

v. **Current Condition Class:**

Snow Canyon watershed has a score of 2.3, rating it as Impaired.

**Target Condition Class:**

The target condition class for Snow Canyon is Functional at Risk. This is currently the only impaired watershed on the Gila National Forest.

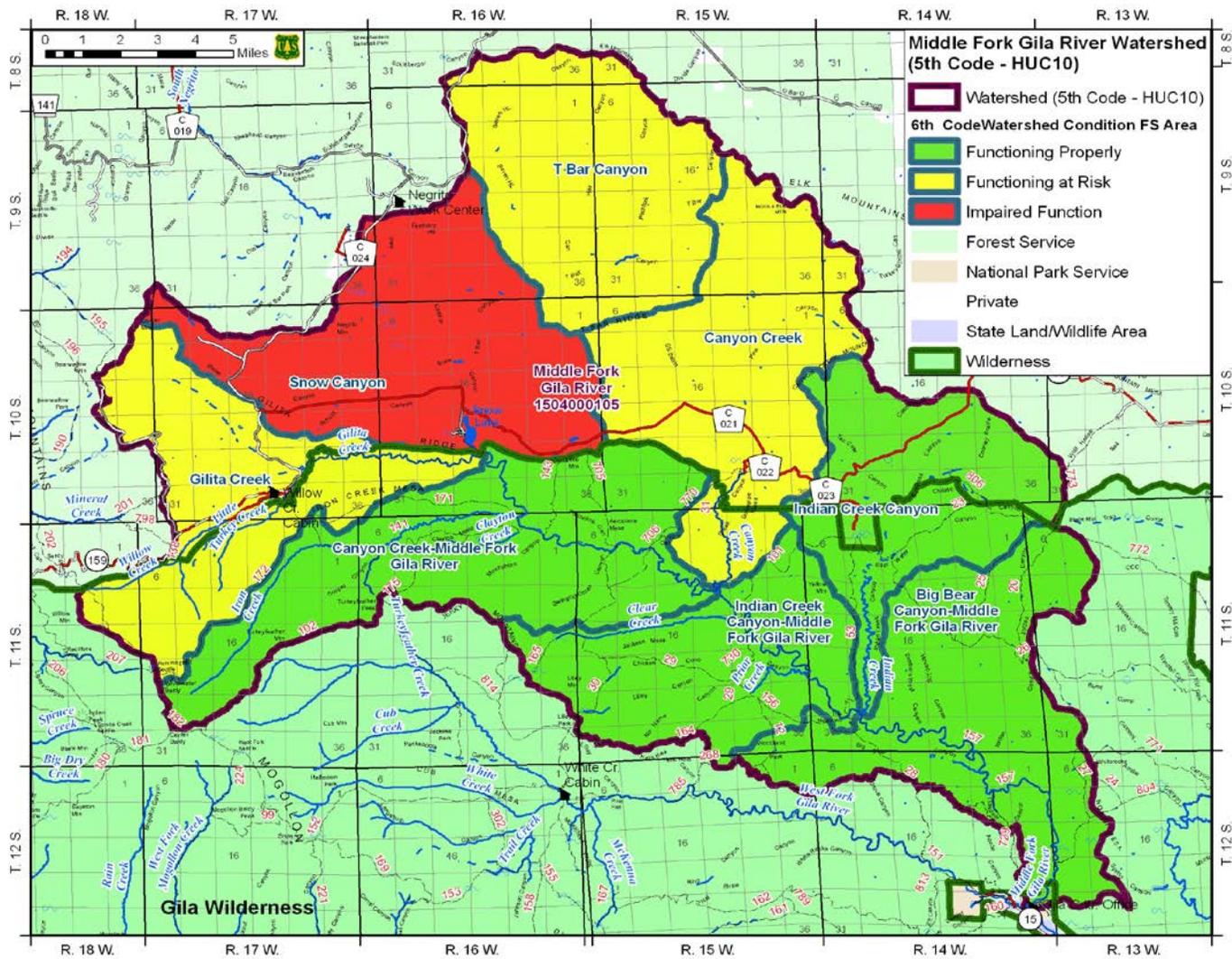


Figure 2. Condition Class Ratings for Middle Fork Gila River 5<sup>th</sup> Code Watershed

**e. Key Watershed Issues**

1 – Attributes/Indicator within FS control to affect – See Table 1 below. The Snow Canyon watershed is almost entirely under the jurisdiction of the Gila National Forest. Snow Lake is managed as a recreational fishery by the New Mexico Game and Fish Department; however, the Forest Service is a close partner in its management and implementation of activities addressing water quality and aquatics. Most roads within the watershed are under the jurisdiction of the Gila National Forest, with the exception of County Road C021 that leads to Snow Lake and continues east.

**SNOW CANYON WATERSHED CONDITION INDICATORS**

INDICATOR	ATTRIBUTE	Attribute Score	Indicator Score	Weight	REASON FOR RATING
<b>Aquatic Physical</b>					
1 <i>Water Quality</i>	Impaired Waters (303d Listed)	2	2.5	10%	Middle Fork Gila River is currently on the NM 303(d) list of impaired water bodies as not meeting its designated use of high quality coldwater aquatic life. Probably causes for impairment are cited as water temperature, turbidity and aluminum
	Water Quality Problems (Not Listed)	3			
2 <i>Water Quantity</i>	Flow Characteristics	3	3.0	10%	Snow Lake alters natural flow regime. Construction of Snow Lake Dam in the mid-1960s provided for a permanent capacity of 570 acre feet over 55 acres. A maximum of 1,500 acre feet and 100 surface acre area would occur at the principal spillway level. An evaporation consumptive use water right of 129.6 acre feet per year was granted based on the 55 acre permanent pool.
3 <i>Aquatic Habitat</i>	Habitat Fragmentation	3	3.0	10%	Historic perennials now drying up (T Bar, Snow Creek), Snow Lake Dam, Snow Canyon Tank
	Large Woody Debris Channel Shape and Function	n/a 3			

INDICATOR	ATTRIBUTE	Attribute Score	Indicator Score	Weight	REASON FOR RATING
<b>Aquatic Biota</b>					
4 <i>Aquatic Biota</i>	Life Form Presence	3	3.0	15%	Natives are gone, partially due to drying and nonnative introductions. Snow Lake dam and dam's influence downstream
	Native Species	3			
	Exotic and/or Invasive Species	3			
5 <i>Riparian/Wetland Vegetation</i>	Vegetation Condition	2	2.0	15%	Some reaches are Proper Functioning Condition and some are Functional at Risk – short perennial reach in T Bar Canyon above T Bar Tank negatively impacted by livestock

INDICATOR	ATTRIBUTE	Attribute Score	Indicator Score	Weight	REASON FOR RATING
<b>Terrestrial Physical</b>					
6 Roads and Trails	Open Road Density	2	1.7	15%	Calculated score
	Road Maintenance	2			County road to Snow Lake is in good shape. Others mostly Maintenance Level 2 with few BMPs
	Proximity to water	1			Calculated score
	Mass wasting	n/a			
7 Soils	Soil Productivity	2	1.7	15%	General Ecosystem Survey information
	Soil Erosion	2			Some areas of Bear Fire still experiencing negative effects
	Soil Contamination	1			No known contaminants

INDICATOR	ATTRIBUTE	Attribute Score	Indicator Score	Weight	REASON FOR RATING
<b>Terrestrial Biological</b>					
8 Fire Regime or Wildfire	Fire Condition Class or	2	2.0	2%	Watershed has had a lot of recent fires (Bear 2006, Middle 2002)
	Wildlife Effects	n/a			
9 Forest Cover	Loss of Forest Cover	3	3.0	2%	2006 Bear Fire
10 Rangeland Vegetation	Vegetation Condition	1	1.0	2%	T Bar Allotment - 2004 Range data analysis; 2009 consultation information, 2010 production information, professional judgment by District Range Staff; Overall not contributing to current degraded watershed conditions, with exception of small riparian area in T Bar Canyon above T Bar Tank.
11 Terrestrial Invasive Species	Extent and Rate of Spread	1	1.0	2%	No known populations
12 Forest Health	Insects and Disease	1	1.0	2%	No known populations
	Ozone	1			Calculated score

Watershed Average Score 2.1  
Watershed Weighted Score 2.3

## 2—Attributes beyond FS control to affect – other parties needed to address

The Forest Service has the ability to influence and/or address all attributes with assistance of partners and cooperators. Snow Lake does impede the natural hydrology, thus the attributes of Aquatic Biota and Aquatic Habitat will always be negatively impacted unless the lake is removed and stream channels restored to their natural state. The New Mexico Game and Fish Department has jurisdiction over Snow Lake Dam.

County Road C021 to Snow Lake is under the jurisdiction of Catron County. The Forest Service will work with the County as a partner to address issues related to this road, in particular immediately above Snow Lake where the French drain is proposed, as described in Section 3.C.

The small amount of private land located within the watershed is beyond Forest Service control; however this parcel is not contributing to current degraded watershed conditions.

