



United States
Department of
Agriculture

Forest
Service

**Coconino
National
Forest**

**November
2013**



Water Quality, Quantity and Watershed Existing Condition Specialist Report

Forest Plan Revision DEIS

Submitted by:

/s/ _____

Rory Steinke, CPSSc

Watershed Program Manager

Coconino National Forest, July 12, 2011, April 11, 2013,
November 2013

The U.S. Department of Agriculture (USDA) prohibits discrimination against its customers, employees, and applicants for employment on the bases of race, color, national origin, age, disability, sex, gender identity, religion, reprisal, and where applicable, political beliefs, marital status, familial or parental status, sexual orientation, or all or part of an individual's income is derived from any public assistance program, or protected genetic information in employment or in any program or activity conducted or funded by the Department. (Not all prohibited bases will apply to all programs and/or employment activities.)

Preface

The information in this specialist report reflects analysis that was completed prior to and in conjunction with the completion of the Draft Environmental Impact Statement (DEIS) for the revision of the 1987 Coconino National Forest Land Management Plan (the Plan). The primary purpose of specialist reports associated with the DEIS is to provide detailed information to assist in the preparation of the DEIS. As the DEIS was prepared, review-driven edits to the broader DEIS resulted in modifications to some of the information contained in some of the specialist reports. As a result, some reports no longer contain information and analysis that was updated through an interdisciplinary review process and is included in the DEIS in its entirety. Information on the environmental consequences for this resource is included in its entirety in the DEIS and is not duplicated in this report. Efforts have been made to ensure that the retained information in the specialist reports is consistent with the DEIS. If inconsistencies exist between specialist reports and the DEIS, the DEIS should be regarded as the most current, accurate source of analysis.

Executive Summary

This report is only the affected environment. Environmental consequences are disclosed in the Draft Environmental Statement.

Affected Environment:

Water quality on Coconino NF lakes and streams is variable. About 33 miles (about 15%) of streams (50 miles including non-forest lands) and five reservoir lakes on the Forest are classified by ADEQ or EPA as impaired and are not attaining designated beneficial uses (Appendix A), the category of most severe water quality problems. An additional 24 miles (about 11%) are classified as not attaining (category 4), the next most severe water quality category. These lakes and streams miles do not meet state and federal water quality standards and do not support designated beneficial uses including either aquatic and warm water fisheries, full body contact (swimming) or fish consumption. They are described below by watershed.

Stream miles are approximate. Based on recent GIS calculations, perennial stream miles on forest administered and managed lands are about 229 miles and 296 miles of non-forest lands but still within the forest boundary. There are about 944 intermittent stream miles and 3,743 ephemeral stream miles on forest administered and managed lands and 1019 intermittent and 4,164 ephemeral stream miles on non-forest administered lands within the forest boundary. This information updates information listed in (Steinke, 2007a).

Streamflow and some well data indicate a recent downward trend in groundwater levels adjacent to Flagstaff and communities in the Verde Valley, particularly in areas that have the most well pumping on private lands. Continued or increased pumping may negatively affect the base flow of streams especially the Verde River, Beaver Creek, West Clear Creek, and Oak Creek because domestic use is high adjacent to these streams, which are in the Upper Verde River and Lower Verde River 4th code watersheds.

Overall, about 79% of 6th HUC watersheds are not properly functioning and departed from reference condition. It was assumed that watersheds were functioning properly in reference conditions.

A more detailed description of the affected environment can be found in the affected environment section of this report. Forest wide trends for watershed condition and water are shown in Table 1.

The analysis of environmental consequences for water resources and watersheds by alternative can be found in the DEIS only.

Table 1 Soil and Water Resource Trends for Alternative A (existing condition)

Resource	Alternative A
Watershed Condition	Static
Water Quality	Static TMDL direction only for impaired waters in Oak Creek, Verde River, mercury impaired lakes, Stoneman Lake
Water Quantity (Streamflow)	Static to Away
Groundwater Quantity	Away on Non forest lands Static on forest lands

Contents

Introduction	1
Relevant Laws, Regulations, and Policy that Apply.....	1
Methodology and Analysis Process	8
Description of Affected Environment	10
Water Resources of the Coconino NF.....	10
Environmental Consequences	29
References	30
Specialist Information.....	31
Appendix A. Water Quality by 4th and 5th HUC Watershed.....	34
Appendix B. Watershed condition scores and ratings by 6th level HUC	35

Introduction

This specialist report evaluates watershed condition and water quality, and stream flow quantity and groundwater resources on the Coconino National Forest used in the analysis of the revised land management plan. The analysis of environmental consequences for water resources and watersheds by alternative can be found in the DEIS only.

Relevant Laws, Regulations, and Policy that Apply

All alternatives are designed to guide the Coconino NF's management activities in meeting all applicable Federal and State laws, regulations, and policies.

Bankhead-Jones Farm Tenant Act of July 22, 1937 - Directed the Secretary of Agriculture to develop a program of land conservation and utilization in order to correct maladjustments in land use and thus assist in such things as control of soil erosion, reforestation, preservation of natural resources, and protection of fish and wildlife.

Emergency Flood Prevention (Agricultural Credit Act) Act of August 4, 1978 - Authorizes the Secretary of Agriculture to undertake emergency measures for runoff retardation and soil-erosion prevention, in cooperation with land owners and users, as the Secretary deems necessary to safeguard lives and property from floods, drought, and the products of erosion on any watershed whenever fire, flood, or other natural occurrence is causing or has caused a sudden impairment of that watershed.

Federal Land Policy and Management Act of October 21, 1976 - Requires that public lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values; that, where appropriate, will preserve and protect certain public lands in their natural condition; that will provide food and habitat for fish and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use. Also states that the United States shall receive fair market value of the use of the public lands and their resources unless otherwise provided for by law.

Federal-State Cooperation for Soil Conservation Act of December 22, 1944 - Authorized the adoption of eleven watershed improvement programs in various states for the improvement of water runoff, water flow retardation, and soil erosion prevention.

Federal Water Pollution Control Act and Amendments of 1972 (Clean Water Act) - Enacted to restore and maintain the chemical, physical, and ecological integrity of the Nation's waters. Provides for measures to prevent, reduce, and eliminate water pollution; recognizes, preserves, and protects the responsibilities and rights of States to prevent, reduce, and eliminate pollution, and to plan the development and use (including restoration, preservation, and enhancement) of land and water resources; and provides for Federal support and aid of research relating to the prevention, reduction, and elimination of pollution, and Federal technical services and financial aid to state and interstate agencies and municipalities for the prevention, reduction, and elimination of pollution.

Established goals for the elimination of water pollution; required all municipal and industrial wastewater to be treated before being discharged into waterways; increased Federal assistance for

municipal treatment plant construction; strengthened and streamlined enforcement policies; and expanded the Federal role while retaining the responsibility of States for day-to-day implementation of the law.

Federal Water Project Recreation Act of July 9, 1965 - Requires that recreation and fish and wildlife enhancement opportunities be considered in the planning and development of Federal water development.

Forest and Rangeland Renewable Resources Planning Act of August 17, 1974 - Directs the Secretary of Agriculture to prepare a Renewable Resource Assessment every ten years; to transmit a recommended Renewable Resources Program to the President every five years; to develop, maintain, and, as appropriate, revise land and resource management plans for units of the National Forest System; and to ensure that the development and administration of the resources of the National Forest System are in full accord with the concepts of multiple use and sustained yield.

Healthy Forests Restoration Act of 2003 (H.R. 1904) - Purposes are to reduce wildfire risk to communities and municipal water supplies through collaborative hazardous fuels reduction projects; to assess and reduce the risk of catastrophic fire or insect or disease infestation; to enhance efforts to protect watersheds and address threats to forest and rangeland health (including wildfire) across the landscape; to protect, restore, and enhance forest ecosystem components such as biological diversity, threatened/endangered species habitats, enhanced productivity.

Joint Surveys of Watershed Areas Act of September 5, 1962 - Authorizes and directs the Secretaries of the Army and Agriculture to make joint investigations and surveys of watershed areas in the United States, Puerto Rico, and the Virgin Islands, and to prepare joint reports setting forth their recommendations for improvements needed for flood prevention, for the conservation, development, utilization, and disposal of water, and for flood control.

Knutson-Vandenberg Act of June 9, 1930 - Authorizes the Secretary of Agriculture to establish forest tree nurseries; to deposit monies from timber sale purchasers to cover the costs of planting young trees, sowing seed, removing undesirable trees or other growth, and protecting and improving the future productivity of the land; and to furnish seedlings and/or young trees for the replanting of burned-over areas in any National Park.

Land and Water Conservation Fund Act of September 3, 1964 - Authorizes the appropriation of funds for Federal assistance to States in planning, acquisition, and development of needed land and water areas and facilities and for the Federal acquisition and development of certain lands and other areas for the purposes of preserving, developing, and assuring accessibility to outdoor recreation resources.

The National Environmental Policy Act of 1969 - This act declares a national policy that encourages productive and enjoyable harmony between people and their environment, promotes efforts that will prevent or eliminate damage to the environment and biosphere, and enriches the understanding of the ecological systems and natural resources important to the nation.

National Forest Management Act of October 22, 1976 - The National Forest Management Act reorganized, expanded, and otherwise amended the Forest and Rangeland Renewable Resources Planning Act of 1974, which called for the management of renewable resources on National Forest System lands. The National Forest Management Act requires the Secretary of Agriculture

to assess forest lands, develop a management program based on multiple-use, sustained-yield principles, and implement a resource management plan for each unit of the National Forest System. It is the primary statute governing the administration of National Forests.

National Forest Roads and Trails Act of October 13, 1964 - Authorizes the Secretary of Agriculture to provide for the acquisition, construction, and maintenance of forest development roads within and near the National Forests through the use of appropriated funds, deposits from timber sale purchasers, cooperative financing with other public agencies, or a combination of these methods. The Act also authorizes the Secretary to grant rights-of-way and easements over National Forest System lands.

Organic Administration Act of June 4, 1897 - Authorizes the President to modify or revoke any instrument creating a national forest; states that no national forest may be established except to improve and protect the forest within its boundaries, for the purpose of securing favorable conditions of water flows, and to furnish a continuous supply of timber for the use and necessities of citizens of the United States. Authorizes the Secretary of Agriculture to promulgate rules and regulations to regulate the use and occupancy of the national forests.

Multiple-Use Sustained-Yield Act of June 12, 1960 - States that it is the policy of Congress that the national forests are established and shall be administered for outdoor recreation, range, timber, watershed, and wildlife and fish purposes, and authorizes and directs the Secretary of Agriculture to develop and administer the renewable surface resources of the national forests for the multiple use and sustained yield of products and services.

