



United States Department of Agriculture

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## Appendix E

# Priority Watersheds for the Manti-La Sal National Forest



Forest Service

Intermountain Region

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# ACRONYMS AND ABBREVIATIONS

AU — Assessment Unit

CCR — Code of Colorado Regulations

CFR — Code of Federal Regulations

CO — Colorado

DEQ — Department of Environmental Quality

EPA — Environmental Protection Agency

FSH — Forest Service Handbook

FSM — Forest Service Manual

HUC — Hydrologic Unit Code

MLNF — Manti-La Sal National Forest

NF — National Forest

NFS — National Forest System

PWS — Public Water System

SSA — Sole Source Aquifer

SWPZ — Surface Water Protection Zone

TMDL — Total Maximum Daily Load

US — United States

USC — U.S. Code

UT — Utah

WCC — Watershed Condition Class

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## INTRODUCTION

One of the original purposes for establishing the National Forest System was to protect our Nation's water resources. The 2012 planning rule includes a newly created set of requirements associated with maintaining and restoring watersheds and aquatic ecosystems, water resources, and riparian areas in the plan area (36 CFR 219.7(f)(1) and FSH 1909.12, chapter 20). The increased focus on watersheds and water resources in the 2012 planning rule reflects the importance of this natural resource, and the commitment to stewardship of our waters. It also fits one of the four overall fiscal year 2015-2020 Forest Service Strategic plan strategic goals to "deliver benefits to the public" and more specifically to "provide abundant clean water".

The 2012 planning rule requires that plans identify watersheds that are a priority for restoration and maintenance. The 2012 planning rule requires all plans to include components to maintain or restore the structure, function, composition, and connectivity of aquatic ecosystems and watersheds in the plan area, taking into account potential stressors, including climate change, and how they might affect ecosystem and watershed health and resilience. Plans are required to include components to maintain or restore water quality and water resources, including public water supplies, groundwater, lakes, streams, wetlands, and other bodies of water. The planning rule requires that the Forest Service establish best management practices for water quality, and that plans ensure implementation of those practices.

Plans are also required to include direction to maintain and restore the ecological integrity of riparian areas. The Manti-La Sal National Forest will remove the 1986 riparian management areas and integrate riparian management into the overall watershed management by including specific riparian area interdisciplinary components.

The priority watersheds appendix includes three sections. The first section deals with the watershed condition framework. The watershed condition framework is designed to restore watersheds to their natural potential condition. These watersheds require short-term investments for their restoration. The second section discusses the restoration of impaired water bodies on the state 303(d) list that have completed total maximum daily loads, also referred to as TMDLs. These watersheds would also require short-term investments. The final section covers watersheds which supply municipal water.

## WATERSHED CONDITION FRAMEWORK

In 2011, sixth-level sub-watersheds, typically 10,000 to 40,000 acres, across all NFS lands were classified using the national watershed condition framework. The classification was re-evaluated in 2016. The watershed condition framework was designed to be a consistent, comparable, and credible process for improving the health of watersheds across all NFS lands.

Benefits from implementing the watershed condition framework are as follows:

- Strengthens the effectiveness of Forest Service watershed restoration
- Establishes a consistent, comparable, credible process for determining watershed condition class
- Enables a priority-based approach for the allocation of resources for restoration

- Improves Forest Service reporting and tracking of watershed condition
- Enhances coordination with external agencies and partners.

The first step of the watershed condition framework implementation was to rate the watershed condition of each watershed, utilizing existing data, knowledge of the land, and professional judgment. Watersheds were rated using a set of twelve indicators of geomorphic, hydrologic, and biotic integrity relative to potential natural condition. The ratings are entered into a computer database, which generates an overall rating for each watershed. The results are also used to create a watershed condition class map.

Geomorphic functionality or integrity is defined in terms of attributes such as slope stability, soil erosion, channel morphology, and other upslope, riparian, and aquatic habitat characteristics. Hydrologic functionality or integrity relates primarily to flow, sediment, and water-quality attributes. Biological functionality or integrity is defined by the characteristics that influence the diversity and abundance of aquatic species, terrestrial vegetation, and soil productivity.