## **2. Watershed Characteristics and Conditions**

### **a. General Context/Overview of the Watershed.**

Snow Canyon Watershed occupies a central high and comparatively undissected portion of the Mogollon Plateau in the Gila National Forest. Highest watershed elevation is 9,938 feet at Corner Mountain in the Mogollon Mountains which form the watershed's western divide. Lowest elevation is 7,267 feet in Snow Canyon at its confluence with Gilita Creek to form the Middle Fork of the Gila River. The mean watershed elevation is 8,038 feet.

The watershed drains School, Snow, Quaking Aspen, T-Bar, Ewe and Seven HL Canyons. All are ephemeral or intermittent, except for a small reach in Snow Canyon around Snow Canyon Tank. The watershed is divided nearly evenly between forest and grasslands. These high elevation grasslands between Ewe and T Bar Canyons and along the flanks of Feathery Hill are among the most visually striking features of the forest.

Snow Lake receives all runoff from these streams. The lake was constructed in the 1960s from damming Snow Canyon about ¼ mile above its confluence with the Middle Fork of the Gila River. The Lake has a maximum area of 100 acres, and a maximum volume of 1,500 acre feet. Normal discharge is through a controlled outlet works above the permanent pool elevation along with some groundwater seepage, which maintains a 570 acre foot lake volume. The spillway elevation is 7,445 feet. It is managed as a recreational (fishing) lake by the New Mexico Department of Game and Fish and is described in more detail below. There are no available records of lake levels or discharge rates.

The geologic setting is within the Mogollon-Datil volcanic field of southwestern New Mexico (Elston, 2008). The Mogollon Plateau (Ratte et al, 1989) is the central core of the Mogollon-Datil volcanic field. Volcanic eruptions from numerous volcanoes coalesced to form the volcanic field between 24 and 40 million years ago. This feature, which includes the mountainous terrain of the Gila Wilderness, covers 40,000 square kilometers. Volcanic activity migrated from the Organ Mountains near Las Cruces toward the northwest, ending with the eruption of the 28 million year old Bursum caldera northwest of Silver City.

The northern edge of the Bursum caldera extends into the southern half of the Snow Canyon watershed, although its location is hidden beneath volcanic rocks from more recent volcanic activity.

Feathery Hill is a recently erupted volcano (approximately 2.3 million years; Ratte, 2001) along the north watershed boundary. Its lava has covered much of the area now covered by grasslands.

The climate of the area is typical of the arid southwest, with mostly clear skies, limited precipitation and low humidity. Precipitation is nearly equally divided between summer and winter, with the latter season averaging slightly greater amounts. The climate of the Snow Canyon Watershed is similar, but because of its elevation and placement within the central highland area, has milder temperatures and greater precipitation than occurs within the surrounding valleys. Precipitation records are not available for the watershed. The nearest station with long term records is the Beaverhead Ranger Station (1938-pres, elevation 6,670 feet), where the average yearly precipitation is 14.6 inches and the average yearly snow accumulation is 20 inches; the average temperatures are 30 degrees F in January and 67 degrees F in July (Western Regional Climate Center). The nearest Snotel Station is on Silver Creek Divide (1980-pres, elevation 9,000 feet), about 12 miles southwest of Snow Lake. On average, snow was present 99 days per year with a maximum depth of 106 inches. The average yearly precipitation at this station is 36.1 inches (1985-2001); the average temperatures are 27 degrees F in January and 58 degrees F in July (1990-2002) (Compiled by William Moir, 2004).

The State precipitation map indicates average annual precipitation in the vicinity of the watershed is between 20 and 25 inches. The PRISM precipitation map (NRCS, 2010) indicates that annual precipitation in the watershed varies between 21 inches along the east boundary to 35 inches along the highest elevations along the west boundary. This distribution indicates that the drainages with the highest precipitation are Quaking Aspen and Snow Canyons. These two drainages are most likely the greatest contributors to flow in the watershed.

There are a number of springs in the watershed, many of which are used for stock water. None are monitored for flow. Groundwater discharges to the surface above Snow Canyon Tank (Photo 1) and maintains a perennial flow in Snow Creek for a short distance. A water well at the Snow Lake campground provides potable water for use. Several stock wells are also scattered throughout the watershed. These wells obtain small amounts of water from fractures and seams within the volcanic rocks (Trauger, 1960).



T Bar Grasslands, 2011



Snow Lake, 2011

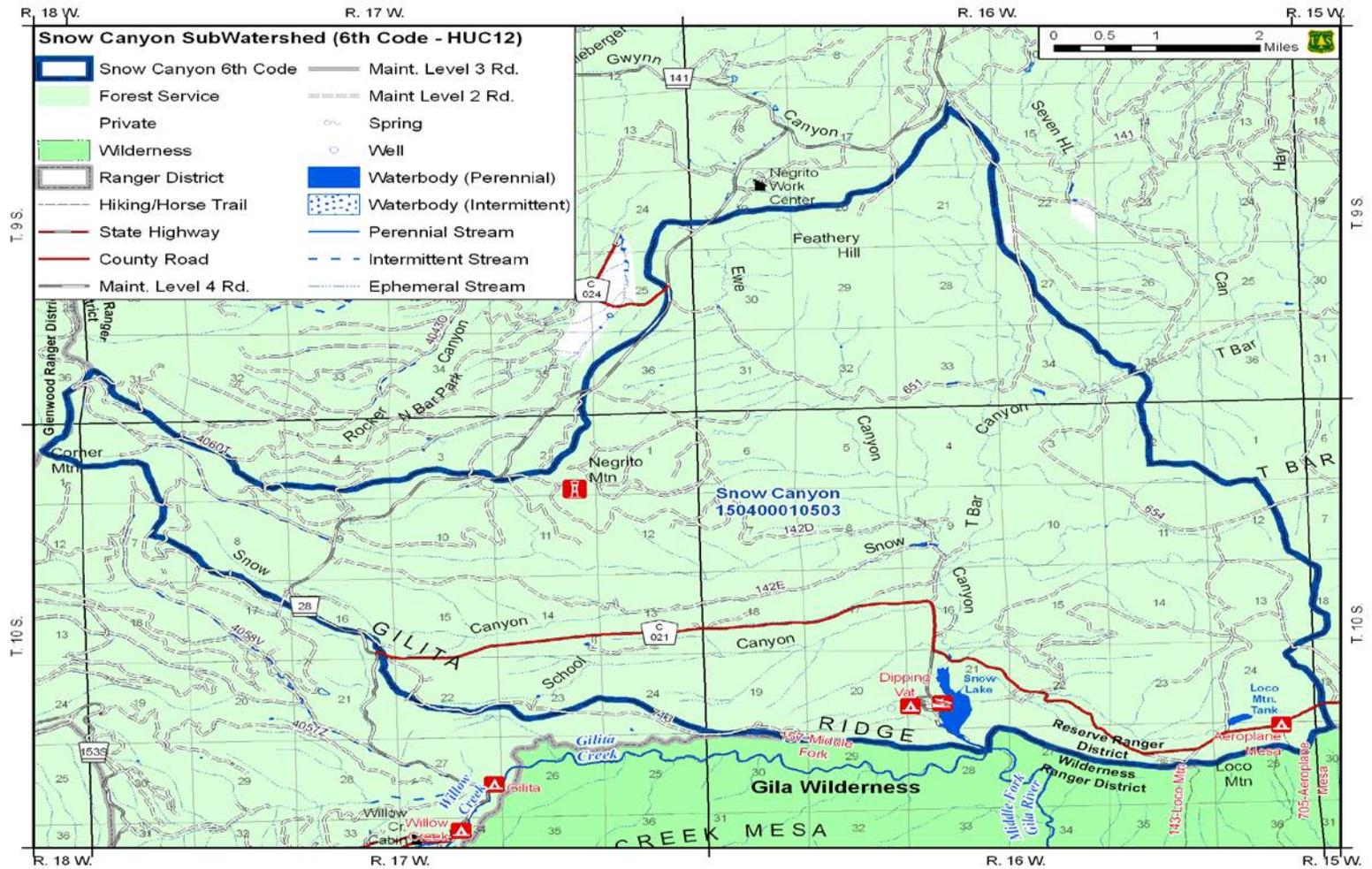


Figure 3. Snow Canyon 6<sup>th</sup> Code Watershed

## **b. Watershed Conditions.**

As listed in Table 1, the overall condition class of the watershed is Impaired with an indicator score of 2.3. Some of the important indicators are:

### **In-channel habitat conditions:**

**Water Quality:** Water quality is implicated in the high population of *Lernaea*, a parasitic copepod that causes lesions in the muscle and skin tissue of fish, in Snow Lake. This parasite has also been found below Snow Lake in the Middle Fork of the Gila River, diminishing the aquatic habitat. Water quality has also been impacted in the watershed as a result of the 2006 Bear Fire, which resulted in higher sedimentation rates in stream channels and in Snow Lake. Livestock grazing immediately along the lake shores is likely contributing some additional nutrients to the lake which may be contributing to water quality issues.

