United States Department of Agriculture

Forest Service

Southwestern Region

Watershed Specialist Report

Forest Plan Revision DEIS

Submitted by: __/s/ _____

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Introduction

This report evaluates and discloses the potential environmental consequences on watershed condition that may result with the adoption of a revised land management plan. It examines, in detail, four different alternatives for revising the 1987 Apache-Sitgreaves NFs land management plan (1987 forest plan).

Relevant Laws, Regulations, and Policy that Apply

Federal Statutes

The following is a partial listing of relevant laws which have been enacted by Congress. A Federal statute, or law, is an act or bill which has become part of the legal code through passage by Congress and approval by the President (or via congressional override). Although not specified below, many of these laws have been amended.

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.

Clean Water Act (see Federal Water Pollution Control Act)

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.

Endangered Species Act of 1973, as amended - Authorizes the determination and listing of species as endangered and threatened; prohibits unauthorized taking, possession, sale, and transport of endangered species; authorizes the assessment of civil and criminal penalties for violating the Act or regulations; and, authorizes the payment of rewards to anyone furnishing information leading to arrest and conviction for any violation of the Act or any regulation issued there under. Section 7 of the Act requires Federal agencies to use their authorities to carry out programs for the conservation of endangered and threatened species and to insure that any action authorized, funded, or carried out by them is not likely to jeopardize the continued existence of listed species or modify their critical habitat.

Section 4 of the Act directs the development and implementation of recovery plans for threatened and endangered species and the designation of critical habitat. Several species listed under the Act are found on the Apache-Sitgreaves NFs, some with recovery plans and some with designated critical habitat. Those with a recovery plan and/or a critical habitat designation as of 2010 are listed below:

- Southwest Willow Flycatcher, Recovery Plan and Critical Habitat
- Mexican Spotted Owl, Recovery Plan and Critical Habitat
- Chiricahua Leopard Frog, Recovery Plan and pending Critical Habitat
- Little Colorado River Spinedace, Recovery Plan and Critical Habitat
- Arizona Trout (Apache Trout), Recovery Plan
- Spikedace, Recovery Plan and Critical Habitat

- Gila Trout, Recovery Plan
- Gila Chub, Critical Habitat
- Loach Minnow, Recovery Plan and Critical Habitat
- Mexican Wolf, Recovery Plan

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.

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.

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.

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 2510** Watershed Planning
- **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 7700 Transportation System

- **FSM 7710** Travel Planning

- FSH 7709.55 Travel Analysis
- FSH 7709.56 Chapter 2 – Road Location

Methodology and Analysis Process

This section describes the methodology and analysis processes used to determine the environmental consequences on watershed condition 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 2008) 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 HUC[1] have been determined and are appropriate to be used at the planning level. The initial assessment was conducted in March 2011 using protocols set within the national watershed condition framework and assessment technical guide (USDA Forest Service, 2011). 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.

Assumptions

- For estimating the effects of alternatives at the programmatic forest plan level, the assumption has been made that the kinds of resource management activities allowed under the prescriptions will occur to the extent necessary to achieve the goals and objectives of each alternative. The actual location, design, and extent is not known at this time and will be a site specific (project by project) decision. Therefore this analysis refers to potential of the effect to occur, realizing that in many cases, these are only estimates. The effects analysis is useful in comparing and evaluating alternatives on a forestwide basis but is not to be applied to specific locations on the forests. Some resources are not within the Agencies ability to control; these will be noted.
- 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.
- 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

[1] The United States is divided and sub-divided into successively smaller hydrologic units which are classified into six levels: regions (1), sub-regions (2), accounting units (3), cataloging units or sub-basins (4), watersheds (5)and sub-watersheds (6). The hydrologic units are arranged within each other, from the smallest (sub-watersheds) 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.

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.

