

1 that riparian areas dependent on spring flows will experience a decrease in available water. These
2 changes can create corresponding shifts in plant composition, diversity, and abundance.

3 For riparian vegetation Plan components and management approaches, see the “Watershed
4 Resources” section.

5 Watershed Resources

6 Watersheds

7 Background and Description

8 A watershed is a region or land area drained by a single stream, river, or drainage network.
9 Watersheds encompass all of the ecosystem elements—water, geology, soils, vegetation, and
10 animals. Watersheds also span the landscape at many different scales. Watershed boundaries cross
11 ownership boundaries since they are based on topography. There is an established method for
12 delineating watershed boundaries which is defined by a number code called the hydrologic unit code
13 (HUC). Each two digits in the number system represent a drainage basin, with successive numbers
14 referring to smaller watersheds nested within the larger one. On the Cibola, the Plan area is located
15 within portions of 60 5th (10 digit) HUC watersheds. Nested within these larger watersheds, there are
16 205 individual 6th (12 digit) code HUCs sub-watersheds that intersect the Plan area.

17 The “USFS watershed condition framework” was developed to assess the condition of watersheds
18 that intersect National Forest System lands. Watershed condition is the state of the physical and
19 biological characteristics and processes within a watershed that affect the soil and hydrologic
20 functions supporting aquatic ecosystems. Watersheds that are functioning properly have the
21 terrestrial, riparian, and aquatic ecosystem that capture, store, and release water, sediment, wood, and
22 nutrients within their range of natural variability for these processes. When watersheds function
23 properly they are considered in satisfactory condition and healthy. There are 119 sub-watersheds
24 within the Plan area that rated as functioning properly, 46 watersheds rated as functioning at risk, and
25 1 watershed rated as impaired. Forty-two watersheds were not rated because they had less than 10
26 percent of their area within the Plan area. The condition rating only applies to the National Forest
27 System lands within each watershed.

28 Desired Conditions

- 29 ■ Watersheds are functioning properly, in satisfactory condition.
- 30 ■ Watersheds are not at risk due to the fuels composition and uncharacteristic disturbance.
- 31 ■ Watersheds mostly contain free-flowing streams and functioning wetlands and riparian areas.
- 32 ■ The hydrologic regime within a watershed is not impacted by the density and distribution of
33 roads, trails, and impervious surfaces.
- 34 ■ Watersheds exhibit high geomorphic, hydrologic, and biotic integrity relative to their potential
35 condition.
- 36 ■ More than 50 percent of each 12 digit sub-watershed is in a satisfactory fire condition class as
37 described in the watershed condition framework.
- 38 ■ No more than 20 percent of the forested land in each 12 digit sub-watershed should be at
39 imminent risk of high levels of mortality due to insects and disease.

1 **Standard**

- 2 ■ Cost-effective, reasonable, and effective best management practices will be prescribed for every
3 project that has a potential effect on watershed condition, including water quality.

4 **Guidelines**

- 5 ■ Maximum road density should be 1.9 miles per square mile or less, except in developed sites.
- 6 ■ Where possible, new and reconstructed roads, infrastructure, recreation sites, or similar
7 constructed facilities, should be located outside of the 100-year floodplain (Executive Order
8 11988: Floodplain Management) except where necessary for stream crossings or to provide for
9 resource protection to avoid the long-term adverse impacts associated with the occupancy and
10 modification of flood plains and water resource features.
- 11 ■ Where possible, new or reconstructed roads, infrastructure, and recreation sites, or similar
12 constructed facilities, should not be constructed within 300 feet of water resource features,
13 unless to provide for resource protection, in order to avoid the long-term adverse impacts
14 associated with the occupancy and modification of water resource features.
- 15 ■ New or reconstructed trails should be planned, designed, constructed, and maintained to avoid
16 cumulative effects and to protect riparian-dependent values and proper functioning condition.
- 17 ■ Structures in stream channels which are no longer necessary or functional should be rehabilitated
18 or removed and the stream stabilized.