Mining and Minerals Policy Act of December 31, 1970 - States that it is the policy of the Federal government to foster and encourage the development of economically sound and stable domestic mining, minerals, metal, and mineral reclamation industries; the orderly and economic development of domestic mineral resources, reserves, and reclamation of metals and minerals to help assure satisfaction of industrial, security, and environmental needs; mining, mineral, and metallurgical research to promote the wise and efficient use of our natural and reclaimable mineral resources; and the study and development of methods for the disposal, control, and reclamation of mineral waste products and the reclamation of mined land.

National Environmental Policy Act of January 1, 1970 - Directs all Federal agencies to consider and report the potential environmental impacts of proposed Federal actions, and established the Council on Environmental Quality.

National Forest Management Act of October 22, 1976 - The National Forest Management Act reorganized, expanded, and otherwise amended the Forest and Rangeland Renewable Resources Planning Act of 1974, which called for the management of renewable resources on National Forest System lands. The National Forest Management Act requires the Secretary of Agriculture to assess forest lands, develop a management program based on multiple-use, sustained-yield principles, and implement a resource management plan for each unit of the National Forest System. It is the primary statute governing the administration of National Forests.

Safe Drinking Water Amendments of November 18, 1977 - Amended the Safe Drinking Water Act to authorize appropriations for research conducted by the Environmental Protection Agency relating to safe drinking water; Federal grants to states for public water system supervision programs and underground water source protection programs; and grants to assist special studies relating to the provision of a safe supply of drinking water.

Sikes Act of October 18, 1974, as amended - This Act authorizes the Forest Service to cooperate with state wildlife agencies in conservation and rehabilitation programs for fish, wildlife, and plants considered threatened or endangered.

Soil and Water Resources Conservation Act of November 18, 1977 - Provides for a continuing appraisal of the United States' soil, water and related resources, including fish and wildlife habitats, and a soil and water conservation program to assist landowners and land users in furthering soil and water conservation.

Surface Mining Control and Reclamation Act of August 3, 1977 - Authorizes the Secretary of Agriculture to enter into agreements with landowners, providing for land stabilization, erosion, and sediment control, and reclamation through conservation treatment, including measures for the conservation and development of soil, water, woodland, wildlife, and recreation resources, and agricultural productivity of such lands.

Travel Management Rule - On December 9, 2005, the Forest Service published the TMR. The agency rewrote direction for motor vehicle use on National Forest Service (NFS) lands under 36 CFR, Parts 212, 251, and 261, and eliminated 36 CFR 295. The rule was written to address at least in part the issue of unmanaged recreation. The rule provides guidance to the Forest Service on how to designate and manage motorized recreation on the Forests. The rule requires each National Forest and Grassland to designate those roads, motorized trails, and Areas that are open to motor vehicle use.

U.S. Mining Laws (Public Domain Lands) Act of May 10, 1872 - Provides that all valuable mineral deposits in lands belonging to the United States, both surveyed and unsurveyed, are free and open to exploration and purchase, and the lands in which they are found to occupation and purchase by citizens of the United States and those who have declared their intention to become such, under regulations prescribed by law, and according to the local customs or rules of miners, so far as the same are applicable and not inconsistent with the laws of the United States. There are a number of Acts which modify the mining laws as applied to local areas by prohibiting entry altogether or by limiting or restricting the use which may be made of the surface and the right, title, or interest which may pass through patent.

Water Quality Improvement Act of April 3, 1970 - Amends the prohibitions of oil discharges, authorizes the President to determine quantities of oil which would be harmful to the public health or welfare of the United States; to publish a National Contingency Plan to provide for coordinated action to minimize damage from oil discharges. Requires performance standards for marine sanitation device and authorizes demonstration projects to control acid or other mine pollution, and to control water pollution within the watersheds of the Great Lakes. Requires that applicants for Federal permits for activities involving discharges into navigable waters provide state certification that they will not violate applicable water quality standards

Water Resources Planning Act of July 22, 1965 - Encourages the conservation, development, and utilization of water and related land resources of the United States on a comprehensive and coordinated basis by the Federal government, states, localities, and private enterprises.

Watershed Protection and Flood Prevention Act of August 4, 1954 - Establishes policy that the Federal government should cooperate with states and their political subdivisions, soil or water conservation districts, flood prevention or control districts, and other local public agencies for the purposes of preventing erosion, floodwater, and sediment damages in the watersheds of the rivers

and streams of the United States; furthering the conservation, development, utilization, and disposal of water, and the conservation and utilization of land; and thereby preserving, protecting, and improving the Nation's land and water resources and the quality of the environment.

Regulations

Below is a partial listing of relevant regulations. Federal executive departments and administrative agencies write regulations to implement laws. Regulations are secondary to law. However, both laws and regulations are enforceable.

33 CFR 323 Permits for Discharges of Dredged or Fill Material into Waters of the United States - This regulation prescribes those special policies, practices and procedures to be followed by the Corps of Engineers in connection with the review of applications for permits to authorize the discharge of dredged or fill material into waters of the United States.

36 CFR 212.5 (b) Roads - ...the responsible official must identify the minimum road system needed for safe and efficient travel and for administration, utilization, and protection of National Forest System lands. ... The minimum system is the road system determined to be needed to meet resource and other management objectives adopted in the relevant land and resource management plan (36 CFR 219), to meet applicable statutory and regulatory requirements, to reflect long-term funding expectations, to ensure that the identified system minimizes adverse environmental impacts associated with road construction, reconstruction, decommissioning, and maintenance.

Identification of unneeded roads. Responsible officials must review the road system on each National Forest and Grassland and identify the roads on lands under Forest Service jurisdiction that are no longer needed to meet forest resource management objectives and that, therefore, should be decommissioned or considered for other uses, such as for motorized routes.

Regional Forester's direction: Roads analysis process (RAP) for all other existing roads should be completed in conjunction with implementation of the off-highway vehicle (OHV) Record of Decision, watershed analyses, other project level activities or Forest Plan revisions.

Travel Management Rule - On December 9, 2005, the Forest Service published the TMR. The agency rewrote direction for motor vehicle use on National Forest Service (NFS) lands under 36 CFR, Parts 212, 251, and 261, and eliminated 36 CFR 295. The rule was written to address at least in part the issue of unmanaged recreation. The rule provides guidance to the Forest Service on how to designate and manage motorized recreation on the Forests. The rule requires each National Forest and Grassland to designate those roads, motorized trails, and Areas that are open to motor vehicle use.

36 CFR 219 Planning - Sets forth a process for developing, adopting, and revising land and resource management plans for the National Forest System.

36 CFR 241 Fish and Wildlife - Sets forth the rules and procedures relating to the management, conservation, and protection of fish and wildlife resources on National Forest System lands.

40 CFR 121-135 Water Programs - Sets forth the provisions for the administration of water programs including: state certification of activities requiring a Federal license or permit; EPA administered permit programs; state program requirements; procedures for decision making; criteria and standards for the National Pollutant Discharge Elimination System; toxic pollutant

effluent standards; water quality planning and management; water quality standards; water quality guidance for the Great Lakes System; secondary treatment regulation; and, prior notice of citizen suits. See Title 40 (Protection of Environment), Chapter 1 (Environmental Protection Agency), subchapter D (Water Programs).

40 CFR 1500 Council on Environmental Quality - Council on Environmental Quality regulations implementing the National Environmental Policy Act.

Executive Orders

Below is a partial listing of relevant executive orders. Executive orders are official documents by which the President provides instructions to executive departments and agencies. An executive order may be used to reassign functions among executive branch agencies. It may adopt guidelines, rules of conduct, or rules of procedure for government employees or units of government. It can also establish an advisory body or task force.

EO 11988 Floodplain Management, 1977 - Requires each Federal agency to provide leadership and to take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities for acquiring, managing, and disposing of Federal lands and facilities; providing federally undertaken, financed, or assisted construction and improvements; and conducting Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities.

EO 11990 Protection of Wetlands, 1977 - Requires each Federal agency to provide leadership and to take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities for acquiring, managing, and disposing of Federal lands and facilities; providing federally undertaken, financed, or assisted construction and improvements; and conducting Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities.

Policy

The Forest Service Manual (FSM) contains legal authorities, goals, objectives, policies, responsibilities, instructions, and the necessary guidance to plan and execute assigned programs and activities.

Forest Service Handbooks (FSH) are directives that provide instructions and guidance on how to proceed with a specialized phase of a program or activity. Handbooks either are based on a part of the FSM or they incorporate external directives.

FSM 2500 Watershed and Air Management

- **FSM 2520** Watershed Protection and Management
- FSH 2509.25 Watershed Conservation Practices Handbook, Southwestern Region
- **FSM 2540** Water Uses and Development, Southwestern Region supplement
- **FSM 2543** Ground Water Resource Management
- **FSM 2880** Geologic Resources

- **FSM 2560** To be Drafted in Federal Register shortly for groundwater resource management.

FSM 7700 Transportation System

- **FSM 7710** Travel Planning
 - FSH 7709.55 Travel Analysis
 - FSH 7709.56 Chapter 2 – Road Location

FSH 2509.22 (Soil and Water Conservation Practices Handbook) and Draft **FSH 2509.25** when finalized, or more current guidance.

Best management practices to control nonpoint source pollution for ground disturbing activities should be mitigated through identification and implementation of best management practices identified by the interdisciplinary team and guided by FSH 2509.22

Intergovernmental Agreements

Intergovernmental Agreement 16-R3-91-033 between the State of Arizona Department of Environmental Quality and the USDA Forest Service SW Region

To respond to the objectives defined by Congress in the Federal Water Pollution Control Act, as amended (1987). This objective is to restore and maintain the chemical, physical and biological integrity of the nation's waters in Arizona by attaining the goal of water quality which provides for the protection and propagation of fish, and wildlife, and provides for safe recreation in and on the waters of the State of Arizona;

- 1.To manage all resources and operate all programs for which they are responsible in a manner that seeks to achieve federal water quality goals and state water quality standards;
- 2.That the most practical and effective means of controlling potential nonpoint pollution sources from forests and rangelands is through development of preventative or mitigating land management practices, generally referred to as Best Management Practices (BMP's), and to ensure control of such nonpoint sources through the implementation of BMP's;
- 3.To develop and implement procedural methods to minimize duplication of effort and facilitate complementary nonpoint source pollution control and abatement programs;
- 4.To jointly identify existing or potential nonpoint source pollution problems on National Forest System lands;
- To designate the Forest Service as the designated Planning and Management Agency for National Forest System lands within the context of the Arizona Water Quality Management Program pursuant to Section 208;

Structure of Report

This report collectively analyzes existing watershed condition, water quality and quantity including groundwater resources. Each resource is separated by headings to more easily find and interpret the findings in the analysis.