- There are other important considerations to note when considering environmental effects of implementing the alternatives with regard to ecological restoration. Each alternative is described as having a range of treatment objectives, from low to high[2]. Each alternative has a different treatment emphasis by vegetation type as well. The benefits and effects to forest resources at a low objective level may be quite similar to each other in some alternatives on a forest scale, and quite different at a high objective level. The benefits and effects to forest resources within each particular vegetation type may be similar or different as well. As an example, Alternative C proposes high emphasis the ponderosa pine vegetation type for treatment, where alternatives B and D treatment emphasis are geared more towards restoration of all vegetation types that are currently departed from desired condition. At the low level treatment objectives, the resulting improvement in vegetative condition for Alternative B and D are very similar, and somewhat lower than C. At the high level of treatment objectives there are greater differences noted between the alternatives. In all cases with regard to Alternative A, which does not emphasize restoration treatments but fuel treatment around communities, there is little improvement towards desired conditions for vegetation condition, even with similar treatment levels.

Revision Topics Addressed in this Analysis

Ecosystem Health

Watershed Condition

- Indicator - Qualitative discussion about the effects of activities and prioritization of treatments on watershed condition measured at the 6th HUC level.

Summary of Alternatives

A summary of alternatives, including the key differences among alternatives, is outlined in the Draft Environmental Impact Statement.

[2] The low objective level is based on a minimum program of work to treat only areas of highest priority, such as treatment or maintenance of vegetation near communities where fire risk is high, or treatments in critical wildlife habitats. The high objective level is an estimate of the forest's highest capability to accomplish treatments using the current workforce and assuming funding is not limiting.

Description of Affected Environment

Watershed Condition

A desired condition of ecosystem health is that watersheds exhibit high geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. Watershed condition is defined as the state of the physical and biological characteristics and processes within a watershed that affect the hydrologic and soil functions supporting aquatic ecosystems. 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 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.

The table below describes the number of 6th level HUCs (Hydrologic Unit Code) within each basin by rating, and lists some of the common degrading factors that have resulted in reduced condition. Currently 32 percent of forests' 170 6th level HUCs are considered to be functioning properly (class 1), 68 percent are functioning-at-risk (class 2), and less than 1 percent are considered impaired (class 3).

Table 1. Summary of 6th level HUC watershed condition by basin.

Basin	Number of 6th Level HUCs*	Class 1 Functioning Properly	Class 2 Functioning-At-Risk	Class 3 Impaired	Common Degrading Factors
Little Colorado River	92	23	69	0	High Road Density, Poor Aquatic Habitat Conditions, Poor Fire Regime Conditions, Poor Aquatic Biota Conditions

Basin	Number of 6th Level HUCs*	Class 1 Functioning Properly	Class 2 Functioning-At-Risk	Class 3 Impaired	Common Degrading Factors
Upper Gila River	55	20	35	0	Impaired Soil Conditions, Poor Fire Regime Conditions, Poor Aquatic Habitat Conditions
Upper Salt River	23	11	11	1	Poor Aquatic Habitat Condition, Poor Fire Regime Conditions
Total (Percent of Total)	**170 (100%)**	**54 (32%)**	**115 (68%)**	**1 (> 1%)**	
*Watersheds with minor amount NFS lands are not tallied.					

Appendix A contains tables that describe general threats and risks to watershed conditions as well as threats and risks to specific 5th level HUCs. Table 2 lists the 6th level HUCs and their watershed condition score. Condition of Non-NFS lands was not included in the classification of watersheds. Therefore, areas with significant Non-NFS lands could heavily influence a rating. The Forest Service is currently developing protocols to evaluate all lands.

Table 2. Watershed condition rating by 6th level HUC with watershed acres, NFS acres, non-NFS acres, and proportional extend of NFS ownership.