19 **Management Approaches**

- 20 ■ Identify priority watersheds, develop prescriptions, and plans for improvement through the
21 watershed condition framework or other similar processes.
- 22 ■ Watershed restoration action plans or similar process are completed for priority watersheds.
- 23 ■ Watershed planning is used as a further means to improve watershed condition within the Cibola
24 National Forest.
- 25 ■ Best management practices are monitored using a current protocol, such as the National Best
26 Management Practices for Water Quality Management on National Forest Systems Lands.
- 27 ■ Update watershed condition classification after large-scale disturbance events such as wildfire.
- 28 ■ Soil and water resource information is included as part of land and resource management
29 planning.
- 30 ■ Work with local, State, and Tribal governments, Land Grants and other stakeholders to identify
31 watershed improvements and priorities for protection and management.
- 32 ■ Cooperate with other agencies, groups, and individuals whose plans or proposals affect
33 watershed condition on National Forest System lands.
- 34 ■ Integrate watershed condition improvement projects with other project activities. Favor projects
35 that require minimal maintenance.
- 36 ■ Vegetation, recreation, and range management projects are planned to support the natural
37 variability of ecological characteristics to support satisfactory watershed condition while
38 considering the effects of climate change.
- 39 ■ Management actions are planned to reduce the risk of uncharacteristic wildfire and mortality due
40 to insects and disease.

1 **Soil**

2 **Background and Description**

3 Soil is the unconsolidated mineral and organic material on the immediate surface of the Earth that
4 serves as a natural medium for the growth of land plants. As such, soil is the basis of the terrestrial
5 ecosystem. In addition, soils provide habitat for many organisms, carbon storage, and act as filtration
6 and storage system for water. Without soil, there are no plants. Soils have unique physical, chemical,
7 and biological properties important to their use. The location and kind of soil is determined by soil-
8 forming factors such as parent material, climate (past and present), living organisms, topography, and
9 time.

10 The physical and chemical characteristics of soils are vulnerable to forest management activities.
11 Physical characteristics include surface structure, bulk density, infiltration, erosion, and surface
12 horizon. Impacts to these characteristics include compaction, erosion, rutting, and loss of the surface
13 horizon. Chemical characteristics include nutrient cycling and soil composition. Impacts to the
14 chemical aspect of soil include changes in vegetative community position, litter loss, lack of coarse
15 woody material, and atmospheric deposition. Forest management activities have the potential to
16 impact both the physical and chemical attributes of soils.

17 **Desired Conditions**

- 18 ■ Soil condition is satisfactory, soil functions are sustained and soil is functioning properly. The
19 ability of soil to maintain resource values and sustain outputs is high.
- 20 ■ Vegetation contributes to soil condition, nutrient cycling, and hydrologic regimes at natural
21 levels.
- 22 ■ Downed woody material occurs at levels (size, decay, and amount) sufficient to support soil
23 productivity.
- 24 ■ Biological soil crusts are present at sustainable levels where expected (desert grasslands, desert,
25 pinon-juniper, and sagebrush).
- 26 ■ Soils are free from pollutants that could alter ecosystem integrity or affect public health.
- 27 ■ Soils do not exhibit excessive rill, sheet, or gully erosion.
- 28 ■ Soils have minimal evidence of pedestaling and are within the range of natural amounts of litter
29 with little exposure of roots.

30 **Standards**

- 31 ■ High-risk soils will be identified prior to ground-disturbing activities and the appropriate best
32 management practices will be used to protect them. This may include avoidance and timing
33 restrictions.
- 34 ■ Appropriate best management practices will be applied to all ground-disturbing activities.
- 35 ■ Sites disturbed during management activities or actions will be stabilized and restored to
36 satisfactory conditions.
- 37 ■ Spill prevention and containment plans will be in place when hazardous substances are used in
38 or associated with forest management activities. This includes petroleum products, fuels,
39 herbicides, and cleaning fluids.