In each case, integrity is evaluated in the context of the natural disturbance regime, geoclimatic setting, and other important factors within the context of a watershed. The definition encompasses both aquatic and terrestrial components because water quality and aquatic habitat are inseparably related to the integrity and functionality of upland and riparian areas within a watershed. The three watershed condition classes are directly related to the degree or level of watershed health or integrity:

- Class 1 - functioning properly: watersheds exhibit high geomorphic, hydrologic, and biotic integrity relative to their natural potential condition.
- Class 2 - functioning-at-risk: watersheds exhibit moderate geomorphic, hydrologic, and biotic integrity relative to their natural potential condition.
- Class 3 - impaired: watersheds exhibit low geomorphic, hydrologic, and biotic integrity relative to their natural potential condition.

In this framework, a watershed is considered in good condition if it is functioning in a manner like one found in natural wildland conditions. This characterization should not be interpreted to mean that managed watersheds cannot be in good condition. A watershed is functioning properly if the physical attributes are appropriate to maintain or improve biological integrity. This consideration implies that a class 1 watershed in properly functioning condition has minimal undesirable human impact on natural, physical, or biological processes and is resilient and able to recover to the desired condition when or if disturbed by large natural disturbances or land management activities. By contrast, a class 3 watershed has impaired function because some physical, hydrological, or biological threshold has been exceeded. Substantial changes to the factors that caused the degraded state are commonly needed to set them on a trend or trajectory of improving conditions that sustain physical, hydrological, and biological integrity.

The plan area overlaps 144 sixth-level sub-watersheds, of which 120 have a Watershed Condition Classification, or WCC, score. Following the watershed condition class protocol from the 2016 Watershed Condition Framework, 102 sub-watersheds were rated as functioning properly, 18 sub-watersheds were rated as functioning at risk, and 0 sub-watersheds were rated as impaired. Overall, the biggest sources of impairment were road and trail issues, their proximity to water, and insect and disease related issues. Sub-watersheds that were not scored had either only a small part of the watershed on the plan area and/or there was not enough information available to rate the indicators.

Table 1 is a summary of the sub-watershed condition class ratings across the MLNF at the sixth-level HUC<sup>i</sup> or Hydrologic Unit Code.

*Table 1. Sixth-level watershed condition classes in the Manti-La Sal National Forest plan area.*

Area	Class 1	Class 2	Class 3	Not Scored	Total
Wasatch Plateau	49	6	0	12	67
San Pitch Mountains	7	3	0	4	14
La Sal Mountains	18	5	0	4	27
Abajo Mountains	28	4	0	4	36

Priority watersheds are on a constant 5-year rotation, always being replaced with another watershed once restoration has been completed. Even though certain areas may be planned for the next restoration cycle, priority areas could change quickly because of events such as wildfire or the introduction of invasive species. Therefore, the 2012 planning rule includes priority watersheds as plan content, so that an administrative change could be used to quickly respond to changes in priority.

Since the restoration of the plan area began, three priority watersheds were identified in 2011, and are currently active or in progress as shown in Table 2. There have been three watersheds identified for priority restoration in the next five-year budget cycle as shown in Table 3. This list is a modification of the priority watersheds identified in the Forest Plan Revision Assessment hydrology specialist report. The change was made after consultation with line-officers and resource specialists based on a combination of need for watershed restoration, progress status of the NEPA process for planned projects and project area access limitations due to steep terrain and cultural resources.

*Table 2. Manti-La Sal National Forest active priority watersheds.*

HUC6 Sub-Watershed Name	Area	Total Acres	Plan Area Acres	Percent of Watershed within Plan Area
Left Fork Huntington Canyon [140600090101]	Wasatch Plateau	30,538	30,538	100
Lowry Water [140600090202]	Wasatch Plateau	43,910	43,910	100
Johnson Creek [140802010301]	Abajo Mountains	15,542	12,575	80.91

*Table 3. Manti-La Sal National Forest planned priority watersheds.*

HUC6 Sub-Watershed Name	Area	Total Acres	Plan Area Acres	Percent of Watershed within Plan Area
Right Fork Huntington Canyon [140600090102]	Wasatch Plateau	40,101	40,101	100
Stevens Canyon [140300050801]	Abajo Mountains	24,886	19,852	79.77
Deer Creek-La Sal Creek [140300020902]	La Sal Mountains	24,854	15,642	62.94

The watershed condition framework is one component of our aquatic conservation strategy and is designed to restore watersheds to their natural potential condition. These watersheds require short-term investments to restore them. Another component is to restore impaired water bodies on the state 303(d) list that have completed total maximum daily loads, also referred to as TMDLs. These watersheds would also require short-term investments.