HUC6 Number	HUC6 NAME	Watershed Condition Class	Water-shed Acres	NFS Acres	Non-NFS Acres	NFS Percent Owner-ship
150200010101	Auger Creek	1	9,414	6,561	2,854	70
150200010102	Colter Creek	2	10,252	9,508	744	93
150200010103	Paddy Creek-Nutrioso Creek	2	14,659	12,954	1,705	88
150200010104	Rudd Creek	2	17,743	16,227	1,516	91
150200010105	Riggs Creek-Nutrioso Creek	2	21,903	17,684	4,219	81
150200010106	Dry Lakes-Nutrioso Creek	2	18,796	18,608	188	99
150200010107	Picnic Creek-Nutrioso Creek	2	17,034	6,684	10,350	39
150200010201	West Fork Little Colorado River	1	8,136	7,552	584	93
150200010202	East Fork Little Colorado River	1	8,969	8,822	147	98
150200010203	Hall Creek-Little Colorado River	2	20,562	18,702	1,859	91
150200010204	South Fork Little Colorado River	1	16,216	16,131	85	99
150200010205	Fish Creek-Little Colorado River	1	13,549	12,210	1,339	90
150200010206	Water Canyon Creek	2	12,367	10,256	2,112	83
150200010207	Grapevine Creek-Little Colorado River	2	13,040	6,278	6,763	48
150200010208	Becker Lake-Little Colorado River	2	10,530	897	9,633	9
150200010302	Canovas Creek-Coyote Creek	2	32,466	23,593	8,873	73
150200010303	Pratt Lake	2	12,736	9,145	3,591	72
150200010304	Long Lake	2	12,316	5,621	6,695	46
150200010401	Cheney Lake	1	13,188	5,382	7,806	41
150200010402	Upper Carnero Creek	2	14,449	9,328	5,122	65
150200020201	Wildcat Creek	2	6,863	480	6,383	7
150200020202	Upper Mallory Draw	1	18,300	7,096	11,204	39
150200020401	Pulcifer Creek	1	15,424	14,380	1,044	93
150200020402	Neal Spring	1	16,686	7,703	8,983	46
150200020403	Sepulveda Creek	1	11,418	5,552	5,866	49
150200020404	Upper Mineral Creek	1	13,050	9,230	3,819	71

HUC6 Number	HUC6 NAME	Watershed Condition Class	Water-shed Acres	NFS Acres	Non-NFS Acres	NFS Percent Owner-ship
150200020406	Windsor Valley	1	40,561	3,798	36,764	9
150200050101	Billy Creek	2	17,835	9,468	8,366	53
150200050102	Porter Creek	2	25,108	22,496	2,613	90
150200050103	Fools Hollow	2	7,185	3,982	3,203	55
150200050104	Show Low Lake-Show Low Creek	2	19,228	8,206	11,022	43
150200050105	Long Lake	2	13,714	10,709	3,005	78
150200050106	Linden Draw	2	12,256	7,123	5,133	58
150200050107	Bagnal Draw-Show Low Creek	2	17,725	13,970	3,755	79
150200050108	Bull Hollow	2	8,552	8,138	414	95
150200050109	Thistle Hollow-Show Low Creek	2	13,809	12,518	1,291	91
150200050110	Schoens Crossing-Show Low Creek	2	11,591	7,598	3,993	66
150200050201	Ortega Draw	1	10,495	6,574	3,921	63
150200050202	Upper Brown Creek	2	11,087	10,292	795	93
150200050204	Lower Brown Creek	2	22,102	7,797	14,305	35
150200050205	Upper Rocky Arroyo	2	16,244	15,426	818	95
150200050206	Lower Rocky Arroyo	2	15,128	9,862	5,266	65
150200050207	Upper Silver Creek-White Mountain Lake	2	13,146	3,475	9,671	26
150200050208	Mexican Lake-Silver Creek	2	9,470	992	8,478	10
150200050301	Stinson Wash	2	8,023	7,060	963	88
150200050302	West Fork Cottonwood Wash-Cottonwood Wash	2	18,802	18,139	664	96
150200050303	Upper Day Wash	2	12,184	11,230	954	92
150200050304	Lower Day Wash	2	16,661	16,186	475	97
150200050305	Dalton Tank-Cottonwood Wash	2	11,704	11,034	670	94
150200050306	Town Draw	2	16,505	12,900	3,604	78
150200050307	Walker Lake-Cottonwood Wash	2	23,285	10,649	12,635	46
150200050308	Mortensen Wash	2	19,430	17,707	1,723	91
150200050309	Dodson Wash	2	21,428	16,790	4,638	78
150200050310	Ballard Tank-Cottonwood Wash	2	10,781	3,004	7,777	28
150200080101	Decker Wash	2	20,119	18,990	1,129	94
150200080102	Upper Phoenix Park Wash	2	19,279	19,174	105	99
150200080103	Scott Wash	2	6,817	3,148	3,669	46
150200080104	Lower Phoenix Park Wash	2	31,054	7,173	23,880	23
150200080305	Gentry Canyon	1	15,042	14,946	96	99
150200080306	Upper Willow Creek	2	18,603	18,121	482	97
150200080307	Leonard Canyon	2	29,555	28,388	1,167	96
150200080308	Cabin Draw	2	14,272	14,227	45	100
150200080309	Wilkins Canyon	1	13,422	13,335	87	99
150200080310	Lower Willow Creek	1	12,387	11,917	470	96
150200080311	East Clear Creek-Clear Creek	2	39,178	36,717	2,461	94
150200080401	Tillman Draw	2	12,370	10,186	2,184	82
150200080402	Sand Draw	2	14,830	9,834	4,996	66
150200080403	Echinique Draw-Clear Creek	1	33,562	20,310	13,252	61
150200080404	Pablo Canyon	2	23,938	3,713	20,226	16
150200100101	Woods Canyon and Willow Springs Canyon	2	16,705	16,705	0	100
150200100102	Long Tom Canyon-Chevelon Canyon	1	21,248	20,908	340	98
150200100103	Upper Wildcat Canyon	1	25,488	25,038	450	98
150200100104	Upper Chevelon Canyon-Chevelon Canyon Lake	2	17,083	17,031	52	100