**Water Quantity:** Since the construction of Snow Lake Dam, the contributing flow regime to the Middle Fork of the Gila has been altered, and the overall quantity reduced due to the impounded water and consequent higher evaporation quantities.

**Aquatic Habitat:** Habitat fragmentation has been observed in T Bar Canyon, Snow Canyon and Quaking Aspen Canyon over the past two decades. Historically perennial reaches have dried up and associated riparian habitat has decreased. Increased erosion from head cuts and channel incision has been observed in many of these drainages, in particular following recent wildfires.

**Aquatic Biota:** The above mentioned influences of Snow Lake on downstream flows and the introduction and spread of non-native fish species in the lake have impacted native species and downstream flow conditions.

### **Uplands/Hillslope conditions:**

A large degree of forest cover has been lost over the past decade between the 2002 Middle Fire and the 2006 Bear Fire. Cumulatively, more than 15,000 acres were classified as high severity burn in the watershed as a result of both fires.

Noxious weed threats have been a concern following 2006 burn. Spotted knapweed was found in an adjacent watershed and the Reserve Ranger District has monitored the area closely to ensure that this population has not spread to other areas, including the Snow Canyon watershed.

Soil erosion has occurred in the uplands from loss of forest cover following the Bear Fire. Seeding efforts have helped to reduce soil loss; however some degree of erosion is still occurring.

Forest roads in the watershed were negatively impacted following the Bear Fire due to an increase in stormflow runoff processes. Lack of ground cover in the uplands resulted in excessive soil and water movement, which subsequently damaged road/stream crossings in addition to creating new channels.

### **Riparian conditions:**

Riparian vegetation associated with portions of T Bar Canyon, Snow Canyon, and Quaking Aspen Canyon has been negatively impacted from recent drying trends, grazing management,

roads, and the Bear Fire. Many of these reaches have either dried up or downcut from post-fire flood flows, reducing the amount of riparian vegetation in the watershed.

The Middle Fork Gila River, located immediately downstream of Snow Lake, is currently on the New Mexico 303(d) list of impaired water bodies. Probable causes of impairment are listed as Aluminum, water temperature, and turbidity. The Snow Canyon watershed is one of the primary headwater watersheds for the Middle Fork Gila River.



Snow Canyon below Snow Canyon Tank, 2011



Snow Canyon watershed conditions post-Bear Fire, 2006

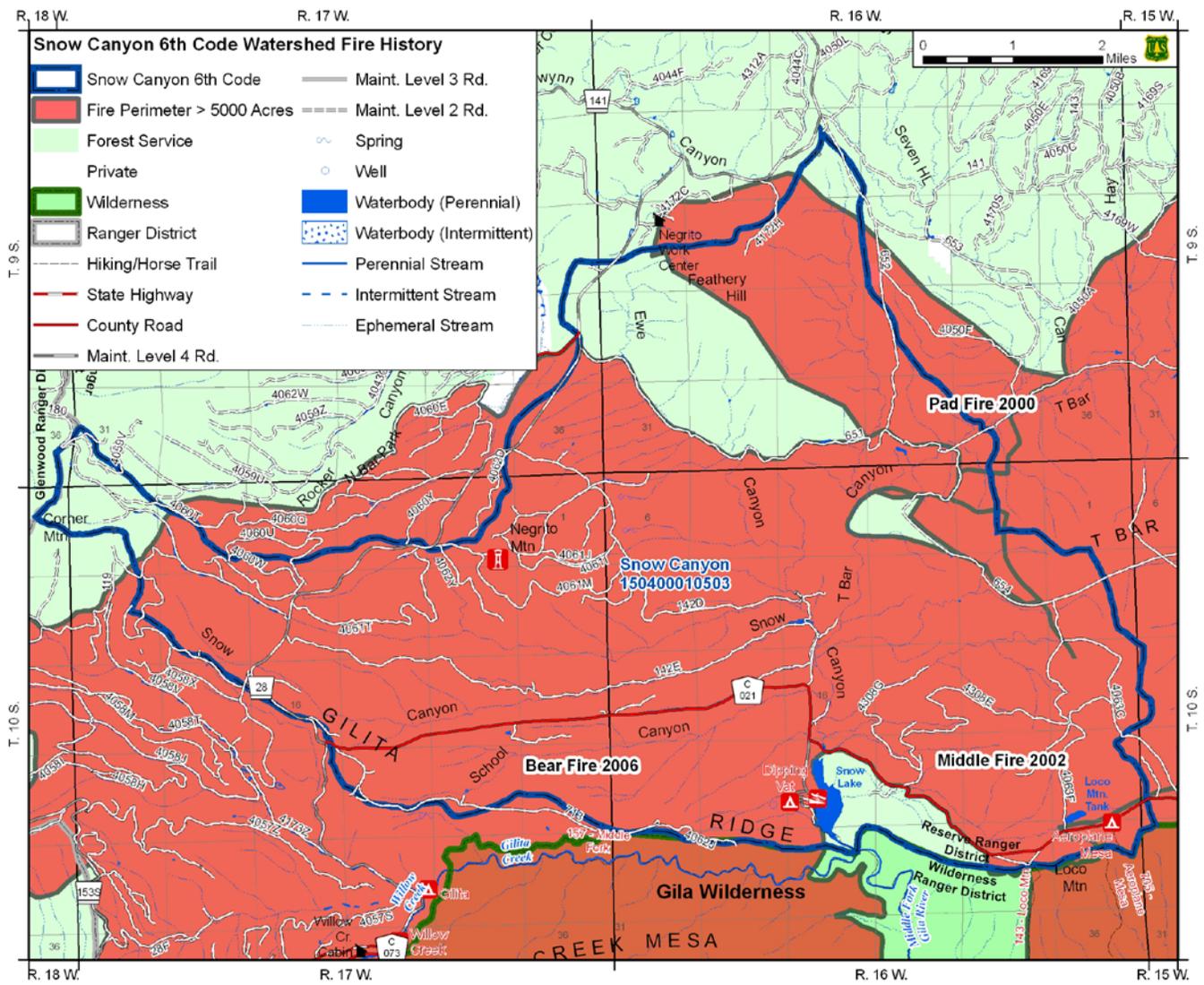


Figure 4. Snow Canyon Watershed Recent Fire History

### 3. Restoration Goals, Objectives, and Opportunities

#### a. Goal Identification and Desired Condition.

The Forest's goals for the Snow Canyon watershed include reestablishing riparian and upland vegetation, improving channel stability across the watershed, and improving overall water quality within streams and waterbodies. Reaching these goals would assist in achieving the goal of moving the watershed out of an impaired condition class and into the Functional - At Risk category.

Desired Condition objectives are focused primarily on improvement of water quality within the watershed. If water quality indicators can be raised from impaired to functional at risk, the overall watershed condition will improve from impaired to functional at risk. Watershed conditions have been on an upward trend due to natural processes and time. Water quality is the most reasonable indicator to focus on, as continued improvement in stream channel conditions, riparian conditions, and aquatic habitat conditions will further advance and hasten improvement across the watershed.

The following items denote specific desired conditions that will be focused on:

- Reestablish herbaceous vegetation on upland slopes where the Bear Fire burned;
- Reestablish forested conditions in some areas;
- Improve aesthetic appearance of burned area;
- Utilized Snow Lake as a Gila trout fishery;
- Improve water quality in Snow Lake;
- Remove *Lernaea* from Snow Lake;
- Improve water quality in Snow Canyon below Snow Lake and into Middle Fork Gila River;
- Increase riparian vegetation in Snow Canyon, School Canyon and Quaking Aspen Canyon;
- Improve road drainage in roads of all maintenance levels across the watershed;
- Reduce sediment movement in watershed drainage network and ultimately into Snow Lake;
- Protect upland meadows and grasslands from conifer encroachment;
- Utilize water quantity (water rights) more efficiently in watershed; and
- Improve Dipping Vat Campground drainage.

#### b. Objectives

##### i. Alignment with National, Regional, or Forest Priorities.

This watershed is the sole Impaired Gila National Forest watershed on the 2011 Watershed Condition Classification map. It has a high potential for completing work and moving it into the Functional at Risk condition class within a 3-5 year timeframe.

Objectives include: restoring of safety, physical and biological integrity, and human use/enjoyment. The plan will utilize interdisciplinary teams and partners as appropriate in assessment and environmental analysis of proposed activities. The plan will also continue to add site-specific information as it becomes available.

An estimated 15,000 acres burned with high intensity on the Bear Fire. Priorities for treatment have been high-severity burn areas with good rehabilitation potential and need, moderately burned areas with specific needs, and all areas with values at risk. It is recognized that climate will be a major

factor, and some treated areas have failed during major weather events. “Good” rehabilitation potential is a site-specific evaluation by resource specialists, considering a variety of factors.