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## Issues and Rationale Affecting Each Priority Watershed

### **Left Fork Huntington Canyon [140600090101] and Lowry Water [140600090202]**

Both adjacent sub-watersheds were combined for restoration treatment purposes because the problems occurred on the south-end of the Left Fork and the bordering north-end of the Lowry Water watersheds. These two sub-watersheds contain both recreation and wetland corridors which are home to 50 percent of the wetlands existing on the plan area. Collectively they have impaired ratings for habitat fragmentation, exotic and invasive species, loss of forest cover due to spruce mortality, mass wasting from large quantities of debris along the Lowry Water drainage, and proximity of roads/trails to water.

### **Johnson Creek [140802010301]**

The following issues have an influence on the watershed condition: erosion due to unauthorized roads, dense even-aged vegetation and heavy fuel loading contribute to fire hazards, forest health and insect and disease potential in ponderosa pine and pinyon pine trees, sudden aspen decline is occurring in the upper areas of the watershed, 2002 Nizhoni fire burned 2,400 acres. This is also a popular recreation area.

### **Right Fork Huntington Canyon [140600090102]**

Right Fork Huntington Creek sub-watershed is selected to complete the restoration work started after the heavy damage caused by the 2012 Seeley Fire and subsequent mud slides altering the course of a part of Huntington Creek and some of its tributaries. The abundant presence of beetle-killed trees might have influenced the impacts of the fire. Restoration will be tied to commercial harvesting of remaining dead spruce trees and fuels reduction activities in the area upstream from Electric Lake along Upper Huntington Creek. This will result in improved watershed soil and water conditions. The Candland mountain area below the Electric Lake Dam is in a roadless area which will not be logged.

The 2016 WCC rating for this sub-watershed was rated 2 or higher for the following indicators, water quantity, riparian wetland indicator, roads and trails, forest cover, rangeland vegetation, and terrestrial invasive species. This rating was made for the following reasons: water is being stored into Electric Lake which supplies water to the Huntington power plant, abundant recreation, and the presence of roads and trails associated with cabins on private inholdings. The 2012 Seeley Fire in beetle-killed Engelmann spruce stands resulted in loss of forest cover and associated erosion. Post-fire debris flows caused heavy damage to Huntington Creek and eliminated the fish population in lower Huntington Creek. Whirling disease is present in Huntington Creek below Electric Lake, which affects salmonids.

### **Stevens Canyon [140300050801]**

Restoration work in Stevens Canyon will focus on vegetation treatments to reduce the susceptibility to the occurrence of stand replacing fire and reduce the susceptibility to bark beetle outbreak. It will promote watershed health and public uses through providing for a sustainable, manageable road and trail system, reclamation of abandoned uranium mine adits, stabilization of waste rock, restoration of selected springs and head cut areas, and improved vegetation health. Extending fences will allow for better control of livestock.



Stevens Canyon was rated 2 or higher in the 2016 WCC rating for the following indicators: water quantity, riparian wetland indicator, roads and trails, fire regime and wildfire, forest cover, rangeland vegetation, and forest health. This sub-watershed contains one inholding. Historical chaining and overgrazing occurred at the turn of the 20th century. There is still livestock and wildlife overuse in portions of Big Flat and Round Mountain units. There is potential for leaching of contaminants from adits and waste rock locations associated with abandoned uranium mines. Exploration roads likely contribute sediment into the drainage. This watershed is also a popular recreation area which created user-created unauthorized trails. The Fire Regime Condition Class in the conifer stands is class 3.

### **Deer Creek-La Sal Creek [140300020902]**

Restoration projects planning on Deer Creek-La Sal Creek watershed has not reached the same detail as for the previous identified priority watersheds. Intended projects may include vegetation treatments and fuels reduction that will benefit fire regimes as well as conditions in the Wildland Urban Interface, aspen restoration, potential road work rehabilitation, restoration of wet meadows, improve native fish habitat, and address threatened and endangered species issues.