1 **Guidelines**

- 2 ■ Ground-disturbing activities that cause compaction, bare soils, loss of litter, or erosion resulting
3 in loss of soil function should be limited to 15 percent or less of a project area.
- 4 ■ Poorly drained or saturated soils should not have mechanized equipment operating on them.
- 5 ■ When soil condition is less than satisfactory as the result of management activities, restoration of
6 soil condition should occur to restore soil condition to satisfactory.
- 7 ■ Mechanized management activities such as mastication and skidding should occur along the
8 contour except where necessary to change direction.
- 9 ■ Burn piles should not be larger than 10 feet by 10 feet with no more than 10 piles per acre to
10 protect soil condition. Where soil under burned piles does not return to pre-burn condition within
11 5 years, burn scars should be restored with methods such as scarification and revegetation to
12 restore condition. Piles should contained a mix of fuel sizes and no more than 50 percent large
13 wood to reduce soil heating.
- 14 ■ Prescribed fire should occur when soils are moist when possible to limit heat penetration and
15 protect soil condition.
- 16 ■ Depth of masticated material should not exceed an average of 4 inches.
- 17 ■ Vegetation should be maintained or improved to conditions as indicated by Terrestrial Ecosystem
18 Unit Inventory as verified on the ground to support soil functions.
- 19 ■ Repeated use of fire (less than 10-year interval) should be avoided on sites with infertile soils
20 with low site potential. Other methods to reduce fuels on these sites should be considered.
- 21 ■ Woody material should be retained at levels sufficient to maintain nutrients during forest
22 management activities such as thinning and prescribed fire. Large decaying woody material
23 should be retained to support nutrient cycling.
- 24 ■ Whole-tree harvesting should only occur on productive sites unless slash is redistributed across
25 treatment area to support nutrient cycling and satisfactory soil condition.
- 26 ■ Whole-tree harvesting should not occur on aspen sites to protect soil condition unless necessary
27 for aspen regeneration.
- 28 ■ Soils with severe erosion hazard should be protected from ground-disturbing activities.
- 29 ■ Mechanized, ground-based vegetation management activities such as skidding and mastication
30 should be limited to slopes less than 40 percent.
- 31 ■ Ground-disturbing activities should only occur when soils are sufficiently dry, frozen, or
32 protected by an adequate snowpack to maintain productive soils.
- 33 ■ Vegetative ground cover should be improved or maintained to levels indicated by Terrestrial
34 Ecosystem Unit Inventory as verified on the ground to support soil functions.
- 35 ■ Selected areas with existing biological crusts should be identified and protected from ground
36 disturbance in project areas where ground disturbance is a potential effect. These areas will allow
37 for crusts to repopulate after project activities are completed.
- 38 ■ Areas of concentrated mechanized activities such as landings, areas where cattle are
39 concentrated (such as watering points, mineral blocks, and collection areas), and other sites
40 where ground disturbance is continual, should not be located on areas where soils have a severe
41 erosion hazard rating or are poorly drained or saturated. Drainage and erosion control measures

1 will be implemented and maintained for these features. Slope should be no more than 5 percent
2 where these areas are located to prevent erosion.

3 Management Approaches

- 4 ■ Assess, evaluate, and monitor the soil resource to detect changes in soil properties resulting from
5 implementation of management plans.
- 6 ■ Consider soil condition and appropriate prevention or mitigation practices when Forestwide and
7 project-level activities are planned. .
- 8 ■ Assess the extent to which soil condition is being maintained or restored to satisfactory.
- 9 ■ Evaluate the effectiveness of soil condition practices to maintain satisfactory soil condition.
- 10 ■ Project-level plans contain land management prescriptions consistent with maintaining
11 satisfactory soil conditions.
- 12 ■ Terrestrial Ecosystem Unit Inventory is the basis for planning project activities where soil
13 condition may be affected, including vegetation management, grazing, and transportation
14 projects.
- 15 ■ Manage forest and rangelands in a manner that will improve soil productivity.
- 16 ■ Soil information is integrated into land and resource management across the Forest.
- 17 ■ Policies and actions of the local, State, and Federal government in matters of soil resource
18 protection are fully ensured to the benefits of the resource.
- 19 ■ Restoration treatments are focused on areas with currently low herbaceous production for
20 sustained nitrogen availability.
- 21 ■ Plan and prioritize vegetation and landscape projects that will maintain proper soil health.
- 22 ■ Improve soils where conditions are less than satisfactory using appropriate management actions.

23 Groundwater

24 Background and Description

25 Groundwater is an important component of water resources on the Cibola National Forest. Much of
26 the water on the Forest comes from groundwater resources. In addition, the mountains on the Cibola
27 provide water for recharging many aquifers in the region. Recharge depends mostly on precipitation
28 which is greatest at the higher elevations within the Plan area. Snow has a significant input to
29 recharge in the mountains. Groundwater flows out from the mountains from all sides; generally there
30 is no other source of water for the aquifers in the region. Mountain front recharge and recharge
31 through ephemeral arroyos occurs along all of the mountain units within the Plan area. Therefore,
32 recharge in the mountains of the Cibola National Forest is very important to the groundwater
33 resources of the region. Groundwater uses will become more important as surface water resources
34 become scarce due to drought and long-term changes.