Methodology and Analysis Process

Watershed

This section describes the methodology and analysis processes used to determine the environmental consequences on watershed condition and from implementing the alternatives. Environmental consequences are not site-specific at the broad forest planning level and will be described with qualitative descriptions supported by past studies and observations. Much of the background information is found in the Ecological Sustainability Report (Forest Service 2009) and it's supporting specialists' reports.

Watershed condition is the state of the physical and biological characteristics and processes within a watershed that affect the hydrologic and soil functions supporting aquatic ecosystems. Watershed conditions at the 6th level HUC¹ have been determined and are appropriate to be used at the planning level. The initial assessment was conducted in March 2011 using the national watershed condition framework and assessment tool (Forest Service, Potyandy, J. 2010). The results of that assessment are presented in the affected environment section. The environmental consequences section provides a qualitative assessment of forecasted trends in watershed conditions by alternative based on the concept of concentrating restoration treatments within focus watersheds, and in a more general sense, describing potential effects from forest restoration activities, recreation and roads, grazing, special uses, and climate change on watershed condition.

Water Quality and Quantity

This section describes the methodology and analysis processes used to determine the environmental consequences on water quality and quantity from implementing the alternatives. Environmental consequences are not site-specific at the broad forest planning level and will be described with qualitative descriptions supported by past studies and observations. Much of the background information is found in the Ecological Sustainability Report (Forest Service 2009) and it's supporting specialists' reports.

Water quality has been assessed in major perennial stream reaches and lakes on the forests. The general classification used for surface water quality by ADEQ is attaining, attaining some uses, inconclusive/not assessed, not-attaining, and impaired for the identified uses. The classification designates each waterbody in one of five categories:

- **Category 1** Surface waters assessed as “attaining all uses.” All designated uses are assessed as “attaining.”
- **Category 2** - Surface waters assessed as “attaining some uses.” Each designated use is assessed as either “attaining,” “inconclusive,” or “threatened.”

¹ The United States is divided and sub-divided into successively smaller hydrologic units which are classified into six levels: regions, sub-regions, accounting units, cataloging units or sub-basins, watersheds and subwatersheds. The hydrologic units are arranged within each other, from the smallest (subwatersheds) to the largest (regions). Each hydrologic unit is identified by a unique hydrologic unit code (HUC) consisting of two to twelve digits based on the six levels of classification in the hydrologic unit system.

- **Category 3** - Surface waters assessed as “inconclusive.” All designated uses are assessed as “inconclusive” due to insufficient data to assess any designated use (e.g., insufficient samples or core parameters). By default, this category would include waters that were “not assessed” for similar reasons
- **Category 4** - Surface waters assessed as “not attaining.” At least one designated use was assessed as “not attaining” and no uses were assessed as “impaired.” A Total Maximum Daily Load² (TMDL) analysis will not be required at this time for one of the following reasons:
 - **4 A.** - A TMDL has already been completed and approved by EPA but the water quality standards are not yet attained;
 - **4 B.** - Other pollution control requirements are reasonably expected to result in the attainment of water quality standards by the next regularly scheduled listing cycle; or
 - **4 C.** - The impairment is not related to a “pollutant” loading but rather due to “pollution” (e.g., hydrologic modification).
- **Category 5** - Surface waters assessed as “impaired.” At least one designated use was assessed as “impaired” by a pollutant. These waters must be prioritized for TMDL development.

Water quality is assessed by comparing existing conditions (category 1 to 5) with desired conditions that are set by Arizona under authority of the Clean Water Act. Waters that are not impaired (those not on 303d³ list or in category 4 or 5) are providing for beneficial uses identified for that stream and can be considered in a desired condition until further sampling indicates impairment. Those in category 2 or higher require special attention during site specific project analysis. The Arizona Department of Environmental Quality (ADEQ) is the regulating authority for water quality in Arizona as promulgated by EPA.

The ADEQ also interprets its surface water quality standards to apply to “intermittent, non-navigable tributaries.” The ADEQ interprets the definition of “surface water” to include tributaries (“the tributary rule”) and assigns water quality standards to intermittent surface waters that are not specifically listed by name in Arizona’s surface water quality standards rules. ADEQ feels it is necessary to regulate and protect these types of waters as “waters of the United States”

²A TMDL is a written analysis that determines the maximum amount of a pollutant that a surface water can assimilate (the “load”), and still attain water quality standards during all conditions. The TMDL allocates the loading capacity of the surface water to point sources and nonpoint sources identified in the watershed, accounting for natural background levels and seasonal variation, with an allocation set aside as a margin of safety.

³ Under section 303(d) of the 1972 Clean Water Act, states, territories, and authorized tribes are required to develop lists of impaired waters. These impaired waters do not meet water quality standards that states, territories, and authorized tribes have set for them, even after point sources of pollution have installed the minimum required levels of pollution control technology. The law requires that these jurisdictions establish priority rankings for waters on the lists and develop TMDLs for these waters.
(<http://yosemite.epa.gov/R10/WATER.NSF/TMDLs/CWA+303d+List>)

because it is estimated that approximately 95 percent of the surface waters in Arizona are either intermittent or ephemeral.

Watershed Assumptions

- The Watershed Condition Framework provides a 6-step process for watershed wide restoration. The forest has completed step A, classification of 6th code watershed condition. The remaining steps prioritize, plan treatments, implement treatments, track accomplishments and verify and monitor watershed improvement. The actual improvement rate of watershed condition is dependent on funding and support levels from internal sources as well as other land owners within the focus watershed.
- Focus or priority watersheds are the designated watersheds where restoration activities will concentrate on the explicit goal of improving watershed condition. The selection of these watersheds is yet to come, however, once selected, will be a major consideration for implementation of projects in some alternatives. The following sections qualitatively describe and compare the effects to watershed condition by the types of activities allowed under the description of alternatives, and how each alternative influences where work will be concentrated. The Watershed Condition Framework (WCF) provides a consistent way to evaluate watershed condition at both the National and Forest levels. The WCF consists of reconnaissance level assessments by individual National Forests, implementation of integrated improvement activities within focus watersheds, validation, and monitoring of watershed condition class changes, and aggregation of program performance data for national reporting.

Water Quality and Quantity Assumptions

- Data used in this analysis represents forest-wide conditions and may not represent water quality or flow conditions at any given point across the landscape. Onsite inspection should be conducted for site specific project assessments. Water quality data for impaired waters or waters not attaining (categories 4 and 5 and EPA listed waters) is derived from the 2004 and latest ADEQ 305 b report 2006/2008 (ADEQ 2004 and 2006) and EPA listed waters. Water in categories 1-3 are summarized from ADEQ data from 2004/2006 305b report. To date, the forest is unable to acquire GIS coverage of all category streams from ADEQ listed in the 2006/2008 report. A more detailed description of existing water conditions can be found in the Water Resources Specialist's Report for the Ecological Sustainability Report for the Coconino NF (Forest Service 2007).

Description of Affected Environment

Water Resources of the Coconino NF

Water resources and attributes analyzed in the forest include water quantity, water quality and groundwater.

Water Quality

Water quality is assessed by comparing existing conditions (State Water Quality Categories 1-5 which are described in methodology above) with desired conditions that are set by the States under authority of the Clean Water Act. Water quality standards are based on types of uses by people and wildlife. Based on these state water quality categories, any stream listed as Category 5 or Category 4 in the watershed is being highly departed from reference conditions. Non-listed streams or Categories 1-3 streams were identified as not impaired and are considered to meet the desired condition.

Reference Condition:

Reference water quality was assumed to be sufficient to sustain ecological systems and species and be of equivalent quality as attaining all uses as intended by Arizona State water quality standards. Non-point sources of pollution such as roads, timber harvesting, extensive livestock grazing, recreation, and non-characteristic fire were neither widespread nor frequent.

Forest-wide:

Water quality on Coconino NF lakes and streams is variable. About 33 miles (about 15%) of streams (50 miles including non-forest lands) and five reservoir lakes on the Forest are classified as impaired and are not attaining designated beneficial uses by ADEQ or EPA Appendix A), the category of most severe water quality problems. An additional 24 miles (about 11%) are classified as not attaining (category 4), the next most severe water quality category. These lakes and streams miles do not meet state and federal water quality standards and do not support designated beneficial uses including either aquatic and warm water fisheries, full body contact (swimming) or fish consumption. They are described below by watershed .

Please see Appendix A and (Steinke, 2007a) for tabular information by 4th and 5th HUC watershed and more details.

The following information for impaired waters (categories 4 and 5) comes from the 2006/2008 Status of Surface Ambient Water Quality in Arizona ADEQ 305b Report, November, 2009 and includes the Report Map (website at <http://www.azdeq.gov/environ/water/assessment/assess.html>) (ADEQ, 2009). Categories 1-3 information is derived from the 2004/2006 ADEQ assessment and summarized below.

- There are currently 7, Category 5 impaired (EPA 303d listed) waters (5 Lakes and 2 streams) on the Forest due to mercury exceedances in fish tissue and *E. coli* exceedances in Oak Creek and Spring Creek.
- The 2006/2008 ADEQ 303(d) Impaired waters report lists waters including Oak Creek (from headwaters to Spring Creek, about 43.4 miles) as impaired due to exceedances in bacteria *e. coli*, including Spring Creek from Coffee Creek to Oak Creek, 6.4 miles). The likely source of the impairment is leaky septic systems and high levels of recreational swimming in Oak Creek.
- There are 24 miles of Category 4 streams (not attaining). Most are located in the Verde River and its tributaries where past and current impairments of the turbidity water quality standard have occurred.
- There are 189 miles in Category 1, 2 or 3 streams on the Forest.

Category 1 streams are streams that meet State water quality standards and are in full support of designated beneficial uses. Categories 2 – 4 have waters where monitoring data shows common exceedances in turbidity/suspended sediments water quality standards.

The Forest has the following 5 approved TMDL's designed by ADEQ in response to past water quality impairments; Verde River for Turbidity, Stoneman Lake for Dissolved Oxygen, pH and nutrients, Oak Creek at Slide Rock for Pathogen (*e. coli*), and Oak Creek Basin including Munds Creek for Nitrogen and Phosphorus and Lake Mary Regional TMDL for Mercury in Fish Tissue. These TMDL's strive to improve water quality through recommended appropriate management activities by the Forest and State agencies.

Recommendations in the Verde River TMDL include limiting or restricting OHV travel and decommissioning or obliteration of roads to reduce sediment delivery into connected streams. TMDLs for Stoneman Lake, Oak Creek, and Munds Creek don't include specific recommendations for OHV management or road obliteration.