The 2016 WCC rating for this sub-watershed was rated 2 or higher for the following indicators, water quantity, aquatic biota, aquatic habitat, roads and trails, fire regime and wildfire, and forest health. This sub-watershed provides a substantial portion of the irrigation water for the area around La Sal, and there are numerous diversions and ditches resulting in dewatered sections of streams. The area has a high density of roads.

## **RESTORATION OF IMPAIRED WATER BODIES**

In 1972 Congress passed the Water Pollution Control Act, more commonly known as the Clean Water Act. Its goal is to “restore and maintain the chemical, physical, and biological integrity of the Nation’s waters”. The Clean Water Act requires each state to set water quality standards to protect designated beneficial water uses and to monitor the attainment of those uses. Fish and aquatic life, wildlife, recreation, agriculture, industrial, and drinking water are all types of beneficial uses. Streams and lakes (also referred to as water bodies) that do not meet the established standards are called “impaired waters”. These waters are identified on the 303(d) list, named after Section 303(d) of the Clean Water Act, which mandates the monitoring, assessment, and listing of water quality limited water bodies. The Forest cooperates in this process.

The Manti-La Sal National Forest is located primarily in Utah, with a minor portion extending eastwards into Colorado. Section 303(d) of the federal Clean Water Act, Utah Administrative Code R317-2, and Colorado Regulation #93 require the approval, in Utah, or development, in Colorado, of TMDLs for impaired waters where a measurable pollutant, such as metals, nutrients, or E. coli, is the cause of the impairment. A TMDL is a loading capacity and refers to the maximum amount of a pollutant a stream or lake can receive and still meet water quality standards.

The Utah and Colorado Departments of Environmental Quality (DEQ) develop total maximum daily loads for streams and lakes that do not meet, or are not expected to meet, their state’s water quality standards. The TMDLs are submitted to the United States Environmental Protection Agency (EPA) for approval every two years according to section 305(b) of the Clean Water Act. Total maximum daily loads provide an approach to improve water quality so that streams can support and maintain their state-designated beneficial uses.

Impaired water listings are based upon a five-category system for classifying water quality standards for water bodies. Of these five categories the two that are most relevant to this discussion are categories 4A and 5. Category 4A waters are polluted waters for which an approved TMDL is in place and is actively being implemented, which is expected to result in water quality criteria being met - the pollution problem is being addressed. Category 5 waters are impaired or threatened, requiring a TMDL to address the impairment - these are the 303d listed waters. Streams and lakes may also be rated as both Category 4A and 5 (5/4A). That means a TMDL has been established for one water quality pollutant, but TMDL(s) are still needed for one or more pollutants not meeting standards. Other category listings could be category 1, 2, or 3, none of them refer to impaired waters. Category 1 waters indicate that all designated uses are supported, category 2 means the stream or lakes support all assessed uses, and category 3 means that insufficient data are available to rate the water. See table 5 for a detailed description of the EPA Assessment Categories.

*Table 4. EPA assessment categories for waters.*

<b>EPA Assessment Category</b>	<b>Assessment Category Description</b>
1 Supporting	All beneficial uses assigned to a waterbody are evaluated against one or more numeric criteria and each use is found to be fully attaining applicable water quality standards.
2 No Evidence of Impairment	Some, but not all, beneficial uses assigned to a waterbody are evaluated against one or more numeric criteria and each assessed use is found to be fully attaining applicable water quality standards.
3 Insufficient Data and/or Information	There are insufficient data and information to conclude support or nonsupport of a use. The application of this category may be applied when: (1) the dataset is smaller in size and has water quality criteria exceedances OR no water quality criteria exceedances, (2) a secondary review was applied to a waterbody that was not attaining, (3) water quality criteria and/or beneficial use support assessment methods are not yet developed (or are undergoing development or revisions) and therefore use attainment has not been determined, (4) waterbodies were assessed against water quality parameters and characteristics that require further investigations as defined in UAC R317-2, (5) assessment units (AUs) lack use designations, have improper use designations, or contain other inconsistencies in the dataset. In cases where no recent data are available, historic-listing determinations will be maintained.
4A TMDL-Approved	Waterbodies that are impaired by a pollutant and have had TMDL(s) developed and approved by EPA. Where more than one pollutant is associated with the impairment of a waterbody, the waterbody and the parameters that have an approved TMDL are listed in this category. If a waterbody has other pollutants that need a TMDL, the waterbody is still listed in Category 5 with an Approved TMDL.
4B Pollution Control	Consistent with 40 Code of Federal Regulations (CFR) 130.7(b) (I) (ii) and (iii), waterbodies that are not supporting designated uses are listed in this subcategory where other pollution-control requirements, such as best management practices required by local, state, or federal authority, are stringent enough to bring the waters listed in this category back into attainment in the near future with the approved pollution-control requirements in place. All waterbodies placed in this category must have a pollution control requirement plan developed and approved by EPA. Similar to Category 4A, if the waterbody has other pollutants that need a TMDL, or there is