35 Groundwater pumping has the potential to impact surface water sources by removing water which
36 recharges these features. Proper location can prevent this effect by locating wells away from surface
37 water features. Groundwater wells are vulnerable to polluting sources located on the surface. Source
38 water protection areas and restrictions on uses within these areas prevent this risk. Watershed
39 condition is important for groundwater recharge in terms of quantity and spatial patterns of recharge.

1 When watersheds are healthy, snow packs and infiltration processes are effective in recharging
2 aquifers.

3 **Desired Conditions**

- 4 ■ Groundwater quality is not impacted by Forest Service activities or Forest Service-permitted
5 activities.
- 6 ■ Groundwater-dependent resources are not impacted by Forest Service groundwater withdrawal
7 activity or Forest Service-permitted withdrawal on National Forest System lands.
- 8 ■ Watershed condition supports recharge of aquifers.

9 **Standard**

- 10 ■ New groundwater wells on Forest Service lands will be located so that springs, wetlands
11 (including riparian areas), surface flows, and groundwater-dependent ecosystems are not
12 impacted.

13 **Guidelines**

- 14 ■ Groundwater sources should be used preferentially over surface water sources for Forest Service
15 uses, such as livestock, recreation, and other Forest uses. This protects surface water sources
16 which are at risk due to drought while providing for management uses.
- 17 ■ When existing groundwater wells that have the potential to impact surface water features require
18 improvement, these wells should be relocated far enough away from surface water features to
19 prevent impacts. Surface water features include wetlands, riparian areas, floodplains, streams,
20 playas, maars, and springs.
- 21 ■ Forest Service activities which could impact groundwater quality should be located to prevent
22 potential impacts to source water protection areas. In these protection areas, gravel pits, mining,
23 septic systems, injection wells, equipment fueling or maintenance, underground storage tanks,
24 landings, garbage storage, confined animal operations, chemical storage, pesticide use, and other
25 potentially polluting activities should not be allowed.

26 **Management Approaches**

- 27 ■ Manage groundwater quantity and quality on National Forest System lands in cooperation with
28 appropriate State agencies.
- 29 ■ Aquifers are identified within the Plan area, including important recharge areas. Management
30 actions will consider these areas during project planning and implementation to protect them.
- 31 ■ Manage watershed condition to support groundwater recharge processes such as snow pack
32 management and improved soil condition.
- 33 ■ Collaborate with external groups, such the U.S. Geological Survey, State, Tribal and local
34 governments, Land Grants, State geological surveys, universities, and industry and other
35 appropriate organizations when locating, investigating, or assessing the hydrogeology and
36 groundwater resources of National Forest System lands
- 37 ■ Identify and inventory groundwater-dependent resources.
- 38 ■ Manage groundwater resources sustainably. Implement water conservation strategies in Forest
39 Service administrative and recreational uses. Work with local, State, and other Federal agencies

- 1 and Tribes to sustain the availability and usability of groundwater over the long term through the
2 use of conventional and innovative approaches.
- 3 ■ Manage surface water and groundwater resources as hydraulically interconnected, and consider
4 them interconnected in all planning and evaluation activities, unless it can be demonstrated
5 otherwise using site-specific information.
 - 6 ■ Evaluate all applications to States for water rights on National Forest System lands and
7 applications for water rights on adjacent lands that could adversely affect National Forest System
8 groundwater resources, and identify any potential injury to those resources or Forest Service
9 water rights under applicable State procedures.
 - 10 ■ Encourage the use of water sources located off National Forest System lands when the water use
11 is largely or entirely off National Forest System lands.
 - 12 ■ Monitor and evaluate the effects from authorized activities involving groundwater withdrawals.

13 **Water Resources Features and Wetland/Riparian**

14 **Background and Description**

15 Water resource features include riparian areas, wetlands, perennial, intermittent, and ephemeral
16 streams, springs, and floodplains.