HUC6 Number	HUC6 NAME	Watershed Condition Class	Water-shed Acres	NFS Acres	Non-NFS Acres	NFS Percent Owner-ship
150200100105	Middle Wildcat Canyon	2	10,362	10,362	0	100
150200100106	Alder Canyon	1	15,616	15,548	68	100
150200100107	Upper West Chevelon Canyon	1	16,750	16,285	465	97
150200100108	Lower West Chevelon Canyon	1	16,864	16,794	70	100
150200100109	Lower Wildcat Canyon	2	10,923	10,923	0	100
150200100110	Durfee Draw-Chevelon Canyon	1	22,790	22,059	731	97
150200100201	West Fork Black Canyon	2	8,670	8,670	0	100
150200100202	Buckskin Wash	2	18,626	17,129	1,497	92
150200100203	Bear Canyon-Black Canyon	2	16,915	15,944	971	94
150200100204	Upper Pierce Wash	2	16,415	13,147	3,268	80
150200100205	Upper Brookbank Canyon	2	16,593	16,314	279	98
150200100206	Long Draw	2	15,538	12,845	2,693	83
150200100207	Lower Pierce Wash	2	12,489	7,343	5,146	59
150200100208	Long Hollow Tank-Black Canyon	2	24,176	19,416	4,760	80
150200100209	Lower Brookbank Canyon	2	20,989	19,736	1,253	94
150200100210	Squaw Wash-Black Canyon	2	15,879	4,619	11,260	29
150200100301	Upper Potato Wash	2	12,971	12,968	3	100
150200100302	Lower Potato Wash	2	24,200	10,520	13,680	43
150200100303	Trap Tank-Chevelon Canyon	2	17,333	2,828	14,505	16
150400020804	Apache Creek	2	39,083	15,891	23,191	41
150400020806	Cottonwood Creek	1	9,520	1,358	8,162	14
150400020807	C A Bar Creek	2	11,954	2,369	9,586	20
150400020808	Cold Creek	2	17,036	6,325	10,711	37
150400020809	Buzzard Roost Canyon	2	8,207	1,931	6,276	24
150400020810	Rattlesnake Canyon	2	8,984	3,243	5,741	36
150400040301	San Francisco River-Luna Lake	2	22,989	18,521	4,468	81
150400040302	Trout Creek	2	20,934	19,861	1,073	95
150400040303	Stone Creek-San Francisco River	2	35,768	33,348	2,420	93
150400040501	Coleman Creek	1	11,860	11,860	0	100
150400040502	Dry Blue Creek	2	25,047	24,719	328	99
150400040503	Campbell Blue Creek	1	34,221	33,998	223	99
150400040504	Centerfire Creek-Blue River	1	17,311	17,105	206	99
150400040505	Foote Creek	1	12,967	12,961	6	100
150400040506	Steeple Canyon-Blue River	2	37,761	37,033	729	98
150400040507	Grant Creek	1	12,670	12,670	-	100
150400040508	KP Creek	1	12,020	11,984	36	100
150400040509	Raspberry Creek-Blue River	1	34,205	33,775	431	99
150400040601	Upper Pueblo Creek	2	21,553	21,541	11	100
150400040602	Lower Pueblo Creek	2	29,506	29,506	0	100
150400040603	Keller Canyon	1	24,803	24,091	712	97
150400040604	Vigil Canyon	2	25,882	25,475	407	98
150400040606	Wendy Flat-San Francisco River	2	22,811	20,553	2,258	90
150400040701	Strayhorse Creek	1	18,626	18,625	1	100
150400040702	Squaw Creek	1	23,131	23,125	6	100
150400040703	Dutch Blue Creek	1	12,400	12,399	1	100
150400040704	Little Blue Creek	1	25,068	25,068	0	100
150400040705	Oak Creek-Blue River	1	22,293	22,293	0	100
150400040706	Clear Creek	2	9,223	9,063	160	98
150400040707	Turkey Creek	2	13,712	13,662	50	100
150400040708	Pigeon Creek	2	27,826	27,643	182	99