Restoration goals and objectives for the Snow Canyon watershed tie into National priorities based on the guidance in the 2007-2012 Forest Service Strategic Action Plan (<http://fsweb.wo.fs.fed.us/rpa/index.htm>) which outlines the following goals:

- Goal 1: Restore, Sustain and Enhance the Nation’s Forests and Grasslands;
- Goal 2: Provide and sustain Benefits to the American People;
- Goal 3: Conserve Open Space
- Goal 4: Sustain and Enhance Outdoor Recreation Opportunities

Restoration goals and objectives for the Snow Canyon watershed tie into Regional priorities based on the guidance in the Southwestern Region Action Plan ([http://fsweb.r3.fs.fed.us/action\\_plan/](http://fsweb.r3.fs.fed.us/action_plan/)) which provides for the following:

- Assist Communities Adjacent to Forests
- Forest and Rangeland Restoration

Restoration goals and objectives for the Snow Canyon watershed tie into Forest priorities based on Gila National Forest 2011 priorities which state the following:

- Accomplish vegetation treatment targets that protect communities,
- Reduce the risk of catastrophic wildfire,
- Restore watershed functionality, and
- Promote economic development and community vitality through biomass production, stewardship projects and infrastructure development.

Specifically related to Snow Canyon watershed is a long term post-fire restoration plan for the Bear Fire (2006) area. Included in that plan for long-term priorities after emergency rehabilitation treatments are:

- Soil and water stabilization
- Retrieval of merchantable products as a tool to facilitate objectives and contribute to the restoration of fire-adapted ecosystems.

Alignment with State or local goals.

Objectives to improve water quality and overall watershed health and integrity in Snow Canyon are aligned with partner goals and objectives as documented below:

- The New Mexico Environment Department – Surface Water Quality Bureau’s mission is to preserve, protect, and improve New Mexico’s surface water quality for present and future generations. A water quality survey of Snow Lake is being undertaken by NMED in 2011 to assess designated use attainment and provide information to the public on the condition of surface water quality in this area.
- New Mexico Game and Fish’s mission is to provide and maintain an adequate supply of wildlife and fish within the state of New Mexico by utilizing a flexible management system that provides for their protection, conservation, regulation, propagation, and for their use as public recreation and food supply.
- Trout Unlimited’s mission is to conserve, protect, and restore North America’s coldwater fisheries and their watersheds.

- Mesilla Valley Flyfishers was founded in Las Cruces in 1987 and has the goals of conserving, restoring, and educating through flyfishing.

## **Opportunities**

### **ii. Partnership Involvement.**

- i. New Mexico Game and Fish Department will assist in planning and implementation of activities impacting Snow Lake
- ii. New Mexico Environment Department will assist in planning, funding, and monitoring of activities throughout the watershed.
- iii. Trout Unlimited, National organization and Gila-Rio Grande Chapter, will assist in implementation of activities in perennial and intermittent streams and at Snow Lake.
- iv. Mesilla Valley Flyfishers will assist in implementation of activities in perennial and intermittent streams and at Snow Lake.
- v. Wellness Coalition AmeriCorps/Youth Conservation Corps will assist in implementation of activities at Snow Lake.
- vi. Aldo Leopold High School Youth Conservation Corps will assist in implementation of activities at Snow Lake.,
- vii. Catron County Youth Conservation Corps will assist in implementation of activities at Snow Lake.

### **iii. Outcomes/Output**

#### **Performance Measure Accomplishment.**

- miles of stream improved/enhanced;
- acres of soil and water improved/enhanced;
- acres of lake improvement;
- structures maintained/improved;
- miles of trail maintained;
- acres of hazardous fuel treatment;
- acres of forest health improved;
- acres of wildlife habitat restored/improved;
- acres of forest health improved;

#### **Socioeconomic Considerations.**

Implementation of essential projects has the potential to benefit local economies by providing for local contracts; revenue from supplies purchased in local communities; increased value as a recreational destination leading to more tourist dollars spent in surrounding communities; and job creation through the Wellness Coalition and Youth Conservation Corps. This watershed can additionally serve as an outdoor classroom for Aldo Leopold High School and other local institutions interested in teaching conservation education.

1. **Additional R3 Guidance :**

- iv. *Maintains and protects cultural values at risk:*
  - i. *Are there any acequias, or acequia associations, within or dependent on the watershed? NO*
  - ii. *Does the watershed serve any Tribal, Land Grant, or small historical non-incorporated communities? NO*
  - iii. *Are there portions of water delivery features, such as acequias, dams, old power generation plants, or mills that were historically dependent on water from the watershed? NO Do these features qualify as historical or heritage sites under the National Historic Preservation Act? NO*
- v. *Supports local infrastructure:*
  - i. *Is this a municipal watershed? NO*
  - ii. *If not, does the watershed supply water to local communities (rural or small non-incorporated towns or villages, fire departments, local parks? NO*
  - iii. *Does the watershed support agriculture or other local industries that require high water utilization, such as computer chip manufacturing or some types of wood products processing? NO*
- vi. *Utilizes local contractors, workforce and resources*
  - i. *Are there local backhoe operators (or other heavy equipment), contracting companies who build and line ditches and canals/pipelines in the area that specifically service water-associated infrastructure? YES*
  - ii. *Can you estimate how many workers these companies employ, or what such jobs entail? 10-20*
  - iii. *Does the Forest contract with such companies for ditch or pipeline maintenance? YES If so, estimate the annual cost of such maintenance? \$5,000-\$30,000, depending on project/year*

**c. Specific Project Activities (Essential Projects)**

The following list of projects includes those identified to improve and, ultimately maintain watershed conditions. Not all projects are deemed necessary to move condition class from Impaired to Functional - At Risk. Implementation and completion of Essential Projects 1-4 are estimated to be the minimum required to move the watershed into the Functional - At Risk Condition Class. Essential Projects 5-10 will continue improvement of the watershed and ensure that it does not regress back into the Impaired state.

**1. Essential Project #1 – RAC Snow Lake Enhancement Project**

- a. Attribute/Indicator Addressed – Water Quality/Water Quality Problems not Listed
- b. Project Description – The project seeks to enhance the recreational experience at Snow Lake by maintaining existing infrastructure, fixing trails, planting cottonwoods and willows, reducing sedimentation, and improving water quality.

- c. Partners Involvement – New Mexico Game and Fish Department, New Mexico Environment Department, Trout Unlimited, Mesilla Valley Flyfishers, Wellness Coalition AmeriCorps/Youth Conservation Corps, Aldo Leopold High School, Youth Conservation Corps, Gila National Forest
  - d. Timeline: Starting in 2011 and continuing for 2 years
  - e. Estimated costs and associated Budget Line Item - \$156,440 Total; \$109,380 are already funded by the Resource Advisory Committee under the Secure Rural Schools Public Law 1100343 – Title II. Other dollars would come from partnership funds.
2. **Essential Project #2 – Riparian Improvement**
- a. Attribute/ Indicator Addressed – Riparian/Wetland Vegetation/Vegetation Condition
  - b. Project Description – This project proposed to plant woody riparian vegetation on degraded streambanks of Snow Canyon, Quaking Aspen Canyon, T Bar Canyon, and School Canyon to provide for revegetation and bank stabilization. Some livestock enclosures may be warranted.
  - c. Partners Involvement: New Mexico Environment Department
  - d. Timeline: Starting in 2012 and continuing for 3 years
  - e. Estimated costs and associated Budget Line Item - \$45,000 /NFVW
3. **Essential Project #3 – Water Source Development**
- a. Attribute/ Indicator Addressed – Water Quality/Water Quality Problems Not Listed
  - b. Project Description: This project will develop an alternative water source(s) for livestock associated with the T Bar Allotment. Livestock currently utilize a waterlot on the east side of Snow Lake, which has led to degraded shoreline conditions and negative water quality impacts. A new location out of sight of the lake will be selected to drill a well. A 3 acre-foot water right would be purchased to cover the well if a Forest-held right is not available. Livestock fencing will implemented along the shoreline. Improvements/maintenance will be made to existing water sources within the watershed.
  - c. Partners Involvement: T Bar Allotment permittee,
  - d. Timeline: Starting in 2012 and continuing for 1 year
  - e. Estimated costs and associated Budget Line Item – \$44,500 Total; Design = \$2,500, Well drilling at remote location = \$30,000, 3 acre-foot water right = \$12,000 / NFVW
4. **Essential Project #4 – Sediment Reduction & Snow Lake French Drain**
- a. Attribute/ Indicator Addressed – Water Quality/Water Quality Problems not Listed
  - b. Project Description: This project will involve the installation of small rock check dams and sediment traps in burned drainages and above stream road crossings. It also includes the reconstruction of a French drain above Snow Lake on County Road C021, by raising the road bed and installing multiple staged culverts. After the Bear Fire, many channels in the watersheds downcut due to large flow volumes and little herbaceous cover. These sediment basins will stop or slow down sediment slows downstream and encourage overbanking and redevelopment of floodplains.
  - c. Partners Involvement: New Mexico Environment Department
  - d. Timeline: Starting in 2013 and continuing for 2 years
  - e. Estimated costs and associated Budget Line Item = \$160,000 / NFVW/CMRD
5. **Essential Project #5 – Snow Lake Water Quality Improvement (Solar Bees and fencing)**
- a. Attribute/ Indicator Addressed – Water Quality/Water quality problems (not listed)