17 Riparian habitats are among the most critical elements of biodiversity within the landscape and they
18 provide key ecosystem services available from no other resource. This includes ecosystem-
19 supporting services such as nutrient cycling; provisioning services such as fresh water, forage and
20 habitat for wildlife; regulating services such as carbon storage, water and flood regulation, water
21 quality, erosion control; and cultural services such as recreation, scientific discovery and education,
22 cultural, intellectual and spiritual inspiration. Where riparian areas are intact and functioning, these
23 ecosystem services can be assumed to be stable; but where riparian areas have degraded or been lost,
24 these services are missing or at risk.

25 **Desired Conditions**

- 26 ■ Riparian areas are in proper functioning condition and support higher ecological values.
- 27 ■ Sufficient reproduction of native species appropriate to the site is occurring to ensure
28 sustainability.
- 29 ■ Native riparian plants such as willow (such as Bebb, peachleaf) are reproducing with all age
30 classes present where the potential exists.
- 31 ■ Bank characteristics including vegetation are stable within the natural range of variability.
- 32 ■ In aquatic and riparian systems that evolved with wood near the streams, large woody material is
33 present and continues to be recruited into the system at near natural rates.
- 34 ■ Riparian areas around all lakes, perennial and intermittent streams, springs, and open water
35 wetlands contribute to healthy watersheds while providing for multiple uses (including but not
36 limited to grazing, recreation, vegetation management).
- 37 ■ Riparian and wetland areas withstand high flow events with resiliency.
- 38 ■ Springs, riparian areas, and wetlands have the necessary soil, water, and vegetation attributes to
39 be healthy and properly functioning (USDI 2015).

- 1 ■ Wetland/riparian conditions function within their potential or capability (as appropriate) by
2 infiltrating water, recycling nutrients, and resisting erosion.
- 3 ■ Riparian, wetland, and spring-dependent resources are supported preferentially.
- 4 ■ The ecological integrity of riparian areas is maintained or restored, including structure, function,
5 composition, connectivity, water quality, sediment, aquatic and terrestrial habitats, and floodplain
6 values.
- 7 ■ The unique character of water resource features such as springs are maintained and/or restored.
- 8 ■ Water is available to riparian and wetland plant communities maximizing the area where they
9 might potentially grow.
- 10 ■ Instream flows provide for channel and floodplain maintenance, recharge of riparian aquifers,
11 water quality and minimal temperature fluctuations.
- 12 ■ Surface water resources in the Plan area are not impacted by Forest Service surface or
13 groundwater withdrawals.
- 14 ■ Channel width-to-depth ratios are appropriate to the stream type within the capability of the
15 system.
- 16 ■ Channels are vertically stable, with isolated locations of aggradation or degradation which would
17 be expected in near natural conditions.
- 18 ■ Stream channels are connected to their floodplains.
- 19 ■ Floodplains are functioning and lessen the impacts of floods on human safety, health, and
20 welfare.
- 21 ■ Higher ecological values such as habitat associated with water resources features (springs,
22 streams, riparian, and wetlands) are supported by the healthy condition of these features.
- 23 ■ Water resources, including water quality, are maintained or improved by ensuring best
24 management practices are implemented and monitored.
- 25 ■ State of New Mexico water quality standards are met and designated uses are supported.
- 26 ■ Ephemeral channels provide support to downstream subsurface flows, riparian vegetation,
27 groundwater recharge, and do not contribute to downstream water quality degradation outside of
28 the natural range of variability.

29 Standards

- 30 ■ Project activities with potential effects to water resource features will have best management
31 practices prescribed, implemented, and monitored, specific to each activity.
- 32 ■ Activities in and around surface waters will use decontamination procedures to prevent the
33 spread of non-desirable fungus, disease, nonnative and/or invasive biota.
- 34 ■ Streams will not be straightened or altered from desired conditions by management actions.
- 35 ■ New groundwater wells on Forest Service lands will be located so that springs, wetlands
36 (including riparian areas), surface flows, and groundwater-dependent ecosystems are not
37 impacted.
- 38 ■ Tribal governments will be consulted during the planning of projects that involve water
39 resources, wetland, and riparian resources.

- 1 ■ New construction of facilities will not occur in the floodplain as defined by the Executive Order
2 on Floodplain Management except where crossings are needed or to provide resource protection.
3 This includes buildings, recreation sites, and roads.