HUC6 Number	HUC6 NAME	Watershed Condition Class	Water-shed Acres	NFS Acres	Non-NFS Acres	NFS Percent Owner-ship
150400040709	Alder Creek-Blue River	2	31,155	31,141	15	100
150400040710	Cienega Creek-Blue River	2	14,696	14,695	1	100
150400040806	Citizen Canyon	1	14,782	14,782	0	100
150400040807	Big Pine Canyon-San Francisco River	2	30,090	30,040	50	100
150400040808	Harden Cienega Creek	2	21,978	21,338	641	97
150400040809	Coal Creek	2	17,543	17,342	201	99
150400040810	Dix Creek	2	22,255	22,244	12	100
150400040811	Coalson Creek-San Francisco River	2	19,390	19,316	74	100
150400040901	Sardine Creek	1	9,565	9,018	547	94
150400040902	Orejana Canyon-San Francisco River	2	12,584	12,583	1	100
150400040903	Chase Creek	2	17,532	1,684	15,848	10
150400040904	Limestone Gulch-San Francisco River	2	32,250	14,340	17,910	44
150400050201	Dry Prong Creek	2	33,476	15,481	17,995	46
150400050202	East Eagle Creek	2	28,102	28,102	0	100
150400050204	Middle Prong Creek	2	11,417	1,296	10,121	11
150400050205	Bear Canyon	2	14,987	14,987	0	100
150400050206	Mud Springs Canyon-Eagle Creek	2	32,248	21,363	10,886	66
150400050301	Sheep Wash	1	23,474	23,409	65	100
150400050302	Bee Canyon-Eagle Creek	2	18,162	11,967	6,195	66
150400050304	Cottonwood Canyon-Eagle Creek	2	13,414	9,378	4,036	70
150400050305	Whitewater Creek	1	8,081	8,055	26	100
150400050306	Tule Creek-Eagle Creek	1	22,611	9,700	12,911	43
150400050308	Knight Creek	2	10,432	10,330	102	99
150400050309	Pistol Creek-Eagle Creek	1	25,932	3,812	22,121	15
150601010101	Boneyard Creek	2	13,287	13,117	170	99
150601010102	North Fork East Fork Black River	2	29,396	29,367	29	100
150601010103	Coyote Creek	2	10,505	10,505	0	100
150601010104	Upper West Fork Black River	1	21,555	16,794	4,760	78
150601010105	Lower West Fork Black River	1	17,087	16,694	393	98
150601010106	East Fork Black River	2	18,471	18,452	19	100
150601010107	Upper Beaver Creek	2	23,897	23,646	251	99
150601010108	Lower Beaver Creek	1	16,814	16,480	334	98
150601010109	Centerfire Creek	1	17,986	17,122	863	95
150601010110	Fish Creek	1	16,382	16,382	1	100
150601010111	Bear Creek-Black River	1	14,448	14,448	0	100
150601010301	Reservation Creek	1	16,439	3,447	12,992	21
150601010303	Snake Creek-Black River	1	18,817	17,018	1,799	90
150601010304	Bear Wallow Creek	1	15,217	14,289	928	94
150601020102	Snake Creek-North Fork White River	1	15,593	877	14,716	6
150601020104	Horseshoe Creek-North Fork White River	1	14,815	1,003	13,812	7
150601030301	Bull Flat Canyon	2	14,374	4,993	9,382	35
150601030302	Canyon Creek Headwaters	2	25,819	20,522	5,297	79
150601040302	Buckskin Canyon-Carrizo Creek	2	23,931	3,843	20,088	16
150601050202	Gordon Canyon	2	17,995	17,595	400	98
150601050203	Christopher Creek	3	18,828	18,239	589	97
150601050204	Horton Creek-Tonto Creek	2	17,275	17,008	266	98
150601050205	Haigler Creek	2	33,197	32,525	672	98