- b. Project Description – Install two solar water circulators in Snow Lake to improve water quality and fish habitat at Snow Lake. Solar water circulators have been shown to improve dissolved oxygen and pH, decrease turbidity, and prevent fish kills and algae blooms. An aesthetic recreation fence will also be installed around Snow Lake to prevent motorized off-road travel around the lake. Currently, there are several two-track roads adjacent to the lake, which funnel sediment into the lake during stormflow events.
  - c. Partners Involvement: New Mexico Game and Fish Department, New Mexico Environment Department
  - d. Timeline: Starting in 2012 and continuing for future years
  - e. Estimated costs and associated Budget Line Item – \$135,000 Total, 2 circulators @ \$50,000 each = \$100,000 for first year; Wooden fence around Snow Lake = \$25,000 / NFWF/NFVW, see cost spreadsheet
- 6. Essential Project #6 – T-Bar Grassland Maintenance**
- a. Attribute/ Indicator Addressed – Fire Regime/Fire Regime Condition Class
  - b. Project Description – This project will provide for grassland maintenance of the large T-Bar grasslands. This grassland area is one of the largest grasslands on the Gila National Forest and currently is seeing ponderosa pine encroachment on the grassland edges and movement into interior portions. Pine trees will be thinned from the fringes of the grasslands and within interior pine stringers.
  - c. Partners Involvement:
  - d. Timeline: Starting in 2013 and continuing for 3 years
  - e. Estimated costs and associated Budget Line Item = \$210,000 / NFVW/WFHF/NFTM
- 7. Essential Project #7 – Road Improvement**
- a. Attribute/ Indicator Addressed – Roads and Trails/Road and Trail Maintenance
  - b. Project Description: This project will focus on improving best management practices for road drainage on Maintenance Level 3 and 2 roads within the Snow Canyon watershed. BMPs will include improvement of lead out ditches, road dips, and inlet and outlet features of culverts and road/stream crossings.
  - c. Partners Involvement: Catron County
  - d. Timeline: Starting in 2012 and continuing for 4 years
  - e. Estimated costs and associated Budget Line Item = \$162,500/ CMRD
- 8. Essential Project #8 – Burnt Cabin Tank Thinning**
- a. Attribute/ Indicator Addressed – Fire Regime or Wildfire/Fire Regime Condition Class
  - b. Project Description: This project will focus on reestablishing an upland meadow buffer around Burnt Cabin Tank. Additional upland meadows and wetlands will be identified that may offer future projects designed to improve filtering capacity in the watershed.
  - c. Partners Involvement:
  - d. Timeline: Starting in 2013 and continuing for 1 year
  - e. Estimated costs and associated Budget Line Item = \$85,000 / NFTM/NFVW/WFHF
- 9. Essential Project #9 – Snow Lake Water Right Survey**
- a. Attribute/ Indicator Addressed – Water Quantity
  - b. Project Description – Approximately 60 acre-feet of water rights are currently being used at Snow Lake for evaporation purposes. These water rights were based on

evaporation requirements during Enlargements 2 and 3 during the construction of Snow Lake. Sediment accumulation in the upper end of Snow Lake may have reduced the maximum surface area of the lake, possibly freeing up Gila National Forest water rights. A resurvey of Snow Lake’s surface area will confirm the actual amount of water rights necessary for non-consumptive use. Excess rights can be used in other areas of need or placed into a Conservation Plan in the Gila River Basin.

- c. Partners Involvement: New Mexico Office of the State Engineer
- d. Timeline: Starting in 2012 and continuing for 1 years
- e. Estimated costs and associated Budget Line Item – survey work = \$10,000 / NFVW/NFLM

**10. Essential Project #10 – Dipping Vat Campground Drainage Improvement**

- a. Attribute/ Indicator Addressed – Water Quality/Water quality problems (not listed)
- b. Project Description – This project proposes to improve drainage features at campground sites and roads. Storm water runoff is currently washing out interior roads in the campground and depositing gravel and sediment into campsites. Best management practices will be implemented to divert water off of roads more efficiently and effectively and into buffer zones away from campsites.
- c. Partners Involvement:
- d. Timeline: Starting in 2012 and continuing for 3 years
- e. Estimated costs and associated Budget Line Item – \$82,500 / NFRW/NFVW/CMRD

**d. Costs:**

Essential Projects	Planning	Design	Implementation	Project Monitoring	Project Totals
<b># 1 RAC Snow Lake RAC Enhancement Project</b>					
FS Contribution	\$ 7,240				\$ 7,240
Partner Contribution (both in kind and \$)			\$ 33,775	\$ 6,045	\$ 39,820
Funding already obtained			\$ 109,380		\$ 109,380
<b>Total</b>	<b>\$ 7,240</b>	<b>\$ -</b>	<b>\$ 143,155</b>	<b>\$ 6,045</b>	<b>\$ 156,440</b>
<b>#2 Riparian Improvement</b>					
FS Contribution	\$ 5,000		\$ 15,000	\$ 2,500	\$ 22,500
Partner Contribution (both in kind and \$)			\$ 20,000	\$ 2,500	\$ 22,500
<b>Total</b>	<b>\$ 5,000</b>	<b>\$ -</b>	<b>\$ 35,000</b>	<b>\$ 5,000</b>	<b>\$ 45,000</b>
<b>#3 Water Source Development</b>					
FS Contribution	\$ 2,500	\$ 42,000			\$ 44,500
Partner Contribution (both in kind and \$)					\$ -
<b>Total</b>	<b>\$ 2,500</b>	<b>\$ 42,000</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ 44,500</b>
<b>#4 Sediment Reduction and Snow Lake French Drain</b>					
FS Contribution	\$ 10,000	\$ 25,000	\$ 120,000		\$ 155,000
Partner Contribution (both in kind and \$)				\$ 5,000	\$ 5,000
<b>Total</b>	<b>\$ 10,000</b>	<b>\$ 25,000</b>	<b>\$ 120,000</b>	<b>\$ 5,000</b>	<b>\$ 160,000</b>
<b>#5 Snow Lake Water Quality Improvement</b>					
FS Contribution	\$ 5,000		\$ 71,000	\$ 4,000	\$ 80,000

<b>Essential Projects</b>	<b>Planning</b>	<b>Design</b>	<b>Implementation</b>	<b>Project Monitoring</b>	<b>Project Totals</b>
Partner Contribution (both in kind and \$)			\$ 50,000	\$ 5,000	\$ 55,000
<b>Total</b>	<b>\$ 5,000</b>	<b>\$ -</b>	<b>\$ 121,000</b>	<b>\$ 9,000</b>	<b>\$ 135,000</b>
<b>#6 T Bar Grassland Maintenance</b>					
FS Contribution	\$ 10,000	\$ 25,000	\$ 170,000	\$ 5,000	\$ 210,000
Partner Contribution (both in kind and \$)					\$ -
<b>Total</b>	<b>\$ 10,000</b>	<b>\$ 25,000</b>	<b>\$ 170,000</b>	<b>\$ 5,000</b>	<b>\$ 210,000</b>
<b>#7 Road Improvement</b>					
FS Contribution	\$ 10,000	\$ 25,000	\$ 120,000	\$ 5,000	\$ 160,000
Partner Contribution (both in kind and \$)				\$ 2,500	\$ 2,500
<b>Total</b>	<b>\$ 10,000</b>	<b>\$ 25,000</b>	<b>\$ 120,000</b>	<b>\$ 7,500</b>	<b>\$ 162,500</b>
<b>#8 Burnt Cabin Tank Thinning</b>					
FS Contribution	\$ 7,500	\$ 75,000			\$ 82,500
Partner Contribution (both in kind and \$)				\$ 2,500	\$ 2,500
<b>Total</b>	<b>\$ 7,500</b>	<b>\$ 75,000</b>	<b>\$ -</b>	<b>\$ 2,500</b>	<b>\$ 85,000</b>
<b>#9 Snow Lake Water Right Survey</b>					
FS Contribution			\$ 10,000		\$ 10,000
Partner Contribution (both in kind and \$)					\$ -
<b>Total</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ 10,000</b>	<b>\$ -</b>	<b>\$ 10,000</b>
<b>#10 Dipping Vat Campground Drainage Improvement</b>					
FS Contribution	\$ 7,500		\$ 75,000		\$ 82,500
Partner Contribution (both in kind and \$)					\$ -
<b>Total</b>	<b>\$ 7,500</b>	<b>\$ -</b>	<b>\$ 75,000</b>	<b>\$ -</b>	<b>\$ 82,500</b>
<b>Forest Service Totals</b>					<b>\$ 854,240</b>
<b>Partner Contribution Totals</b>					<b>\$ 127,320</b>
<b>Funding already obtained</b>					<b>\$ 109,380</b>
<b>Grand Totals</b>	<b>\$ 64,740</b>	<b>\$ 192,000</b>	<b>\$ 794,155</b>	<b>\$ 40,045</b>	<b>\$ 1,090,940</b>

**e. Timelines and Project Scheduling:**

*By fiscal year, list Tasks necessary to complete project (e.g. planning, design, permitting, implementation) and the expected contribution by the responsible party (FS or Partner).*

Completion of these tasks is contingent on securing necessary funding.