4 Guidelines

- 5 ■ Motorized equipment should not be used in water resource features unless the use benefits the
6 riparian area, is at a designated stream crossing, or to maintain infrastructure.
- 7 ■ Activities within at least 300 feet of riparian areas (except at stream crossings), unless to provide
8 resource protection, should not degrade the riparian-dependent values and stream functioning.
- 9 ■ Native riparian plants and associated wildlife habitat should be retained.
- 10 ■ Management activities should maintain or improve the age class distribution and species
11 diversity of riparian plants and wildlife in wetland/riparian areas.
- 12 ■ Restoration activities should address causes in addition to resource impacts caused as a result of
13 management activities.
- 14 ■ Herbivory of riparian plants should not impact the long-term health of riparian plants. Livestock
15 and wildlife management practices should allow wetland/riparian vegetation to recover.
- 16 ■ Livestock use should avoid grazing the same wetland/riparian areas at the same time, year after
17 year. Exceptions to this may include, but not limited to, trailing systems that may be adjacent to
18 wetland/riparian areas due to topography constraints.
- 19 ■ Plant development or recovery sufficient to sustain healthy wetland/riparian areas should occur
20 following each livestock use period.
- 21 ■ Where recruitment of riparian vegetation is low or not present and the potential exists,
22 wetland/riparian native plants should be planted to restore function of these areas.
- 23 ■ Designated points of use to natural waters should be provided to prevent erosion, trampling, and
24 inadvertent introduction of nonnative and undesirable biota and disease to protect associated
25 values such as riparian habitat and clean water.
- 26 ■ Management activities should retain large diameter trees, snags, and downed logs in and near
27 stream channels and riparian areas to provide for wildlife habitat and recruitment of large woody
28 material.
- 29 ■ Downed woody material in stream channels should be kept in place except where safety is a
30 concern.
- 31 ■ When existing groundwater wells that have the potential to impact surface water features require
32 improvement, these wells should be relocated far enough away from surface water features to
33 prevent impacts.
- 34 ■ Use of surface water for Forest Service activities should not impact wetland/riparian vegetation
35 and dependent wildlife.
- 36 ■ New points of surface water diversions should be located to minimize impacts to water-
37 dependent ecosystems, including instream flows, consistent with special use processes, existing
38 water rights, approved permits, and approved declarations.
- 39 ■ Consistent with existing water rights, water diversions or obstructions should allow sufficient
40 water to pass downstream to preserve minimum levels of water flow that maintain aquatic life
41 and other purposes for National Forest establishment.

- 1 ■ Consistent with existing water rights developed surface waters should only be allowed where
2 there is enough water to support the associated ecosystem and the proposed use.
- 3 ■ New or redesigned stream crossings, such as bridges and culverts, should be wide enough to pass
4 the bankfull width unimpeded.
- 5 ■ New road construction or reconstruction should avoid meadows, wetlands, seeps, springs,
6 riparian areas, stream bottoms, and areas of heritage concern, where feasible. The number of
7 stream crossings should be minimized or mitigated to reduce impacts to aquatic species
8 watershed condition.
- 9 ■ As projects occur in riparian or wet meadow areas or floodplains, unneeded roads should be
10 closed or relocated, drainage restored, and native vegetation reestablished to move these areas
11 toward their desired condition.
- 12 ■ When temporary roads are necessary, designated stream crossings should be constructed to
13 mitigate sedimentation and gradient changes and maintain bank stability. These crossings should
14 be designated by the appropriate resource specialists and removed after use.
- 15 ■ Low water crossings on roads or trails should be improved to protect water quality and stream
16 stability. Fords on perennial streams should be a priority.
- 17 ■ Headcuts should be treated to prevent continued erosion. The cause of headcuts should be
18 addressed and treated at the same time.
- 19 ■ Mineral materials such as gravel will not be removed within water resource features to ensure
20 satisfactory conditions.
- 21 ■ Streambed material disturbed by placer mineral operations should be replaced into its source
22 location to ensure stream stability.
- 23 ■ Roads, culvert, and other water crossing infrastructure should be designed and located to allow
24 for aquatic species organism passage.
- 25 ■ Trees and other vegetation adjacent to the active channel including ephemeral streams should be
26 retained to protect bank stability.
- 27 ■ Vegetation treatments in the riparian area should not occur except to maintain or restore the
28 riparian ecosystem.
- 29 ■ Openings created as part of forest management activities should be of the size to encourage
30 snowpack accumulation, generally about a tree-and-a-half distance to allow for shade.
- 31 ■ There should be no burn piles of slash placed within 300 feet of perennial or intermittent
32 streams, springs, or riparian/wetland areas in order to protect the values of these features. In
33 addition, there will be no burn piles of slash placed within 100 feet of ephemeral channels.
- 34 ■ The planning and implementation of project activities related to water resource features should
35 consider the protection and management of cultural resources and historic properties and other
36 resources, and should be consistent with scenic integrity objectives.