The 5 Lakes with mercury exceedances in fish tissue have a recently approved TMDL and can be found at the following website,
http://www.azdeq.gov/enviro/water/assessment/download/Lake_Mary_Region_Draft-6-16-2010.pdf.

The TMDL concludes the majority of the mercury is derived from atmospheric deposition and is transported through runoff over the watershed. Where vegetation is inadequate to trap the soil and water, mercury is transported into connected streams and lakes. Increased soil erosion from inappropriate motorized use on unsuitable soils thus can increase mercury levels in nearby waterways.

Even though the Lake Mary TMDL does include recommendations to limit OHV or motorized vehicular use on roads, and develop a voluntary implementation plan, it does state that watershed loading of mercury can be reduced through management of sedimentation and vegetative stability. This infers limiting soil disturbance including OHV and motorized use on roads could reduce sediment and mercury transport into the identified, impaired lakes.

Oak Creek was previously listed as not attaining water quality standards for turbidity although the TMDL focuses on exceedences of pathogens. Past exceedences in turbidity in Oak Creek indicate a need to better manage the watershed and road network to reduce the amount of sediment delivered to Oak Creek and support identified beneficial uses

More recent data from the 2006/2008 ADEQ report was included and updated in Appendix A and summarized by watershed for categories 4 and 5 (most attaining or impaired streams).

On the Coconino National Forest, the most important non-point sources of pollution are from sediment generated from roads in close proximity to drainages.

According to TMR analysis, (Steinke, 2011c), forest improved, motorized travel on high clearance roads do detach and contribute appreciable amounts of sediment to connected streamcourses. Major findings are summarized here. Forestwide, native roads (levels 1 and 2) and user-created routes contribute the highest amount of sediment leaving the Forest buffer (about 3500-21,900 tons/yr) compared to improved, graveled roads (about 500-1800 tons/yr).

Before the initiation of Best Management Practices, timber harvesting of ponderosa pine was a greater non-point source of sediments into adjoining stream courses than it is presently. The Forest currently implements and monitors site specific Best Management Practices for all activities with the potential to pollute Arizona's waters.

Water quality trends are considered to be static for alternative A and towards desired condition (meeting state water quality standards)

These include water quality monitoring, implementation of Total Maximum Daily Load (TMDL) report recommendations, implementation and monitoring of BMPs for all projects that have the potential to increase non-point pollution, and state certification and mitigation of temporary point source pollution through the Clean Water Act's National Pollution Discharge Elimination System regulations. Wastewater treatment sites associated with campgrounds and administrative sites are the only potential point sources of water pollution the Forest manages at this time. Some water quality trends are static to downward, and the forest is working closely with the ADEQ in planning and implementing TMDL plans.

Water Quality by 4th and 5th HUC Watersheds

On the Forest, there are about 33 miles of impaired stream miles (Category 5) and 24 non-attaining stream miles (Category 4) (Forest Service, 2007a). There are also five Category 5 lakes. They are described below by watershed.

Middle Little Colorado River fourth code watershed: Three reservoir lakes in the Jacks Canyon fifth code watershed – Long Lake, Soldier, and Soldier Annex – are identified as impaired due to elevated mercury levels in fish tissue. The Forest is working with the Arizona Department of Environmental Quality to develop a TMDL plan for these three and the following two lakes.

Canyon Diablo fourth code watershed: Two reservoir lakes within the Walnut Creek fifth code watershed – Upper Lake Mary and Lower Lake Mary – are identified as impaired due to elevated mercury levels in fish tissue.

Upper Verde fourth code watershed: About 65% of the impaired stream miles in the Oak Creek fifth code watershed occur on Forest lands. Oak Creek and Spring Creek are impaired due to the presence of *Escheria coli* bacteria, which is attributed to the proximity of privately owned septic systems in certain stretches, wildlife contamination, and improper sanitary habits of swimmers during busy weekends. Exceeding *E. coli* bacteria criteria may represent a public health concern if people come in contact with the water. Although a TMDL is approved and is being implemented, ADEQ monitoring indicates that water quality in Oak Creek still remains impaired.

Three of the Upper Verde's 5th code watersheds contain Category 4 (not attaining) waters. In the Oak Creek fifth code, 1.5 miles of Oak Creek on forest land is rated as a Category 4, primarily because of high levels of turbidity (total suspended sediment) that affect warm water fisheries. The turbidity is considered non-point source pollution and is likely coming from roads and hill slopes. In the Beaver Creek fifth code watershed, Stoneman Lake is rated as a Category 4 primarily due to high nutrients, high pH, and low dissolved oxygen. About 60% of the lake is on Forest land and the other 40% is privately owned. An increase in nutrients can result in rapid growth of algae and other plants in the lake, which may result in a drop in dissolved oxygen that can be devastating to other aquatic life and sometimes leads to fish kills. A TMDL has been approved, but has not yet been implemented. In the Cherry Creek-Upper Verde River fifth code

watershed, 29 stream miles in the Verde River are in Category 4, primarily due to exceedences in turbidity which affects warm water fisheries. Fifteen of these miles are on Forest lands, and the remainder is off Forest. A TMDL has been approved for this and the Lower Verde section (described below) and is being implemented.

Lower Verde fourth code: The Fossil Creek-Lower Verde River fifth code watershed includes 21 miles along the Verde River that are assessed as Category 4 for turbidity. About 15.5 miles in this stretch are a shared boundary with the Prescott National Forest and the remainder is privately owned. Exceedences in turbidity affects warm water fisheries.

The remaining streams miles on the Forest are classified as Categories 1-3 and are attaining some or all uses, or monitoring data is inconclusive.

Projected future conditions and trends: The Arizona Department of Environmental Quality recently finalized the TMDL for mercury in fish tissue for the impaired lakes. Under the current plan, the trend of these lakes is projected to move towards reference conditions with implementation of the TMDL on an opportunity basis.

Under current plan most of the streams within the Beaver Creek and Oak Creek 5^h code watersheds are projected to move towards reference conditions, except for portions of the Beaver Creek watershed. Since 1994, the water quality in Beaver Creek has varied or fluctuated from non-attaining to inconclusive and is mostly impacted by disturbances on private lands. It is projected to move away from reference conditions.

In the Fossil Creek-Lower Verde 5th code watershed, elevated levels of pathogens (*E. coli*), streamside trash, and turbidity in Fossil Creek and downstream into the Verde River are predicted to increase in the near future as a result of increased recreation on Forest Service lands adjacent to Fossil Creek. Nonpoint source pollution into connected streams may continue to increase.

Water Quantity

The following section describes water bodies that have surface water year round. These water bodies include perennial streams, and springs, seeps and stocktanks (which do not include wetlands).

Perennial, Intermittent and Ephemeral Streams Forest-wide

Surface water includes perennial streams, reservoirs, lakes, wetlands, stock ponds, and seeps and springs. Many plant and animal species rely on perennial stream water for survival. The extent of perennial stream courses has shifted slightly over time. The Homestead Act of 1862 (P.L. 37-64) facilitated the transfer of some lands containing streams into private ownership, and the creation of dams on East Clear Creek and Leonard Canyon formed CC Cragin Reservoir and Knoll Lake, respectively. Diversions and irrigation ditches reduce stream flow along some stream segments and have been operational for many years. Most diversions and ditches are located off-forest.

Stream miles are approximate. Based on recent GIS calculations, perennial stream miles on forest administered and managed lands are about 229 miles and 296 miles of non-forest lands but still within the forest boundary. There are about 944 intermittent stream miles and 3743 ephemeral

stream miles on forest administered and managed lands and 1019 intermittent and 4164 ephemeral stream miles on non-forest administered lands within the forest boundary. This information updates data in Steinke (2007a).

Many plant and animal species rely on perennial stream water for survival. The extent of perennial stream courses has shifted slightly over time. The Homestead Act of 1862 facilitated the transfer of some lands containing streams into private ownership, and creation of dams on East Clear Creek and Leonard Canyon formed CC Cragin Reservoir and Knoll Lake respectively. Diversions and irrigation ditches reduce stream flow along some stream segments and have been operational for many years. Most diversions and ditches are off Forest.

Visual observations show that the riparian vegetation along most streams has diverse age classes. This suggests that the perennial stream extent has been present for several decades and that disturbance, such as flooding, has influenced vegetation composition and structure. Some streams have abandoned higher floodplains and old riparian forest vegetation, but the stream segment persists in lower lying floodplains. Some stream reaches have downcut through these abandoned floodplains to form a straighter stream segment, slightly reducing overall stream miles. It is not known how many miles have been downcut or affected.

Reference Condition:

Reference levels of water yield are unknown, however research suggests that water yield in pre-settlement, open canopied ponderosa pine forests was higher than in the closed canopy forests that are prevalent today (Forest Service, 2007a from Brown et al. 1974). Studies in paired watersheds (watersheds that are similar in nature with regards to their vegetation and soils) in Arizona have shown that there was a short-term increase in water yield following thinning in ponderosa pine forests (Moir and Ludwig 1979).

Current Condition:

Current surface water use on the Forest is slightly higher than in the early 1980's because new campgrounds and day-use areas were created in response to increased recreation use. Forestwide, livestock and wildlife are expected to continue to rely on stocktanks and perennial streams for water.

Surface flow depends on precipitation, and the recent drought, along with overstocked forests, has reduced flows in some stream reaches occupied by native fish.

Surface water is procured and used for livestock watering, wildlife including fish, domestic use, irrigation, fish consumption, and swimming. Under Federal reserved water rights,⁴ surface water is also available for administrative use, such as firefighting and road maintenance.

Procurement and maintenance of these waters and associated water rights, however, are critical for the management and protection of forest resources. Four out of nine instream flow water rights have been procured on the Forest.

⁴ Federal reserved water rights associated with public lands are reserved to satisfy the purposes for which the public land was established. These water rights, however, are subject to court adjudication.

Perennial Streams by Watershed

The Coconino covers about 20% of the total extent of the 4th code watersheds that overlap the Forest, and contributes a proportionally higher 30% of perennial stream miles. Please see water specialist report (Forest Service, 2007a and 2009) for details.

Water Yield and Stream Flow

As of December 2006, current water yield by 4th code HUC and 5th code HUC watersheds has not been calculated. However, Forest water yield is predicted by comparing gauged streamflow data described below.

Output of water yield or water supply (used synonymously in this analysis) is the amount of water which leaves the immediate site to become surface water yield or groundwater recharge. Essentially, it is the difference between total precipitation and actual evapotranspiration.

A comparison of actual USGS gauged streamflow from major, perennial streams from about 1985 to 2005 is used to estimate streamflow water yield trend. Streamflow water yield is calculated for those streams where USGS has gauged data over the last 20 years or more. Analysis of streamflow trend is useful to determine if major changes in water yield has occurred for that given stream.