<b>FY</b>	<b>Task</b>	<b>FS Cost</b>	<b>Partner cost</b>
2011	NEPA planning for Snow Lake RAC project & Riparian Improvement	\$7,240	\$0
2011	Begin implementation of Snow Lake RAC project	\$9,380	\$0
2012	Complete Snow Canyon RAC project	\$100,000	\$39,820
2012	Begin riparian woody planting with volunteers	\$10,000	\$10,000
2012	Investigate new water source for T Bar Allotment;	\$4,500	\$0
2012	Design sediment reduction structures and French drain for Snow Lake	\$35,000	\$0
2012	Survey Snow Lake perimeter and verify necessary water rights for evaporation use	\$10,000	\$10,000
2013	Complete riparian wood planting with volunteers	\$10,000	\$15,000
2013	Drill new well for T Bar allotment if funds provided; purchase water right to put to consumptive use; install fence on east end of Snow Lake	\$40,000	\$0
	Construct sediment retention structures and French drain for Snow Lake	\$120,000	\$5,000
2013	Purchase and install 2 Solar Bees for Snow Lake	\$50,000	\$50,000
2013	NEPA planning for T Bar Grassland and Burnt Cabin	\$9,000	
2014	NEPA for Road Improvement work	\$10,000	
2014	Construct wooden recreational fence around Snow Lake	\$30,000	\$5,000
2014	Begin T Bar Grassland maintenance	\$67,000	
2014	Implement Burnt Cabin Tank thinning	\$82,500	\$2,500
2015	Continue T Bar Grassland maintenance	\$67,000	
2015	Begin BMP work on Forest roads within watershed	\$75,000	
2015	Implement Dipping Vat Campground drainage improvement	\$82,500	
2016	Finish BMP work on Forest Roads within watershed.	\$75,000	\$2,500
2016	Complete T Bar Grassland maintenance	\$67,000	
2016	Complete/maintain any unfinished essential project		

**f. Other Partners**

The Gila National Forest, with the assistance of John J. Ward, Groundwater Consultant, developed the Snow Canyon Watershed Restoration Action Plan. It was reviewed by New Mexico Environment Department prior to submittal for comment/additions/deletions.

**4. Restoration Project Monitoring and Evaluation**

**a. The forest will monitor:** The Forest will monitor watershed restoration success using the following methods:

- a. Best management practice effectiveness – evaluate road treatments once/year using Forest BMP form
- b. Photo monitoring – establish permanent photo points in riparian treatment areas to be photographed once/year
- c. Pace transects – re-monitor pace transect location established immediately following Bear Fire in seeded areas; once/year
- d. Noxious weed surveys – evaluate burned area for any new establishment of noxious weeds; once/year
- e. Lake water quality monitoring – use monitoring equipment to evaluate dissolved oxygen, pH, conductivity, and temperature levels in lake, once/year *or* Establish long-term data logging on Snow Lake with other equipment.
- f. Lake levels and/or discharge rates (NMED)
- g. Depth survey of Snow Lake (NMED)
- h. Stream Temperature monitoring – establish permanent thermograph sites below Snow Dam on Snow Creek, Gilita Creek, and Middle Fork Gila River to see heat contributions of Snow Lake/Canyon; read once/year
- i. Cross section and longitudinal profiles – establish 2 – 4 permanent monitoring sites on Snow Canyon and Quaking Aspen Canyon to be read once every 5 years.
- j. Sediment traps to measure sediment input

**b. Monitoring will be done in cooperation with:**

The New Mexico Environment Department will assist in the establishment of photo points, permanent stream temperature monitoring site, and cross section and longitudinal profiles. In addition, Snow Lake monitoring data will be shared between both agencies.

Action Plan Date: September 30, 2011

Reviewing Official and Title: \_\_\_\_\_  
 Kelly Russell, Forest Supervisor, Gila National Forest

Forest Contact Information: Carolyn Koury, Forest Hydrologist, 575-388-8378

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## **Appendix A –Snow Canyon Overview Map**

## **Appendix B – Snow Canyon Field Map**

**Appendix C – Snow Canyon Aquatic Processes**

## **Appendix D – Snow Canyon Terrestrial/Biological Processes**

## Appendix E – Snow Canyon Watershed Characteristics

### Snow Canyon (150400010503) Basic Characteristics

SubRegion (HU04 – 2<sup>nd</sup> Code) = Upper Gila (1504)

Basin (HU06 – 3<sup>rd</sup> Code) = Upper Gila (150400)

SubBasin (HU08 – 4<sup>th</sup> Code) = Upper Gila (15040001)

Watershed (HU10 – 5<sup>th</sup> Code) = Middle Fork Gila River (1504000105)

SubWatershed (HU12 – 6<sup>th</sup> Code) = Snow Canyon (150400010503)

Snow Canyon = 31,353.648 acres (14.33% of Middle Fork Gila’s 218,843.42 acres)

<b>Snow Canyon Elevation &amp; Slope Percent Statistics (08/22/2011)</b>						
	Max_M	Max_Ft	Min_M	Min_Ft	Mean_M	Mean_Ft
Elevation	3029	9937.664	2215	7267.06	2450	8038.058
	Max_%	Min_%	Mean_%			
SlopePerc	159	0	15			
Elevation & slope percent derived from 10-meter NED						

<b>Snow Canyon Surface Ownership (08/15/2011)</b>		
<b>Values</b>		
Row Labels	Sum of HU12_Ownership_Acres	Sum of HU12_Ownership_Perc
Private	6.59	0.02
USFS	31,347.06	99.98
<b>Grand Total</b>	<b>31,353.65</b>	<b>100.00</b>
small private parcel on northeast boundary		

**Management Areas**

<b>Snow Canyon Ranger Districts (08/15/2011)</b>		
<b>Values</b>		
<b>Row Labels</b>	<b>Sum of HU12 District Acres</b>	<b>Sum of HU12 District Perc</b>
Glenwood	5.29	0.02
Reserve	31,331.78	99.93
Wilderness	16.57	0.05

<b>Snow Canyon Logical Timber (Forest Plan) Management Areas (08/15/2011)</b>		
<b>Values</b>		
<b>Row Labels</b>	<b>LTMA Acres</b>	<b>LTMA Perc.</b>
4A	18.95	0.06
6B	31,334.69	99.94
<b>Grand Total</b>	<b>31,353.65</b>	<b>100.00</b>

<b>Snow Canyon Ecosystem Management Areas 08/15/2011</b>		
<b>Values</b>		
<b>Row Labels</b>	<b>Sum of HU12 EMA Acres</b>	<b>Sum of HU12 EMA Perc</b>
bear willow	84.2	0.3
gilita	30,769.3	98.1
negrito	500.1	1.6
<b>Grand Total</b>	<b>31,353.6</b>	<b>100.0</b>

<b>Snow Canyon Wilderness (08/29/2011)</b>		
<b>Wilderness Name</b>	<b>Wilderness Acres</b>	<b>Wilderness %</b>
Gila Wilderness	16.57	0.05

The same acreage as Wilderness applies to ORV (prohibited) Areas (1986)

Snow Canyon Roadless Areas (08/29/2011)		
Row Labels	Values	
	Roadless Acres	Roadless Perc.
Contiguous To Gila Wilderness & Primitive Area	909.31	2.90
T Bar	686.67	2.19
<b>Grand Total</b>	<b>1,595.98</b>	<b>5.09</b>

#### Wild & Scenic River Candidates

Snow Lake outlets into Middle Fork Gila River

#### Research Natural Areas

None

### **Snow Canyon (150400010503) Overall Rating: FS = 2.3, Non-FS = 2.3**

(Note: 1 – 1.6 = Functioning Properly – Class 1; 1.7 – 2.2 = Functioning at Risk – Class 2; 2.3 – 3 = Impaired- Class 3)

#### Aquatic Physical Processes

Indicator 1: Water Quality = 2.5

Attribute: Impaired Waters = 2

Snow Canyon Impaired Water (303d) (08/15/2011)

Row Labels	Sum of Impaired_Ft
<b>Gilita Creek (Middle Fork Gila R to Willow Creek)</b>	
<b>high quality coldwater aquatic life</b>	
5/5A	37.20
<b>Middle Fork Gila River (Gila River to headwaters)</b>	
<b>high quality coldwater aquatic life</b>	
5/5B	63.80
<b>Grand Total</b>	<b>101.00</b>

Snow Cyn. HUC12 & Snow Lake are headwaters for listed rivers

Middle Fork listed for turbidity, temperature, and aluminum. “Benthic Macroinvertebrate data were not available to confirm the interim turbidity listing. HQCW use and associated criteria may not be attainable. WQS under review”.