37 Management Approaches

- 38 ■ Best management practices are monitored using a current protocol, such as the National Best
39 Management Practices for Water Quality Management on National Forest Systems Lands.
- 40 ■ Work with local, State, Federal, Tribal governments, land grants, and other interests to identify
41 water resource improvements and priorities for protection and management.

- 1 ■ Cooperate with other agencies, groups, and individuals whose plans or proposals affect water
2 resources on National Forest System lands.
- 3 ■ Integrate water resource improvements into the watershed condition framework to improve
4 overall watershed conditions with a focus on priority watersheds.
- 5 ■ Favor projects that improve resiliency to climate change.
- 6 ■ Utilize groundwater wells to replace surface water sources to prepare for drought and climate
7 change conditions.
- 8 ■ Work to complete and update water resource inventories, including riparian and springs to
9 improve management of these features.
- 10 ■ Provide education opportunities to improve understanding of water resources features.
- 11 ■ Riparian restoration emphasize natural channel design principles over construction involving
12 artificial materials.
- 13 ■ Grazing management plans emphasize upland watering sources where possible and appropriate
14 to restore and maintain riparian areas to desired conditions.
- 15 ■ Utilize the Terrestrial Ecosystem Inventory to improve project design and implementation.
- 16 ■ When studies are conducted regarding water resources such as floodplains, share information
17 with applicable state agencies and local communities.

18 **Water Uses**

19 **Background and Description**

20 There are many water uses in the Plan area. Water use in the planning area includes use of surface
21 and groundwater, and can be consumptive or non-consumptive. Consumptive uses include uses such
22 as drinking water, permitted livestock watering, recreation sites, developed wildlife waters, and
23 administrative uses. Non-consumptive uses include the water that supports the forests, recharges
24 aquifers, and provides for instream flows, aquatic habitat, and ecosystems.

25 The amount of water used by the Forest is related to forest management activities such as water to
26 support permits to graze livestock, recreation sites, and wildlife watering. Many of these uses require
27 water rights obtained from the State. The Cibola National Forest maintains a database of water rights
28 approved by the State of New Mexico for consumptive uses within the Plan area. Some types of
29 water uses are managed through Forest Service permits such as drinking water, livestock watering,
30 and ski areas. It is important these permits include guidelines to protect forest resources while
31 providing water for multiple uses. Water use also includes the sustainable use of water. Water used
32 for National Forest purposes should be used efficiently, without waste.

33 **Desired Conditions**

- 34 ■ Consumptive and non-consumptive water resource needs are provided for through streams,
35 springs, and groundwater resources within the Forest.
- 36 ■ Instream flows provide for favorable conditions of flow including channel and floodplain
37 maintenance, recharge of riparian aquifers, water quality, and minimal temperature fluctuations.
- 38 ■ Groundwater wells on Forest Service lands are located so that springs, wetlands (including
39 riparian areas), surface flows, and groundwater-dependent ecosystems are not impacted.

1 ■ Springs, riparian areas, wetlands, and groundwater-dependent ecosystems have the necessary
2 soil, water, and vegetative attributes to be healthy and functioning.

3 ■ The water rights database is kept up to date to reflect current uses. Currently, the database is
4 called Water Rights and Uses.

5 Standards

6 ■ Water rights will be secured through the appropriate State agency and procedures to support
7 Forest Service activities.

8 ■ Consistent with existing water rights, development of surface waters for consumptive uses will
9 include provisions that support the associated ecosystem such as managing the point of
10 diversion, return flows, or other methods to ensure that water resource features are protected.

11 ■ Proposals to pump, transport, or utilize water from National Forest System lands must not impair
12 resources on National Forest System lands.

13 Guidelines

14 ■ When developing water for National Forest purposes, preference should be given to those types
15 of developments with the most efficient use of water and that provide for the associated
16 ecosystem.