Figure 1 shows the watershed condition rating across the forests. It displays watershed conditions prior to

the 2011 Wallow Fire. Analysis of the watershed conditions within the burned area of the Wallow Fire will occur in 2012. There are 50 watersheds potentially affected. Some watersheds were heavily affected, resulting in a probable shift to a lower class. The effects of the fire to watershed condition in some of these watersheds were minimal. Figure 2 shows the extent of Level 4 and 5 HUCs. Table 7 in Appendix A provides names and hydrologic unit codes for HUC level 4, 5 and 6.

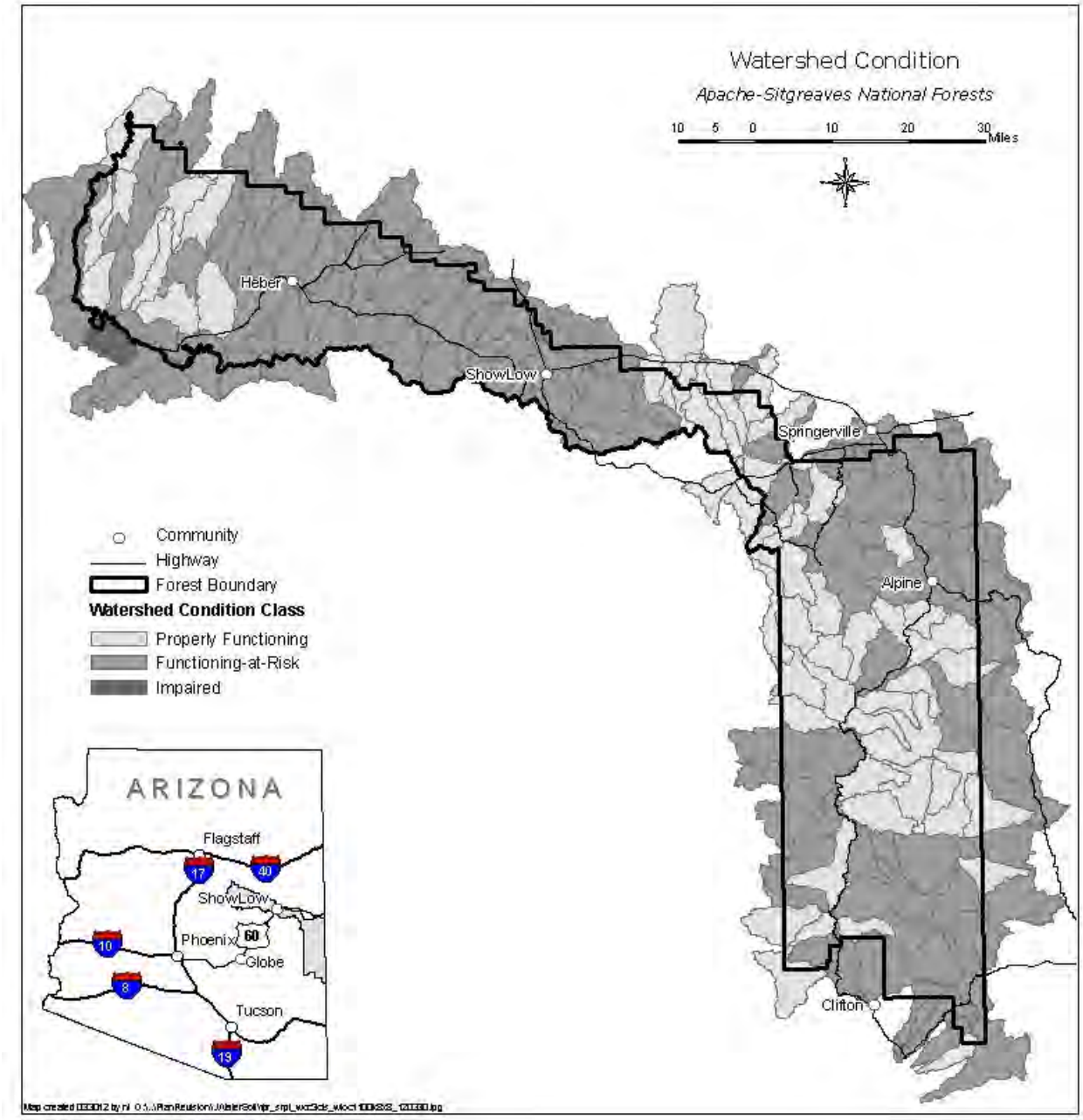

Figure 1. Map of watershed condition class for the Apache-Sitgreaves NFs from the 2011 watershed condition assessment.

Figure 2. Sub-basins (4th level HUC) and Watersheds (5th Level HUC) associated with the ASNFs.

Environmental Consequences

The land management plan provides a programmatic framework that guides site-specific actions but does not authorize, fund, or carryout any project or activity. Because the land management plan does not authorize or mandate any site-specific projects or activities (including ground-disturbing actions) there can be no direct effects. However, there may be implications, or longer term environmental consequences, of managing the forests under this programmatic framework.

Watershed Condition

Alternatives are compared based on their ability to move watersheds towards satisfactory conditions. Land disturbing activities, such as restoration treatments, recreation, roads, grazing, and special uses have short and long term effects on watershed condition. Existing conditions influence the degree of restoration activities needed as well as influencing the selection of priority watersheds for treatment. Priority watersheds are the watersheds where restoration activities will concentrate on the explicit goal of improving watershed condition, especially the restoration of vegetation condition and aquatic resources. The "best" 6th level HUC watersheds (condition class 1 and 2) may be treated first. Within a priority watershed, the highest priority treatments would remove risk factors that may threaten the integrity of the watershed. A wide range of treatments are generally integrated at a watershed scale and sequenced based on an overall work plan. Highest priority work is completed in a watershed before work emphasis shifts to the next priority watershed.