Gilita Creek listed for temperature and aluminum.

**Attribute: Water Quality Problems = 3**

Comments: *Lernaea* parasite present in Snow Lake & Snow Cr. Below lake (localized issue)

**Snow Canyon Assessed Water (305b) (08/15/2011)**

<b>Row Labels</b>	<b>Sum of Assessed_Ft</b>
<b>Snow Canyon Creek (Gilita Creek to Snow Lake)</b>	<b>4,251.14</b>
<b>limited aquatic life</b>	
2	
<b>20.6.4.98</b>	
EPHEMERAL STREAM	4,251.14
<b>Grand Total</b>	<b>4,251.14</b>

Comments:

This unclassified AU may be ephemeral or intermittent: however, per EPA Region 6 instruction, it is being noted under 20.6.4.98 and marginal warmwater aquatic life (MWWAL) and primary contact are presumed uses for all waters noted as 20

**Indicator 2: Water Quantity = 3**

**Attribute: Flow Characteristics = 3**

Comments: Snow Lake stores majority of water in Snow Cr. – alters flow regime

**Snow Canyon NHD Flowlines (08/15/2011)**

Row Labels	Values	
	Sum of LengthFt	Sum of LengthMi
<b>Artificial Path</b>	<b>14,663.03</b>	<b>2.78</b>
Quaking Aspen Creek	170.07	0.03
(blank)	14,492.96	2.74
<b>Ephemeral</b>	<b>666,751.20</b>	<b>126.28</b>
Quaking Aspen Creek	38,589.85	7.31
(blank)	628,161.34	118.97
<b>Intermittent</b>	<b>12,194.49</b>	<b>2.31</b>
Quaking Aspen Creek	12,194.49	2.31
<b>Perennial</b>	<b>2,927.77</b>	<b>0.55</b>
Gilita Creek	7.12	0.00
Middle Fork Gila River	1,557.43	0.29
(blank)	1,363.23	0.26
<b>Pipeline</b>	<b>22,213.46</b>	<b>4.21</b>
(blank)	22,213.46	4.21
<b>Grand Total</b>	<b>718,749.95</b>	<b>136.13</b>

Note: "(blank)" = unnamed

**Snow Canyon Springs (08/15/2011)**

Row Labels	No. of Springs
Dog Flat Spr.	1
Dog Spr.	1
South Fork Spring	1
T Bar Spr.	1
(blank)	2
<b>Grand Total</b>	<b>6</b>

Snow Lake Canyon NHD Waterbodies (08/15/2011)		
Values		
Row Labels	No. of Waterbodies	Acres of Waterbodies
<b>☐ Intermittent Lake/Pond</b>	<b>10</b>	<b>2.11</b>
Burnt Cabin Tank	1	0.25
Dog Spr. Tank	1	0.26
Ewe Tank	1	0.28
Hogwallow Pit Tank	1	0.29
Nedra Tank	1	0.14
Negrato Pasture Tank	1	0.17
Teacher Tank	1	0.40
(blank)	3	0.31
<b>☐ Perennial Lake/Pond</b>	<b>10</b>	<b>110.42</b>
Elladene Tank	1	0.13
Gail Tank	1	1.86
Loco Mtn. Tank	1	9.85
Pipeline Tank	1	0.13
Snow Cyn. Tank	1	1.54
Snow Lake	1	93.63
T Bar Duck Tank	1	0.82
T Bar Spr. Tank	1	0.15
(blank)	2	2.32
<b>☐ Swamp/Marsh</b>	<b>2</b>	<b>8.01</b>
N Bar Lake	1	4.05
(blank)	1	3.96
<b>Grand Total</b>	<b>22</b>	<b>120.54</b>

**Indicator 3: Aquatic Habitat = 3**

**Attribute: Habitat Fragmentation = 3**

**Attribute: Large Woody Debris = N/A**

**Attribute: Channel Shape & Function = 3**

Comments: Historic perennials are now drying up (T Bar Cyn. & Snow Cr.), Snow Lake Dam, Snow Cyn. Tank; channels cut and straightening

## Aquatic Biological Processes

### **Indicator 4: Aquatic Biota = 3**

**Attribute: Life Form Presence = 3**

**Attribute: Native Species = 3**

**Attribute: Exotic and/or Invasive Species = 3**

Comments: Natives are gone partially due to drying, dam and dam's influence downstream, *Lernaea* in lake and stream below dam

Headwater chub (T & E Candidate) occupied habitat and loach minnow (Threatened) critical habitat downstream of Snow Lake in Middle Fork

### **Indicator 5: Riparian/Wetland Vegetation = 2**

**Attribute: Vegetation Condition = 2**

Comments: Some reaches PFC and some FAR

55.22 acres of riparian (based on 300 ft. buffer of perennial or intermittent streams) & 12.51 acres of wet meadow

## Terrestrial Physical Processes

### **Indicator 6: Roads & Trails = 1.7**

**Attribute: Open Road Density = 2**

**Attribute: Road Maintenance = 2**

**Attribute: Proximity to Water = 1**

**Attribute: Mass Wasting = N/A**

Comments: County rd. to Snow Lake in good shape, the rest of the roads are mostly ML 2 with few BMPs

<b>Snow Canyon Developed Recreation Sites (08/15/2011)</b>			
<b>REC_SITE_ID</b>	<b>TYPE</b>	<b>NAME</b>	<b>CFF</b>
22631	BOATING SITE	Snow Lake	915
29144	CAMPGROUND	Dipping Vat	63
72015	CAMPGROUND & TRAILHEAD	Aeroplane Mesa - Trail #705	63
72013	TRAILHEAD	Loco Mtn-Trail #143	921
72019	TRAILHEAD	Snow Lake-Trail #142	921

The 3 trailheads provide access to 100s of miles of trail in Gila Wilderness

Snow Canyon Trails (08/15/2011)	
Row Labels	Sum of GIS_Miles
<input type="checkbox"/> Aeroplane Mesa	0.23
705	0.23
<input type="checkbox"/> Loco Mtn	0.46
143	0.46
<input type="checkbox"/> Snowlake	0.93
142	0.93
<b>Grand Total</b>	<b>1.62</b>

Snow Canyon Roads (08/16/2011)		
Row Labels	Values	
	Sum of Road_Mi	Sum of Rd_Density_SqMi
<input type="checkbox"/> 1 - BASIC CUSTODIAL CARE (CLOSED)	34.010	0.694
<input type="checkbox"/> DE - DECOMMISSIONED	25.992	0.531
<input type="checkbox"/> EX - EXISTING	8.018	0.164
<input type="checkbox"/> 2 - HIGH CLEARANCE VEHICLES	73.329	1.497
<input type="checkbox"/> EX - EXISTING	73.329	1.497
<input type="checkbox"/> 3 - SUITABLE FOR PASSENGER CARS	1.961	0.040
<input type="checkbox"/> EX - EXISTING	1.961	0.040
<input type="checkbox"/> 4 - MODERATE DEGREE OF USER COMFORT	17.574	0.359
<input type="checkbox"/> EX - EXISTING	17.574	0.359
<b>Grand Total</b>	<b>126.875</b>	<b>2.590</b>
Snow Cyn. HU12 Road Densities per Sq. Mile:		
Including all roads (both closed & decomm.) = 2.590 (126.87 total miles)		
Including ML 1 - Closed, ML 2, ML 3, ML 4 = 2.059 (100.88 total miles)		
Including only open ML 2, ML 3, ML 4 = 1.896 (92.87 miles)		

**Indicator 7: Soils = 1.7**

**Attribute: Soil Productivity = 2**

**Attribute: Soil Erosion = 2**

**Attribute: Soil Contamination = 1**

Comments: Some areas of Bear Fire still experiencing negative effects; soil production & condition from Gila GES (Terrestrial Ecosystem Unit Inventory (TEU-I) no coverage)

<b>Snow Canyon General Terrestrial Ecosystem Survey Units (GES) (08/22/2011)</b>		
<b>Values</b>		
<b>Row Labels</b>	<b>HUC GES Acres</b>	<b>HUC GES Perc.</b>
<b>158</b>	<b>4,855.91</b>	<b>15.49</b>
Satisfactory	4,855.91	15.49
<b>168</b>	<b>179.88</b>	<b>0.57</b>
Satisfactory	179.88	0.57
<b>191</b>	<b>8,031.91</b>	<b>25.62</b>
Satisfactory	8,031.91	25.62
<b>192</b>	<b>688.20</b>	<b>2.19</b>
Satisfactory	688.20	2.19
<b>198</b>	<b>2,107.86</b>	<b>6.72</b>
Satisfactory	2,107.86	6.72
<b>561</b>	<b>15,489.90</b>	<b>49.40</b>
Unsatisfactory	15,489.90	49.40
<b>Grand Total</b>	<b>31,353.65</b>	<b>100.00</b>

**Terrestrial Biological Processes**

**Indicator 8: Fire Regime or Wildfire = 2**

**Attribute: Fire Regime Condition Class (FRCC) = 2**

**Attribute: Wildfire Effects = N/A (used FRCC)**

Comments: Watershed has had a lot of fires: Bear (2006), Middle (2002)

<b>Snow Canyon Fire History Acres (08/18/2011)</b>		
<b>Values</b>		
<b>Row Labels</b>	<b>Fire History Acres</b>	<b>Fire History Perc</b>
Bear	23,065.02	73.56
BS	35.18	0.11
Iron	6.16	0.02
Lake	41.09	0.13
Middle	2,036.50	6.50
Pad	4,065.15	12.97
<b>Grand Total</b>	<b>29,249.10</b>	<b>93.29</b>

This table includes fire polygons that overlap each other. Since 1993, 86.10% of the HUC has burned (analysis included fires since 1985; however, 1993 was the earliest fire in Fire\_History).