17 ■ Consistent with existing water rights, Forest Service and permitted water uses, diversions, or
18 obstructions should at all times allow sufficient water to support the associated ecosystem and, in
19 streams, to preserve minimum levels of water flow that maintain aquatic life, aquatic habitat, and
20 other purposes of national forest establishment.

21 ■ Constraints (the maximum limit to which water level can be drawn down or minimum distance
22 from a connected river, stream, wetland, or groundwater-dependent ecosystem) should be
23 established for groundwater pumping sites permitted on National Forest System lands in order to
24 protect the character and function of water resources.

25 ■ When water collection and storage facilities are constructed or developed within National Forest
26 System lands, such as wildlife drinkers, they should be located outside of fragile sites such as
27 wetlands, stream channels, riparian areas, aspen, sensitive soils, and meadows.

28 Management Approaches

29 ■ Claim water rights for water used directly by the Forest Service and by the general public on the
30 National Forest System lands.

31 ■ Claim water rights for water used by permittees, contractors, and other authorized users of the
32 National Forest System to carry out activities related to multiple-use objectives.

33 ■ Participate in water rights processes, including administrative hearings, negotiations, and
34 adjudications.

35 ■ Develop and implement collaborative strategies and partnerships for water resource inventory,
36 assessment, restoration, monitoring and research where appropriate.

37 ■ Protect surface waters through land acquisition where the economic and social benefits are in the
38 interest of the public.

39 ■ Utilize special-use permit conditions as a means of maintaining surface flows.

- 1 ■ Work with adjacent landowners to mitigate the effects of water uses from outside groundwater or
2 surface water sources which could impact forest resources.
- 3 ■ Diversions of any water sources that support wetlands, riparian areas, aquifer recharge, or other
4 important functions will be assessed and mitigated to minimize effects.

5 Species

6 Aquatic Species and Habitats

7 Background and Description

8 Streams, springs, groundwater, and constructed waters are centers of high biological diversity in
9 semi-arid environment, and the ecological health of these resources is important for Forest
10 ecosystem sustainability. Wildlife is more concentrated around open water sources than in the
11 general landscape, and obligate aquatic and semiaquatic species on the Cibola National Forest are
12 sometimes entirely dependent on these limited and scattered water sources. Collectively, these
13 resources contribute to connecting habitat for wildlife across the landscape. Aquatic species and
14 habitats are managed in conjunction with other resources according to the Multiple Use Sustained
15 Yield Act of 1960 (Public Law 86-517). For federally endangered and threatened species on the
16 Cibola, habitat management and compatible multiple uses are determined in accordance with section
17 7 of the Endangered Species Act as amended (Public Law 93-205). For species of conservation
18 concern, habitat management and compatible multiple uses will be accomplished in such a way that
19 ensures those species' persistence on the Forest, per the 2012 Planning Rule.

20 Springs are highly productive habitats in otherwise low productivity semi-arid environment. Springs
21 are frequently more stable hydrologically than surrounding upland ecosystems in arid regions, and
22 may offer biological refugia for some species, particularly those that are narrowly endemic. They
23 also often have important traditional, cultural significance to humans inhabiting arid landscapes and
24 often provide many cultural and recreational opportunities. Contemporary uses include contributions
25 to potable local and urban water supplies and agricultural uses such as livestock watering. These uses
26 are vital to domestic and commercial interests in and around the Cibola National Forest.

27 Natural and constructed waters provide water and food resources that are especially vital to wildlife;
28 particularly amphibians, birds, bats, and invertebrates. Various water impoundments have been
29 constructed on the Cibola for a variety of purposes including reservoirs, constructed lakes, stock
30 tanks, and wildlife drinkers. Some constructed waters provide unique riparian habitats and
31 recreational opportunities.

32 Climate change is an important consideration when managing habitat for aquatic species. While
33 climate change has the potential to affect all wildlife species, some are inherently more vulnerable
34 than others, particularly species with specialized niches, limited mobility, and limited physiological
35 adaptability. Certain habitats are more vulnerable to a changing climate. For example, springs and
36 seeps are a valuable natural water source for a variety of birds and mammals, particularly in semi-
37 arid environments. These areas may offer critical refugia for rare and narrow endemic species.
38 However, springs are especially sensitive to variable precipitation and likely to dry up during
39 prolonged drought. As such, the unreliability of natural water resources would make it harder for
40 wildlife species to persist, pushing the limits of their natural range.