Table 2 summarizes streamflow water yield by 4th HUC watershed (subbasin) and trend from about 1985 to the present. Data was derived from USGS stream gages.

Table 2. Streamflow Trend by Watershed

Forest Stream	Watershed (4th HUC)	Trend 1985 – December, 2005
West Clear Creek	Lower Verde	Static to Slightly Downward
Fossil Creek	Lower Verde	Slightly Downward
Wet Beaver Creek	Upper Verde	Slightly Downward
Dry Beaver Creek	Upper Verde	Static to Slightly Downward
Verde River Near Clarkdale	Upper Verde	Slightly Downward
Verde River Near Camp Verde	Upper Verde	Static
Oak Creek at Sedona	Upper Verde	Slightly Upward
Oak Creek Near Cornville	Upper Verde	Static to Slightly Upward

All data were compiled on Forest and may not represent overall watershed yield because it does not include the Little Colorado River sub basin.

Full flow to Fossil Creek was returned following Irving power plant decommissioning activities in 2006. Streamflow is currently measured to be about 43 cubic feet per second (cfs). Therefore, streamflow trend is irrelevant.

Current surface water use on the forest is slightly higher than in the early 1980s because new campgrounds and day-use areas were created in response to increased recreation use. It is estimated that overall Forest water yield is **static to slightly downward** over the last 20 years due to analysis of streamflow water yield and the following two conditions. Greater tree and shrub basal area and canopy cover has been observed in several PNVTs and recorded over the last 20 years which probably results in increased evapotranspiration and decreased runoff and water yield (aerial photo analysis and Anderson Mesa Landscape Scale Assessment Vegetation Group Specialist report, Steinke, 2/2004) .

Drought conditions have prevailed in most years since about 1999 and have probably contributed to decreased precipitation and runoff and water yield. Climatic (drought) and vegetative conditions on the LCR watersheds are similar to the Verde River watersheds and therefore, water yield trend is estimated to be similar (static to slightly downward). Past studies indicate vegetative treatments to increase water yield only result in short-term water yield increase (1-3 years) (Baker, 1979). Today, treatments to increase water yield are not being considered on the Forest and therefore, a detailed analysis of water yield has not been done. However, it is estimated that Forest-wide, current water yield (supply) is similar to or slightly less than in the early 1980's due to recent climatic drought conditions and greater evapotranspiration stemming from increased tree basal areas resulting in increased water consumption.

Forest-wide water yield in 1980 was estimated to be about 1915 AF-YR (Forest Service Analysis of the Management Situation, 1987). Based on USGS streamflow gage data, water yield may be similar to or slightly less today.

Instream Flow Water Rights:

The Forest is currently active in procuring instream flow water rights for all major perennial streams. All instream flow applications have been approved by the Arizona Department of Water Resources (ADWR) and assessments almost completed pending protest resolution by the Salt River Project (SRP) and other private parties.

The following Forest streams have instream flow applications have been approved and assessments pending ADWR water right certification, East Clear Creek, Oak Creek, Red tank Draw and Sheepshead Creek. Spring Creek, Wet Beaver Creek, Walker Creek, Sycamore Creek, Fossil Creek and the Verde River have certified water rights for instream flow. It is expected that ADWR will award Certified Water Rights for all perennial streams following protest resolution. Outside parties will not be successful in claiming new uses and consequently will not be able to divert water from the stream. Instream flow Certified Water Rights will provide adequate protection of perennial stream water quantity for riparian habitat used by wildlife, fish and recreation. Procuring these water rights will assure water flow will remain in situ or in the stream without fear of outside persons hoping to divert or make claims that could reduce water quantity instream.

Forest acquisition of instream flow certified water rights also protects perennial stream water quantity for riparian habitat used by wildlife, fish, and recreation. The following forest streams

have instream flow applications that have been approved, and they have assessments pending Arizona Department of Water Resources water right certification: East Clear Creek, Oak Creek, Red Tank Draw, and Sheepshead Creek. Spring Creek, Wet Beaver Creek, Walker Creek, Sycamore Creek, Fossil Creek, and the Verde River have certified water rights for instream flow. It is expected that Arizona Department of Water Resources will award certified water rights for all perennial streams following protest resolution. Seven instream flow water rights have been procured on the forest. The remaining water rights are pending resolution of formal protest.

Ground Water

The national ground water policy sets out the framework in which groundwater resources are to be managed on NFS lands. The policy is designed to be located in two parts of the Forest Service Manual, FSM 2880, Geologic Resources, Hazards, and Services, and FSM 2543, Ground Water Resource Management (draft). Regional Foresters and Forest Supervisors are directed by the national ground water policy to perform the duties detailed below. Partial policy direction for the program is contained in Forest Service Manual 2880. The remaining policy direction will be contained in FSM 2560. Therefore, the proposed plan and action alternatives do not need to be assessed in this analysis. However, current ground water conditions are summarized below to compare existing conditions, reference conditions and trends.

Nearly all of the management activities conducted by the forest have potential to affect soil and water resources and overall watershed condition. Their cumulative impact to a watershed depends upon the effect of past, present, reasonably foreseeable actions, and the watershed's sensitivity to disturbance.

Current conditions:

Three major groundwater basins originate on the Forest: the Little Colorado River Plateau, the Verde River, and Coconino Plateau basins. The Forest lies mainly in the Verde River and Little Colorado River Plateau basins. Areas of highest precipitation and groundwater recharge for these basins occur on Coconino National Forest lands.

Major uses of groundwater in the Little Colorado River Plateau basin are: agriculture, municipal use, power generation, and paper manufacturing. Groundwater and surface water are used for the City of Flagstaff's domestic water supply.

Major groundwater uses in the Verde River and Coconino Plateau basins are: agriculture and municipal use. Verde Valley cities rely mostly on groundwater through permitted wells in the Verde River basin.

Major uses of groundwater within the Forest in all basins include domestic water supply for Forest campgrounds, day-use areas and administrative sites and to a lesser extent, livestock and wildlife consumption.

Forest contribution to groundwater recharge is substantial in all three basins, but especially in the Verde River Basin even though recharge rates are variable and dependent on precipitation.

In the Little Colorado River Plateau and Verde River basins, the rate of groundwater pumping is greater than the rate of recharge, especially near Flagstaff and Camp Verde.

In the Verde River and Little Colorado River Basins, located within the Upper Verde and Canyon Diablo 4th code watersheds, domestic groundwater use and demand has increased since 1971. In these watersheds, streamflow and some well data indicate a recent downward trend in groundwater levels adjacent to Flagstaff and Verde Valley cities. This is most prominent in areas that have the most well pumping on private lands (USDA Forest Service 2009a).

Reference Condition:

Even though reference conditions are largely unknown, it is assumed that the natural discharge/recharge in all three basins were in a steady state since there was less domestic use than today. Groundwater pumping was minimal prior to the 20th century.

Projected Future Conditions and Trends:

Demand is predicted to exceed supply in the Little Colorado River Plateau and Verde River Basins. In preparation, the City of Flagstaff purchased water rights at the Red Gap Ranch east of the city as a potential source of groundwater because demand is predicted to exceed supply by 2020 or later.

Continued or increased pumping may negatively affect the base flow of streams that are directly connected to major aquifers and associated streams, especially the Verde River, Beaver Creek, West Clear Creek and Oak Creek, because domestic use is high adjacent to these streams. Groundwater pumping within the Little Colorado River Plateau may negatively affect adjacent Forest wells used for stock watering and domestic use. Groundwater pumping adjacent to springs and seeps may reduce flow, but little quantitative information is available to accurately project the extent. The downward trend in groundwater levels is projected to continue with

increasing use adjacent to the Verde Valley cities and Flagstaff; however, trends in the remainder of the area are unknown. There is an opportunity to assure sustainability of groundwater since it is located in several aquifers that are well distributed and represented throughout the Forest.

There is a concern that groundwater pumping may be exceeding the inflow or recharge of water into the Little Colorado River Plateau basin and the Verde River basin, two of the three groundwater basins under the Coconino NF.

Streamflow and some well data indicate a sharp downward trend over the next few decades (USGS, 2010) in groundwater levels adjacent to Flagstaff and communities in the Verde Valley, particularly in areas that have the most well pumping on private lands. Continued or increased pumping may negatively affect the base flow of streams especially the Verde River, Beaver Creek, West Clear Creek, and Oak Creek because domestic use is high adjacent to these streams, which are in the Upper Verde River and Lower Verde River 4th code watersheds.

The vast majority of withdrawals from wells occur off-forest and thus they are not within the forest's authority to control. Forest Service groundwater policy (Forest Service Manuals 2560, 2880, and 2543) as well as agency technical guides; however, provide direction for well drilling and pumping on the forest and specifies that these activities are not to adversely affect connected riparian habitat and water quantity and quality. Because existing direction outside of the plan was considered to be adequate, additional guidance related to groundwater is not provided under any alternative and, therefore, not analyzed in this environmental impact statement.

Trend is predicted to be static to away on non-forest lands and static on forest lands.

Watersheds of the Coconino NF

Watersheds and condition will be analyzed include watershed at the forest level, 4th HUC (large watersheds), and 6th HUC watersheds (smallest and nested within 4th and 5th HUC watersheds averaging about 20,000 acres each). For information on perennial stream miles and riparian condition at the 5th HUC scale, please see water specialist report, (Forest Service, 2007a). Watersheds are cataloged using a uniform hierarchical system developed by the United States Geological Survey. The United States is divided and sub-divided into successively smaller hydrologic units. The hydrologic units are nested within each other, from the largest to the smallest (region, sub-region, basin, and subbasin). This report focuses on subbasins (referred to as 4th code watersheds) and the next smaller watersheds within them (5th code watersheds).

Watershed condition is the state of the physical and biological characteristics and processes within a watershed that affect the hydrologic and soil functions supporting aquatic ecosystems. Watershed conditions at the 6th level HUC⁵ have been determined and are appropriate to be used at the planning level. The initial assessment was conducted in February and March 2011 using the national watershed condition framework and assessment tool (Potyandy, 2010). The results of that assessment are presented in the affected environment section. The environmental consequences section provides a qualitative assessment of forecasted trends in watershed conditions by alternative based on the concept of concentrating restoration treatments within focus (priority) watersheds, and in a more general sense, describing potential effects from forest restoration activities, recreation and roads, grazing, special uses, and climate change on watershed condition.