	already a TMDL in place for another pollutant, the waterbody may also be listed in Categories 5 and 4A. Therefore, an AU with a pollution control in place can be listed in Categories 4B, 4A, and 5.
4C Non-Pollutant Impairment	Waterbodies that are not supporting designated uses are placed in this category if the impairment is not caused by a pollutant but rather by pollution such as hydrologic modification or habitat degradation. Similar to Categories 4A and 4B, if the waterbody has other pollutants that need a TMDL, or there is an approved TMDL or pollution-control mechanism in place, the waterbody may also be listed in Categories 4A, 4B, and 5. Therefore, an AU with a pollution control in place can be listed in Categories 4C, 4B, 4A, and 5.
5 Not Supporting	The concentration of a pollutant, or several pollutants, exceeds numeric water quality criteria, or beneficial uses are non-attaining based on violation of the narrative water quality standards. In addition, waterbodies identified as —threatened   may also be placed in this category. In the case of a —threatened   waterbody, one or more of its uses are likely to become impaired by the next IR cycle. Water quality may be exhibiting a deteriorating trend if pollution control actions are not taken. In the event that DWQ categorizes a waterbody as —threatened  , documentation of a listing rationale will be provided.
5-Alt TMDL Alternatives	The 303(d) program vision promotes the identification of alternative approaches to TMDL development for impaired waters where these approaches would result in a more rapid attainment of water quality standards. Note: This category is only referred to in DWQ’s —303(d) Vision Document.

In Utah impaired streams are shown in polygonal format, representing a stream drainage and the portion of that drainage which is impaired. This data is displayed in acres. The boundaries of the assessed units often correspond with sixth-level HUC, also known as HUC6, HUC12 or 12 digit HUC, sub-watersheds. This is not the case everywhere however, making it not straightforward to scale them up to fifth-level HUC, also described as HUC10, 10-digit HUC or HUC5, watersheds, the mid-level landscape assessment scale used for forest plan revision. The 2016 assessment shows that there are 25 fifth-level HUC watersheds in the plan area, out of 44 fifth-level HUC watersheds<sup>ii</sup>, that contain Utah DEQ assessment units that have either a 4A, 5 or 5/4A ratings and are impaired. At the Utah DEQ assessment unit (AU) level for impaired waters (4A, 5 or 5/4A), this breaks down to ten AUs on the Wasatch Plateau, three AUs on the San Pitch Mountains, four AUs on the La Sal Mountains, and six AUs on the Abajo Mountains. Several fifth-level HUC watersheds on the east-side of the La Sal Mountains that have their headwaters in Utah but have a substantial portion of the downstream drainage in Colorado are not assessed by either Utah or Colorado.

In Colorado, impaired streams are shown as lines and data is presented in miles. Review of Colorado’s 2016 Integrated Report shows that there are no 303d listed streams within the portion of the plan area located in Colorado. The associated GIS data indicate that Colorado did not assess the streams within the Forest boundary although Roc Creek is listed as impaired starting downstream of the forest boundary.

Neither the Colorado or Utah data sets document the causes for a given water quality pollutant exceeding water quality. All unlisted waters on the Forest are subject to the Antidegradation Policy,

which in Utah states that “...No water quality degradation is allowable which would interfere with or become injurious to existing instream water uses” (UT Administrative Rule R-317-2-3), or in Colorado, they “shall be maintained and protected at their existing quality” (CO 5 CCR-1002-31).