**Indicator 9: Forest Cover = 3**

**Attribute: Loss of Forest Cover = 3**

Comments: Bear Fire

(Laura Vallejos' Forest Cover Snow Canyon Record)

<b>Total Watershed Acres</b>	<b>Gila Forested Acres</b>	<b>Inadequate Forest Cover (Trees &lt; 10)</b>	<b>% of HUC Inadequate Forest Cover (Trees &lt; 10)</b>	<b>% of Gila Forested Acres</b>	<b>Forest Cover Condition</b>	<b>Disturbance</b>
31353.773	19603	5509	17.570453	28.10284	3	Bear Fire BS

**Snow Canyon Bear Fire (2006); Burn Severity (08/18/2011)**

**Values**

**Row Labels**  **Bear Severity Acres** **Bear Severity Perc.**

Row Labels	Bear Severity Acres	Bear Severity Perc.
High	852.88	2.72
HM2	4,418.80	14.09
HM5	702.50	2.24
Low	17,031.72	54.32

**Snow Canyon Existing Midscale Vegetation Canopy Cover (08/18/2011)**

**Values**

**Row Labels**  **Canopy Cover Acres** **Canopy Cover %**

Row Labels	Canopy Cover Acres	Canopy Cover %
Grass/Forb, Tree cc <10%, Shrub cc <10%	14,651.50	46.73
Tree cc 10 - 29.9%	3,344.69	10.67
Tree cc 30 - 59.9%	11,237.89	35.84
Tree cc 60+%	2,016.39	6.43
Water	103.19	0.33

**Snow Canyon Midscale Existing Veg. Size Class(08/18/2011)**

**Values**

**Row Labels**  **Veg. Size Acres** **Veg. Size %**

Row Labels	Veg. Size Acres	Veg. Size %
Grass/Forb	14,651.50	46.73
Tree, dia 0 - 4.9 in	424.42	1.35
Tree, dia 10 - 19.9 in	13,465.85	42.95
Tree, dia 5 - 9.9 in	2,708.70	8.64
Water	103.19	0.33
<b>Grand Total</b>	<b>31,353.65</b>	<b>100.00</b>

Snow Canyon Existing Midscale Vegetation Dominance Type (08/18/2011)		
Values		
Row Labels	HUC DomType Acres	HUC DomType Perc
alligator juniper	28.02	0.09
aspen	143.72	0.46
deciduous-evergreen tree mix	153.85	0.49
douglas-fir mix	1,100.11	3.51
evergreen oak mix	70.28	0.22
gambel oak	59.43	0.19
gambel oak-evergreen tree mix	75.17	0.24
grass mix	14,691.54	46.86
one-seed juniper mix	352.62	1.12
pinyon, alligator juniper, evergreen oak mix	293.53	0.94
ponderosa pine mix	14,243.06	45.43
upper evergreen forest tree mix	27.93	0.09
water	103.19	0.33
white fir mix	11.21	0.04
<b>Grand Total</b>	<b>31,353.65</b>	<b>100.00</b>

**Indicator 10: Rangeland Vegetation = 1**  
**Attribute: Vegetation Condition = 1**

Snow Canyon Allotments (08/16/2011)		
Values		
Row Labels	Allot. Acres	Allot. Perc.
Corner Mountain	59.58	0.19
Deep Creek	5.29	0.02
T Bar	30,319.28	96.70
Y Canyon	909.84	2.90
<b>Grand Total</b>	<b>31,293.99</b>	<b>99.81</b>

Comments: T-Bar 96% of HUC rated 1 -- Corner Mtn. = 2 (2001 Consultation; vacant allotment; Professional Judgment on current condition), T Bar = 1 (2009 Consultation, 2004 Range Data Analysis, 2010 Production, Professional Judgment), Y Canyon = 2 (2005/2007 Consultation, 2005 Range Data Analysis, 2010 Annual Production), Deep Creek (N/A – small percentage of 6<sup>th</sup> Code)

**Indicator 11: Terrestrial Invasive Species = 1**  
**Attribute: Extent & Rate of Spread = 1**

Snow Canyon TES Wildlife Species Mgmt. Sites (08/18/2011)		
Row Labels	Values	
	TES Site Area	TES Site Perc.
<input type="checkbox"/> Apache Northern Goshawk	1,212.53	3.87
<input type="checkbox"/> Management Area	1,212.53	3.87
reserve_burntcabin1_1991	605.22	1.93
reserve_burntcabin2_1991	607.32	1.94
<input type="checkbox"/> Mexican Spotted Owl	21,206.23	67.64
<input type="checkbox"/> Critical Habitat (FWS)	15,975.15	50.95
MSO Critical Habitat UGM-5a	15,975.15	50.95
<input type="checkbox"/> Management Area	5,231.08	16.68
glenwood_bs/bearwallow_#7_mso_pac_030604007_1989	0.00	0.00
reserve_beaver_#11_mso_pac_030606023_1989	10.36	0.03
reserve_gilita_ridge_mso_pac_030606064_1993	569.55	1.82
reserve_gilita_ridge_mso_pac_030606091	645.22	2.06
reserve_quaking_aspen_canyon_mso_pac_030606092	651.42	2.08
reserve_rocker_complex_#1_mso_pac_030606033_1990	0.98	0.00
reserve_rocker_complex_#2_mso_pac_030606034_1990	15.51	0.05
reserve_rocker_complex_#5_mso_pac_030606037_1990	638.89	2.04
reserve_rocker_complex_#6_mso_pac_030606038_1990	774.46	2.47
reserve_school_canyon_mso_pac_030606090	632.32	2.02
reserve_snow_canyon_#1_mso_pac_030606086_2004	640.49	2.04
reserve_snow_canyon_#2_mso_pac_030606087_2004	651.89	2.08

Snow Canyon Mgmt. Indicator Species Habitat Zones (08/18/2011)		
Row Labels	Values	
	MIS Habitat Acres	MIS Habitat Perc.
<b>High Riparian</b>	<b>43.96</b>	<b>0.14</b>
Beaver, Long-tailed vole	43.96	0.14
<b>Lake</b>	<b>103.19</b>	<b>0.33</b>
(blank)	103.19	0.33
<b>Mid Riparian</b>	<b>11.26</b>	<b>0.04</b>
Beaver, Black Hawk	11.26	0.04
<b>Mixed Conifer</b>	<b>2,482.08</b>	<b>7.92</b>
Hairy Woodpecker, Mexican Spotted Owl	2,482.08	7.92
<b>Pinyon Juniper/Shrub Oak Woodland</b>	<b>742.27</b>	<b>2.37</b>
Mule Deer, Plain Titmouse	742.27	2.37
<b>Plains Grassland/Mountain Grassland</b>	<b>10,941.40</b>	<b>34.90</b>
Mearns' Quail	10,941.40	34.90
<b>Ponderosa Pine</b>	<b>17,016.97</b>	<b>54.27</b>
Hairy Woodpecker, Northern Goshawk	17,016.97	54.27
<b>Wet Meadow/Wetland</b>	<b>12.51</b>	<b>0.04</b>
Long-tailed Vole	12.51	0.04
<b>Grand Total</b>	<b>31,353.65</b>	<b>100.00</b>

**Indicator 12: Forest Health = 1**

**Attribute: Insects and Disease = 1**

**Attribute: Ozone = 1**

Comments: Timber bumped up from RO map due to midscale and other data (Forest's Insect & Disease Table Record)

Total Watershed Acres	Gila Forested Acres	Insect Disease (60+Copy)	% of HUC Insect Disease (60+Copy)	% of Gila Forested Acres	Provided Forest Health Info xlnm Database PCTLOSS	Forest Health Condition	Remarks
31354	19603	1494	4.8	7.6	20 - 40%	1 2	Rate as 1. Most burned in Bear Fire