Watershed condition can range from properly functioning (i.e., in a natural pristine state) to impaired (i.e., in a severely altered state or impaired). Watersheds in properly functioning condition have terrestrial, riparian, and aquatic ecosystems that capture, store, and release water, sediment, wood, and nutrients within their range of natural variability for these processes. Properly functioning watershed conditions create and sustain terrestrial, riparian, aquatic, and wetland habitats that are capable of supporting diverse populations of native aquatic- and riparian-dependent species. In general, the greater the departure from the natural pristine state, the more impaired the watershed condition is likely to be. Properly functioning watersheds are commonly referred to as healthy watersheds.

A desired condition of ecosystem health is that watersheds exhibit high geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. Watershed condition reflects a range of variability from natural pristine (properly functioning) to degraded (severely altered state or impaired). Watersheds in properly functioning condition have terrestrial, riparian, and aquatic ecosystems that capture, store, and release water, sediment, wood, and nutrients within their range

⁵ The United States is divided and sub-divided into successively smaller hydrologic units which are classified into six levels: regions, sub-regions, accounting units, cataloging units or sub-basins, watersheds and subwatersheds. The hydrologic units are arranged within each other, from the smallest (subwatersheds) to the largest (regions). Each hydrologic unit is identified by a unique hydrologic unit code (HUC) consisting of two to twelve digits based on the six levels of classification in the hydrologic unit system.

of natural variability for these processes. Properly functioning watershed conditions create and sustain functional terrestrial, riparian, aquatic, and wetland habitats that are capable of supporting diverse populations of native aquatic- and riparian-dependent species. In general, the greater the departure from the natural pristine state, the more impaired the watershed condition is likely to be. Properly functioning watersheds are commonly referred to as healthy watersheds.

Watershed condition classification is the process of describing watershed condition in terms of discrete categories (or classes) that reflect the level of watershed health or integrity. In our usage, we consider watershed health and integrity to be conceptually the same. Watersheds with high integrity are in an unimpaired condition in which ecosystems show little or no influence from human actions.

The Forest Service Manual (FSM) uses three classes to describe watershed condition (USDA Forest Service 2004a, FSM 2521.1):

- Class 1 watersheds exhibit high geomorphic, hydrologic, and biotic integrity relative to their natural potential condition and are functioning properly. These are synonymous with Functioning watersheds.
- Class 2 watersheds exhibit moderate geomorphic, hydrologic, and biotic integrity relative to their natural potential condition and are functioning-at-risk. These are synonymous with Functioning-at-Risk watersheds.
- Class 3 watersheds exhibit low geomorphic, hydrologic, and biotic integrity relative to their natural potential condition and are impaired function. These are synonymous with Impaired watersheds.

6th HUC Watersheds and Scores

Appendix B lists the 6th level HUCs and their watershed condition score. Scores ranging from 1.0 to 1.6 are categorized as functioning (class 1), 1.7 to 2.2 is functioning-at-risk (class 2), and scores ranging from 2.3 to 3.0 are impaired (class 3).

The majority of 6th HUC watersheds (65%) are in Functional at Risk condition followed by Properly Functioning (21%) and Impaired Function (14%). Overall, about 79% of 6th HUC watersheds are not properly functioning and departed from reference condition assumed to be functioning properly. These are summarized in Table 3.

Table 3. Forestwide 6th HUC Watershed Condition

Watershed Condition Class	Relative Percent
Properly Functioning	21
Functional At Risk	65
Impaired Function	14
Total	100

Watershed Condition at the 4th HUC

The Coconino NF extends across seven 4th code watersheds with water draining either into the Little Colorado River basin to the east or Verde River basin to the west. Table 4 shows the proportion of these 4th code watersheds on and off the forest.

Table 7. Sub basins and Percent Ownership

4th Code Watershed	Percent watershed on the Forest	Percent watershed off Forest
Havasus Creek	0.16%	99
Middle Little Colorado River	15%	85
Canyon Diablo	57%	43
Lower Little Colorado River	15%	85
Tonto Creek	0.2%	99
Upper Verde River	40%	60
Lower Verde River	24%	76
Forest Totals at 4th Code Scale	19.7%	80.3

Table 5 details the number of 6th level HUCs (Hydrologic Unit Code) within each 4th HUC basin by rating, and lists some of the common degrading factors that have resulted in reduced condition.

Table 5. Summary of 6th HUC Watershed Condition by Sub basin

Sub-basin	Number of 6 th Level HUCs*	Class 1 Functioning Properly	Class 2 Functioning-At-Risk	Class 3 Impaired	Common Degrading Factors
Canyon Diablo	26	2	20	4	High Road Density, Poor Fire Regime Conditions, Impaired water quality, At-risk wetland conditions, well pumping
Havasus Creek	1	0	0	1	Very low acreage in forest
Lower Little Colorado River	16	7	8	1	Impaired Soil Conditions, Poor Fire Regime Conditions, High road density.
Lower Verde River	22	1	18	3	Impaired and unsatisfactory soil conditions, Poor Aquatic Biota Condition, Poor Fire Regime Conditions.
Middle Little Colorado River	15	4	10	1	High Road Density and close proximity to stream courses, Poor Fire Regime Conditions, Impaired and unsatisfactory soil conditions, At-risk riparian conditions, Poor Aquatic Biota and habitat Conditions
Upper Verde River	39	8	22	9	Unsatisfactory soil and riparian conditions, impaired water quality, Poor Fire Regime Conditions, High road density and in close proximity to streams, Poor Aquatic Biota and habitat Conditions, well pumping
Tonto Creek	1	0	1	0	Very low acreage in forest
Total	22	79	19		

Figures 1 and 2 are maps showing the watershed condition for each 6th level HUC. By reviewing the map and associated tables, it is apparent that many of the impaired watersheds are found around communities including Flagstaff, Sedona and Camp Verde. The ratings given to these watersheds reflect the effects of development, such as added runoff from high density of roads, high recreation impacts to riparian area, aquatic biota and habitat, high well withdrawals of groundwater and increased sources of water pollution as compared to undeveloped land. Functional at risk watersheds dominate the forest and are the result of human impacts that have reduced soil and riparian condition, created poor fire regime condition classes through fire suppression, high road densities, high occurrence of stocktanks reducing timing of streamflows.

The majority of Functional watersheds are located in wilderness areas relatively free of human development and impacts or in ponderosa Pine or Great Basin Grassland PNVTS where roads and streams are scarce.

Watershed Condition by 6th HUC

Individual 6th HUC names, numbers and watershed condition ratings and class are located in Appendix B.

Figures 1 and 2 are maps showing the watershed condition, scores and rating for each 6th level HUC. By reviewing the map and associated tables, it is apparent that many of the impaired watersheds are found around communities including Flagstaff, Sedona and Camp Verde. The ratings given to these watersheds reflect the effects of development, such as added runoff from high density of roads, high recreation impacts to riparian area, aquatic biota and habitat, high well withdrawals of groundwater and increased sources of water pollution as compared to undeveloped land. Functional at risk watersheds dominate the forest and are the result of human impacts that have reduced soil and riparian condition, created poor fire regime condition classes through fire suppression, high road densities, high occurrence of stock tanks reducing timing of streamflows. The majority of Functional watersheds are located in wilderness areas relatively free of human development and impacts or in Ponderosa Pine or Great Basin Grassland PNVTS where roads and streams are scarce.

Overall, about 79% of 6th HUC watersheds are not properly functioning and departed from reference condition assumed to be functioning properly.

Watershed condition encompasses several resource conditions that affect quality, quantity and timing of water flows including soil and riparian condition, water quality and quantity and aquatic habitat conditions. Effects to individual resources, such as soil condition and water quality and quantity are discussed under each resource in associated specialist reports.