## PROTECTION OF MUNICIPAL WATER SOURCES

Documented municipal water use on the Forest extends back to at least the late 1920s. A municipal supply watershed is defined as: a watershed that serves a public water system as defined in the Safe Drinking Water Act of 1974, as amended (42 USC §§300 f, et seq.); or as defined in state safe drinking water statutes or regulations. The U.S. Safe Drinking Water Act and associated legislation define a *Public Water System* as an entity that provides "water for human consumption through pipes or other constructed conveyances to at least 15 service connections, or serves an average of at least 25 people for at least 60 days a year".

The 1986 Manti-La Sal Forest Plan identified portions of 3 fifth-level watersheds on the South Zone’s Abajo Mountains as a Municipal Water Supply area. Vega Creek-Montezuma Creek is the source of water for Monticello. Recapture Creek and Indian Creek provide water to the Blanding community. The 1986 Forest Plan Municipal Water Supply area was expanded in the Revised Forest Plan to include the eastern area of Cottonwood Wash fifth-level HUC and all of Recapture Creek fifth-level HUC that lies within the plan area and a larger area of the North Creek-Montezuma Creek sixth-level HUC. The management objective of the expanded 1986 boundary will be the protection of the municipal water infrastructure and to restore the health and function of the forest. This will increase forest resiliency to natural disturbances, such as wildfires and climate change. Restoring and maintaining watershed health is a key component of supporting a properly functioning ecosystem.

The 1986 plan also included a small municipal water supply area on the North Zone in Little Bear Creek Canyon and Tie Fork, tributaries to Huntington Creek in the Huntington Creek fifth-level watershed. This area contains three public water supply wells that provide water for towns north of Huntington. The Revised Forest Plan removed the small Wasatch Plateau Municipal Water Supply as a management areas since there are other watersheds on the Wasatch Plateau which also provide municipal water for downstream communities that were not part of the 1986 Forest Plan municipal water supply management area. The Little Bear Canyon/Tie Fork area will be managed to restore and maintain healthy watersheds, similar to those other areas that supply municipal water.

Drinking Water Protection Zones are required in Utah and Colorado as part of Drinking Water Source Protection for surface and groundwater supplying public water systems. Utah’s DEQ surface water protection zones delineate the intake area for Monticello and Blanding as larger than the 1986 Forest Plan Municipal Water Supply area albeit constrained to the same fifth-level HUCs as identified in the 1986 Forest Plan. The adjusted Municipal Water Supply boundary in the revised forest plan covers all the delineated surface water protection zones. The Johnson Creek intake and the Indian Creek for Blanding are in the Recapture Creek and the Indian Creek fifth-level HUCs respectively. The Monticello Blue Mountain Springs intake is in the Vega Creek-Montezuma Creek fifth-level HUC. There are seven fifth-level HUCs on the Wasatch Plateau that contain surface water protections zones: Scofield Reservoir for the town of Price, Huntington Creek for the town of Huntington and communities north thereof as well as the North Emery area, Cottonwood Creek for the towns of Caste Dale and Orangeville, Ferron Creek for the town of Ferron and communities nearby: Clawson, Molen, and Headwaters Muddy Creek

for the town of Emery. Both the Gordon Creek and Miller Creek fifth-level HUC are Green River City intakes.

Utah's DEQ Public Water Supply data indicate that municipal water from springs or wells in the plan area provides water to twelve communities. These Public Water Supply sources and intakes are in nine fifth-level HUCs. Water from the Huntington Creek watershed is taken for Huntington, Castle Dale, and Cleveland. The Cottonwood Creek watershed supplies water to the Swasey and Reeder subdivision in Joes Valley, the towns of Orangeville and Castle Dale and to Ephraim from water that is transferred across the watershed divide with the help of a tunnel system. The Middle San Pitch watershed provides water from the Wasatch Plateau to Spring City, and Ephraim, and to Wales from the San Pitch Mountains. The Lower San Pitch watershed has intakes for Manti and Sterling. Manti also gets water from the Ferron Creek watershed. The Twelvemile Creek watershed yields water for Mayfield. The Chicken Creek watershed produces water for Levan. Finally, there are Public Water Supply intakes for Blanding in both the Indian Creek and the Recapture watersheds that are located just outside the surface water protection zones described above. Several smaller Public Water Supply springs and wells provide drinking water for transient communities which are mainly used for recreation such as campgrounds and other recreational facilities.

The communities around the La Sal Mountains rely mainly on groundwater for their drinking water supply. There are two sole source aquifers designated by the United States Environmental Protection Agency that provide water for Moab in the Moab-Spanish Valley and for the Town of Castle Valley in the Castle Valley. A Sole Source Aquifer is defined as an aquifer that has been designated by the EPA as the sole or principal source of drinking water for an area. It supplies at least 50 percent of the drinking water for that area and there are no reasonable alternative drinking water sources should the aquifer become contaminated.

The principal aquifer in the Moab-Spanish Valley is the Glen Canyon Group fractured bedrock aquifer. It consists of sandstone of the Wingate, Kayenta and Navajo formations. Most of the wells tapping this aquifer are located on the east side of the valley. The eastern boundary representing the 3-year travel time for eight of those wells just crosses the western edge of the plan area in the Mill Creek fifth-level watershed. The Mill Creek fifth-level watershed in the La Sal Mountains is a source for Glen Canyon group aquifer recharge.

The Town of Castle Valley extracts its municipal water from the second sole source aquifer in the area. This valley-fill aquifer which consists mainly of gravelly stream alluvium and alluvial-fan deposits is the most important source of drinking water in the Castle Valley. The recharge areas of this aquifer are the headwaters of the fifth-level Placer Creek-Colorado River watershed in the La Sal Mountains.

The Sole Source Aquifer recharge areas are part of the Moab Geographic Area. The Moab Geographic Area contains the Placer Creek-Colorado River and the Mill Creek fifth-level HUCs. In addition to this geographic area being managed for the protection of the SSAs recharge, recreation and protection of scenery will be equally important management considerations. The La Sal Mountains provide the scenic backdrop for areas visible from within and around Arches National Park and Canyonlands National Park. The La Sal Loop Road, a scenic backway, crosses this area. This geographic area contains the highest concentration of recreation on the South Zone.

Less than two percent of the Forest is located within the State of Colorado. Within this area in the State of Colorado no surface water protection zones were noted based on geospatial data received from the

state. However, a 5.5-mile segment of Roc Creek in the Roc Creek fifth-level watershed, and a 0.8-mile segment of La Sal Creek, in the La Sal Creek fifth-level watershed, were present and are designated as water supply stream segments. Both segments flow into the Dolores River and contribute to water supplies for Dolores, Montezuma, and surrounding communities.

Three groundwater source points are Paradox Pipeline spring #1, Gateway Canyons WS Office Well #2, and John Brown Creek well. These groundwater sources, located in the West Paradox Creek-Dolores River, Beaver Creek-Dolores River, and John Brown Creek-Lower Dolores River fifth-level watersheds respectively, are for a community water system. The Gateway Canyons and John Brown Creek wells are surrounded by groundwater protection zones 1-3. The Paradox Pipeline Co. groundwater source is surrounded by groundwater protection zones 1-2.

The town of Paradox also uses water from shallow wells tapping the unconfined aquifer in the alluvial valley-fill of the Paradox valley which get recharged from infiltrating snowmelt originating in the West Paradox Creek-Dolores fifth-level HUC on the La Sal Mountains. The small Utah community of La Sal, south of the La Sal Mountains obtains drinking water from the Dakota sandstone aquifer.

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<sup>i</sup> Sixth-level HUC (Hydrologic Unit Code) is used interchangeably with HUC6, HUC10 or 10-digit HUC). A HUC is a sequence of numbers that identify a drainage basin. The more digits there are in the unit, the smaller the size of the unit. It is a nested hierarchical system from which it is possible to tell which Region, Sub-Region, Accounting Unit, Cataloging Unit, and Watershed a sixth-level Sub-Watershed lies within by the first two-, first four-, first six-, first eight- and first 10-digits of the twelve-digit sixth-level code, respectively.

<sup>ii</sup> There are 45 rows with fifth-level HUCs shown in table 4 because the Middle San Pitch River fifth-level HUC is part of both the Wasatch Plateau and the San Pitch Mountains