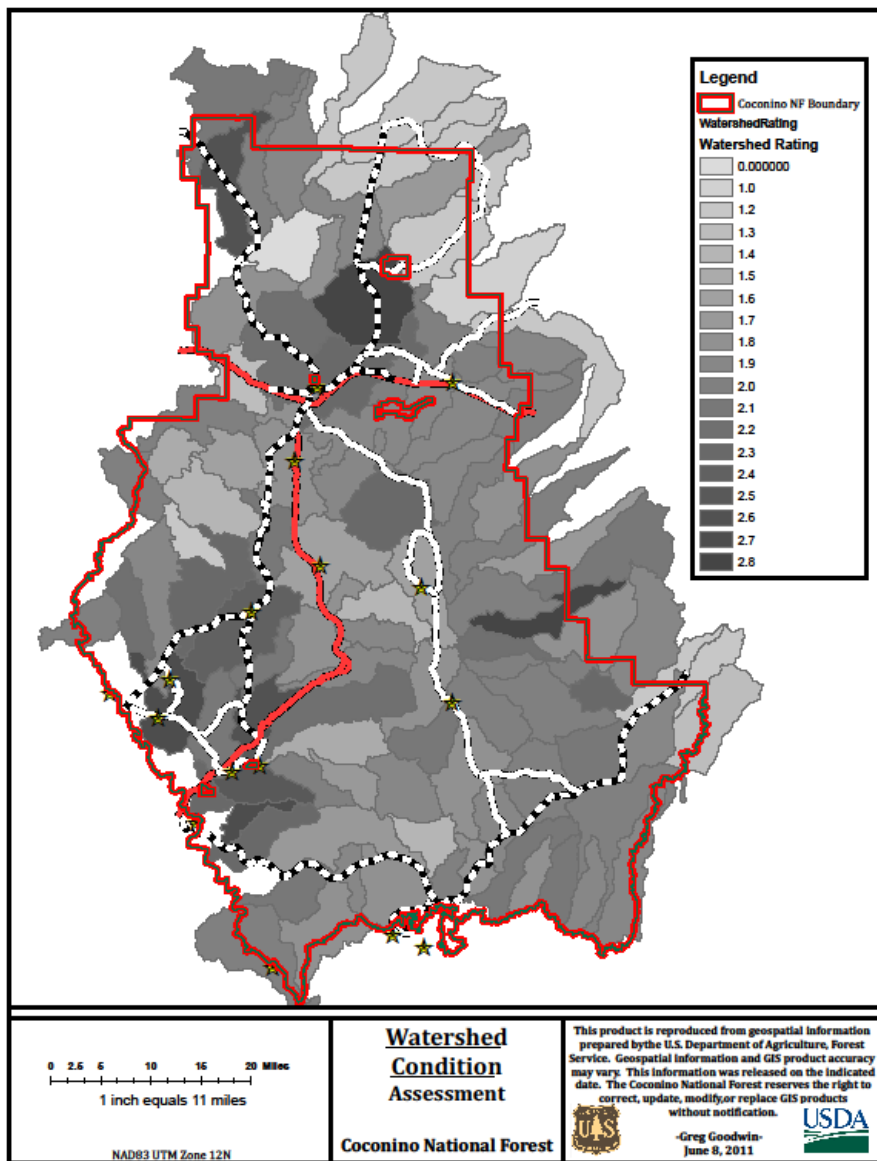


Figure 1. 6th HUC Watershed Ratings

Coconino National Forest 2010 6th Code Watershed Condition Assessment

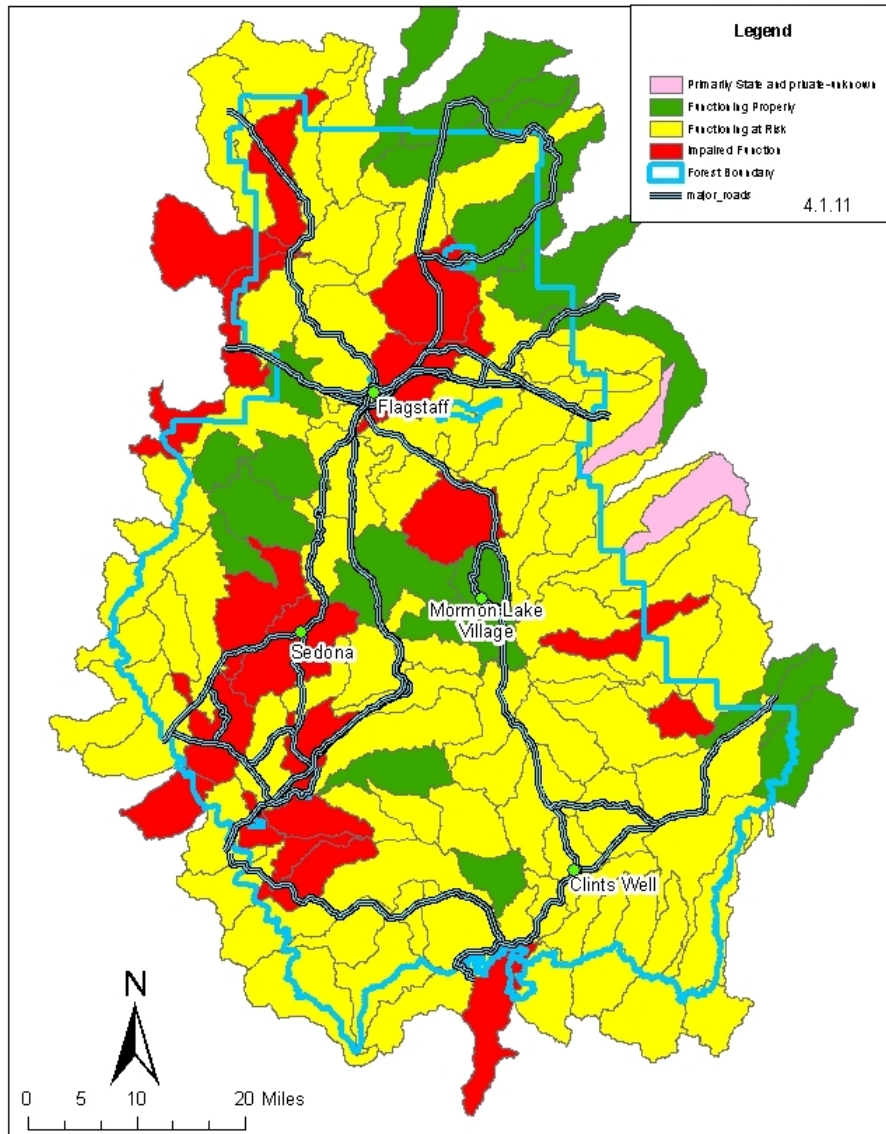


Figure 2. 6th HUC Watershed Condition from 2011 Assessment

Table 6. Soil and Water Resource Trends Towards Plan Components Desired Conditions, Guidelines and Objectives for Alternative A – Existing Condition

Resource	Alternative A
Watershed Condition	Static
Water Quality	Static No TMDL direction
Water Quantity (Streamflow)	Static to Away
Groundwater Quantity	Away on Non forest lands Static on forest lands

Table 7 details treatment type, treatment objectives, and other pertinent plan components for watershed and water resources by alternative A.

Table 7. Major Plan Guidance and Treatment Objectives (Alternative A) Applicable to Watershed, Water Quality, Streamflow and Groundwater

Treatment Type	Alternative A
Restoration of Priority (Focus watersheds)	0
Riparian Treatment Objectives across all riparian vegetation types	80% of riparian areas are recovered by 2030 Acres implemented is < 330 or 3% of total or 10% of areas not in PFC
Road Removal Objectives including from riparian areas	Opportunity Basis or 400 miles in 10 years
Wetland/Cienega Objective	Opportunity Basis/No Objective
Spring Restoration	No direction. Opportunity Basis/No Objective
Soil and water resource improvement projects including hazardous fuel reduction	Limited
Water Quality Improvement (guideline)	Outdated and Lacking direction
Water Quantity Maintenance	Procure water rights on appropriable waters
Instream Flow Procurement/Maintenance	No direction
Maintain or Improve Groundwater Resource	No specific direction
Implement restoration actions leading to recovery of TES	Opportunity Basis
Implement terrestrial wildlife improvement	Opportunity Basis
Implement Stream Habitat Restoration	Opportunity Basis
Ponderosa Pine Mechanical Harvesting/Thinning/Under burning	Variable but less
Pinyon-Juniper Vegetation Treatments	Opportunity Basis/No Objective
Prescribed Fire	Opportunity/No Objective
Wildfires (Pipos)	Opportunity/No Objective
Wildfires (PJ) (Resource Benefit Fires)	Opportunity/No Objective

The majority of wildfires are fires that meet resource objectives formerly called resource benefit fires and include uncharacteristic wildfires generally minor in extent.

There are a variety of treatment methods prescribed by alternatives, including several kinds of mechanical and fire treatments (see table 6 above).

Environmental Consequences

The analysis of environmental consequences of the proposed action and alternatives to water resources and watershed are described in the Draft EIS.

References

- Arizona Department of Environmental Quality Website. 2004/2006. Chapters I through VIII. Arizona's Integrated 305(b) Assessment and 303(d) Listing Report. <http://www.azdeq.gov/environ/water/assessment/2004.html>
- Arizona Department of Environmental Quality, 2006/2008. Status of Surface Ambient Water Quality in Arizona ADEQ 305b Report, November, 2009 and includes the Report Map (website at <http://www.azdeq.gov/environ/water/assessment/assess.html>).
- Arizona Department of Environmental Quality, 2010. Lake Mary Regional TMDL for Mercury in Fish Tissue. OFR-10-2. Website at http://www.azdeq.gov/environ/water/assessment/download/Lake_Mary_Region_Draft-6-16-2010.pdf.
- Joyce, L., R. Haynes, R. White, and R.J. Barbour, (tech. coords.). (2006). Bringing climate change into natural resource management: Proceedings. Gen. Tech. Rep. PNW-GTR-706. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR.
- Millar, C.I., N.L. Stephenson, and S.L. Stephens. (2007). Climate change and forests of the future: Managing in the face of uncertainty. *Ecological Applications*, 17(8): 2145-2151.
- Paige-Dumroese, D.S., M. Jurgensen, and T. Thomas. 2010. Maintaining soil productivity during forest or biomass-to-energy thinning harvests in the Western United States. *West.J. Appl.For.* 25(1) pp 5-10.
- USDA Forest Service. 1987. Analysis of the Management Situation.
- USDA Forest Service. 1987. Coconino National Forest Land and Resource Management Plan. Southwestern Region. Albuquerque, NM. 270pp.
- USDA, Forest Service, 1989, Riparian Area Survey and Evaluation System.
- USDA Forest Service, 1990. FSH 2509.22. Soil and Water Conservation Practices Handbook.
- USDA Forest Service, 1991. FSH 2509.18. Soil Management Handbook. Chapter 2, Soil Quality Monitoring.
- USDA Forest Service. 1995. Terrestrial Ecosystems Survey of the Coconino National Forest. Southwestern Region. 405 pp.
- USDA Forest Service. December, 2007a. Ecological Sustainability Analysis of the Coconino National Forest. An Evaluation of Water Resource Attributes Characteristics and their Contribution in Ecosystem Diversity and Ecological Sustainability Southwestern Region. 83 pp.
- USDA Forest Service. December, 2007b. Ecological Sustainability Analysis of the Coconino National Forest. An Evaluation of Terrestrial Ecosystems (Ecological Units, Soil Composition, Structure and Processes) that Affect Ecosystem Diversity and Contribute to Ecological Sustainability Ecological Sustainability Report, Southwestern Region. 208 pp.

- USDA Forest Service. September, 2010. Coconino National Forest Analysis of the Management Situation. Southwestern Region. 73 pp.
- USDA Forest Service, 2010. Watershed Condition Framework Implementation Guide, Potyondy et. al.
- USDA Forest Service. June, 2011. Soils Specialist Report, Forest Plan Revision DEIS, Southwestern Region. 64 pp.
- USDA Forest Service. June, 2011b. Riparian Specialist Report, Forest Plan Revision DEIS, Southwestern Region. 64 pp.
- USDA Forest Service. June, 2011c. Soil and Water Resource Attributes Trend by Alternative.
- USDA Forest Service, 2011d. Coconino National Forest Travel Management Analysis. Soil and Water Affected Environment and Environmental Consequences Specialist Report. 111 pages.
- USDA Forest Service Manual 2541.03, Water Uses and Development, groundwater policy, signed 2001.
- USDA, Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado, 1979. Baker et al. RM-129, Opportunities for Increasing Water Yields and Other Multiple Use Values on Ponderosa Pine Forest Lands. 36 pages.
- USDI, BLM, National Applied Resource Sciences Center, 1998. Technical Reference 1737-15, Riparian Area Management. A User Guide to Assessing Proper Functioning Condition and the Supporting Science for Lotic Areas. 126 pages.
- USDI, BLM, National Applied Resource Sciences Center, 2003. Technical Reference 1737-16, Riparian Area Management. A User Guide to Assessing Proper Functioning Condition and the Supporting Science for Lentic Areas. 109 pages.
- USDI, United States Geological Survey. 2010. Simulated Effects of Groundwater Pumping and Artificial Recharge on Surface-Water Resources and Riparian Vegetation in the Verde Valley Sub-Basin, Central Arizona. SIR-2010-5147. 27 pp.
- USDI. United States Geological Survey. 2010. Simulated Effects of Groundwater Pumping and Artificial Recharge on Surface Water Resources and Riparian vegetation in the Verde Valley Sub basin, Central Arizona. SIR 2010-5147. 27 pp.

Specialist Information

Rory Steinke, Coconino National Forest Watershed Program Manager, BS. Soil Science, University of Wisconsin Stevens Point, 1981, ARCPACS Certified Professional Soil Scientist, 32 years experience.

Fourth code watershed	Fifth code watershed	⁶ Miles of Category 1, 2 and 3 Streams in Watershed	Miles of Category 1, 2 and 3 Streams within Forest boundary	Miles of Category 4 Streams/Lakes in Watershed	Miles of Category 4 Streams/Lakes within Forest boundary	Miles of Impaired Stream or Name of Category 5 Lakes in Watershed	Miles or Name of Category 5 "Impaired" Streams/Lakes within Forest boundary	⁷ Trend from 1989 - Present
Havasut Creek	Spring Valley Wash	0	0	0	0	0	0	NA. No perennial streams
Middle Little Colorado River	Upper Clear Creek	87	55	0	0	0	0	Static
	Lower Clear Creek	0	0	0	0	0	0	No streams assessed
	Jacks Canyon	0	0	0	0	Long, Soldiers, Soldiers Annex Lakes	Long, Soldiers, Soldiers Annex Lakes	Static to downward. TMDL being developed.
Canyon Diablo	Rio de Flag	0	Waste water treatment plant	0	0	0	0	Static or no apparent trend
	Walnut Creek	0	0	0	0	Upper/Lower Lake Mary	Upper/Lower Lake Mary	Static to downward
	San Francisco Wash	3	3	0	0	0	0	NA. No perennial streams
	Canyon Diablo (Local Drainage)	0	0	0	0	0	0	NA. No perennial streams
	Kana-a Wash-Lower Little Colorado River	0	0	0	0	0	0	NA. No perennial streams

⁶ The water quality of streams/lakes dataset was provided by the Arizona Department of Environmental Quality (ADEQ 2004-2006) More recent data from the 2006/2008 ADEQ report (ADEQ, 2009) was included and updated in this table for category 4 and 5 (impaired streams).

⁷ Trend is an evaluation of ADEQ water quality data (not shown in this document) from 1989 – present (2005).

	Deadman Wash	0	0	0	0	0	0	NA. No perennial streams
	Citadel Wash-Lower Little CO River	0	0	0	0	0	0	NA. No waters
Lower Little Colorado River	Upper Cedar Wash	0	0	0	0	0	0	NA. No perennial streams
	Lower Cedar Wash	0	0	0	0	0	0	NA. No perennial streams
	Haigler Creek-Tonto Creek	32	0	0	0	8	0	NA. No perennial streams
	Sycamore Creek	12	7	0	0	0	0	Static
	Grindstone Wash-Upper Verde River	31	4	0	0	0	0	Static to upward – TMDL approved and in progress
Upper Verde	Oak Creek	97	46	2	2	50	50 miles (33 on Forest)	Downward. TMDL approved and in progress
Upper Verde River	Beaver Creek	22	20	Stoneman Lake	0	0	0	Static to Upward. TMDL approved. Not yet implemented
	Cherry Creek-Upper Verde River	34	2	29	15	0	0	Static to upward – TMDL approved and in progress
Lower Verde River	West Clear Creek	24	24	0	0	0	0	Static
	East Verde River	72	2	0	0	20	0	Static. No data
	Fossil Creek-Lower Verde River	35	26	21	7	0	0	Static to Slightly Upward. Lower Verde TMDL approved and in progress
	Total	449	189	52	24	78	50 miles (33 on Forest), 5 Lakes	

Appendix A. Water Quality by 4th and 5th HUC Watershed

Appendix B. Watershed condition scores and ratings by 6th level HUC

HUC12_Code	HUC12_Name	Watershed_Condition	Watershed_Score
150200080301	Miller Canyon	Functioning at Risk	1.8
150200080302	Bear Canyon	Functioning at Risk	2.1
150200080303	East Clear Creek-Blue Ridge Reservoir	Functioning at Risk	2.1
150200080304	Barbershop Canyon	Functioning at Risk	1.9
150200080307	Leonard Canyon	Functioning at Risk	1.9
150200080311	East Clear Creek-Clear Creek	Functioning at Risk	2
150200080403	Echinique Draw-Clear Creek	Functioning Properly	1.3
150200080501	Windmill Draw-Jacks Canyon	Functioning at Risk	2
150200080502	Tremaine Lake	Functioning at Risk	2
150200080503	Dogie Tank-Jacks Canyon	Functioning at Risk	2.1
150200080504	Chavez Draw	Impaired Function	2.3
150200080505	Hart Tank	Functioning at Risk	1.9
150200080506	Limestone Wash	Functioning Properly	1.1
150200080507	Caliche Tank-Jacks Canyon	Functioning Properly	1.2
150200150101	Sinclair Wash	Functioning at Risk	1.8
150200150102	Upper Rio de Flag	Functioning at Risk	2.2
150200150103	Doney Park	Impaired Function	2.8
150200150104	Lower Rio de Flag	Impaired Function	2.3
150200150201	Mormon Lake	Functioning Properly	1.6
150200150202	Walnut Creek-Upper Lake Mary	Impaired Function	2.3
150200150203	Walnut Creek-Lower Lake Mary	Functioning at Risk	1.9
150200150204	Cherry Canyon-Walnut Creek	Functioning at Risk	1.9
150200150205	Porcupine Canyon-Walnut Creek	Functioning at Risk	1.9
150200150301	Upper San Francisco Wash	Functioning at Risk	2
150200150302	Mormon Canyon	Functioning at Risk	1.9

HUC12_Code	HUC12_Name	Watershed_Condition	Watershed_Score
150200150303	Upper Padre Canyon	Functioning at Risk	2
150200150304	Yellow Jacket Canyon	Functioning at Risk	1.8
150200150305	Youngs Canyon	Functioning at Risk	1.9
150200150306	Lower Padre Canyon	Functioning at Risk	2
150200150307	Middle San Francisco Wash	Functioning at Risk	1.9
150200150309	Lower San Francisco Wash	Functioning Properly	1.1
150200150401	Sawmill Wash	Functioning at Risk	2.2
150200150402	Long Lake-Chavez Pass Ditch	Functioning at Risk	2
150200150403	Kinnikinick Canyon	Functioning at Risk	2
150200150404	Grapevine Canyon	Impaired Function	2.8
150200150405	Crater Lake-Canyon Diablo	Functioning at Risk	1.8
150200150406	Dog Valley	Functioning at Risk	1.9
150200150407	Yeager Draw	Functioning at Risk	1.7
150200150408	Easter Tank-Canyon Diablo	Functioning at Risk	2.1
150200150409	Anderson Canyon	Functioning at Risk	2
150200160101	Cinder Basin	Functioning Properly	1
150200160104	Upper Kana-a Wash	Functioning Properly	1.1
150200160105	Lower Kana-a Wash	Functioning Properly	1.2
150200160201	Bear Jaw Canyon	Functioning at Risk	1.8
150200160202	Upper Deadman Wash	Assessment not completed	
150200160203	Middle Deadman Wash	Functioning at Risk	1.9
150200160204	Lower Deadman Wash	Functioning at Risk	1.7
150200160501	Doney Mountain Wash	Functioning Properly	1.1
150200160502	Citadel Wash	Functioning Properly	1.1
150200160505	Jackrabbit Wash	Functioning Properly	1.1
150200160602	Babbitt Lake	Impaired Function	2.6

HUC12_Code	HUC12_Name	Watershed_Condition	Watershed_Score
150200160603	Rabbit Canyon	Functioning at Risk	2.1
150200160605	Klostermeyer Lake	Functioning at Risk	1.9
150200160606	Upper Cedar Wash (Local Drainage)	Functioning at Risk	2
150200160704	Campbell Francis Wash	Functioning Properly	1.2
150602020301	Volunteer Wash	Functioning at Risk	1.8
150602020303	Telephone Tank	Functioning Properly	1.3
150602020308	Volunteer Canyon	Functioning at Risk	2
150602020310	Little LO Spring Canyon	Functioning Properly	1.5
150602020312	Middle Sycamore Creek	Functioning at Risk	2
150602020407	Sob Canyon-Verde River	Functioning at Risk	2
150602020501	Fry Canyon	Functioning Properly	1.6
150602020502	Pumphouse Wash	Functioning at Risk	1.8
150602020503	West Fork Oak Creek	Functioning Properly	1.4
150602020504	Munds Canyon	Functioning Properly	1.6
150602020505	Upper Oak Creek	Functioning at Risk	2.1
150602020506	Secret Canyon	Functioning Properly	1.1
150602020507	Dry Creek	Impaired Function	2.3
150602020508	Middle Oak Creek	Impaired Function	2.4
150602020509	Coffee Creek	Functioning at Risk	2.2
150602020510	Spring Creek	Functioning at Risk	1.9
150602020511	Lower Oak Creek	Impaired Function	2.7
150602020601	Bar M Canyon	Functioning Properly	1.4
150602020602	Upper Woods Canyon	Functioning at Risk	1.9
150602020603	Double Cabin Park-Jacks Canyon	Functioning at Risk	1.8
150602020604	Brady Canyon	Functioning at Risk	2.1
150602020605	Rattlesnake Canyon	Functioning at Risk	1.9

HUC12_Code	HUC12_Name	Watershed_Condition	Watershed_Score
150602020606	Lower Woods Canyon	Functioning at Risk	1.8
150602020607	Long Canyon	Functioning at Risk	1.7
150602020608	Walker Creek	Functioning at Risk	2
150602020609	Upper Wet Beaver Creek	Functioning Properly	1.5
150602020610	Red Tank Draw	Functioning at Risk	2.2
150602020611	Jacks Canyon	Functioning at Risk	2.1
150602020612	Upper Dry Beaver Creek	Impaired Function	2.6
150602020613	Lower Wet Beaver Creek	Impaired Function	2.5
150602020614	Lower Dry Beaver Creek	Functioning at Risk	2.1
150602020615	Beaver Creek	Impaired Function	2.3
150602030101	Upper Willow Valley	Functioning at Risk	2
150602030102	Long Valley Draw	Functioning at Risk	1.9
150602030103	Toms Creek	Functioning at Risk	2
150602030104	Clover Creek	Functioning at Risk	1.8
150602030105	Lower Willow Valley	Functioning at Risk	1.8
150602030106	Home Tank Draw	Functioning at Risk	1.9
150602030107	Upper West Clear Creek	Functioning Properly	1.4
150602030108	Middle West Clear Creek	Functioning at Risk	1.7
150602030109	Wickiup Creek	Impaired Function	2.7
150602030110	Lower West Clear Creek	Impaired Function	2.3
150602030302	Sycamore Canyon	Functioning at Risk	2.1
150602030304	Mud Tanks Draw	Functioning at Risk	1.9
150602030305	Upper Fossil Creek	Functioning at Risk	1.8
150602030307	Lower Fossil Creek	Functioning at Risk	1.8
150602030308	Gap Creek-Verde River	Functioning at Risk	2