Forest Restoration Activities

Alternative Comparison

There are a variety of treatment methods prescribed by alternatives, including several kinds of mechanical and fire treatments. Ecological condition is highly departed from desired conditions in many of the vegetation types (PNVTs). Vegetation ecological condition affects many of the attributes used to characterize watershed condition, such as soil, riparian and aquatic habitat conditions. Treatment levels and representative kinds of treatments for alternatives are found in appendix A. Effects to individual resources, such as soil condition and water quality and quantity are discussed under each resource. See tables 5 and 6 (Appendix A) for a summary of risk factors by 5th level HUCs, which is applicable to the 6th level HUCs within.

Alternative A does not provide a focused approach to watershed restoration. Treatments are not concentrated within watersheds and would not result in substantially removing degrading factors that cause functioning-at-risk or impaired watersheds to improve. Although the level of treatments is comparable or greater than other alternatives, it is unlikely that entire watersheds will be restored except on an opportunity basis. The action alternatives have an objective to treat priority watersheds, however forest restoration objectives in Alternative C place limitations on which watersheds will be considered as priority. Alternative C focuses restoration on lands that contribute to economic sustainability (such as that on flat terrain in Ponderosa Pine, Dry Mixed Conifer and Pinyon-Juniper vegetation types) or within the Community-Forest Intermix Management Area. The selection of priority watersheds under alternative C would preclude restoration in watersheds that have substantial acres in grasslands, Madrean Pine/Oak Woodland PNVT or riparian areas. Alternative B and D have treatment priorities in all vegetation types; therefore there would be more opportunity to work in areas needing treatment or with other land owners ("All Lands Concept").

Table 3. Treatment objective, emphasis, and priority by alternative.

	Number of focus watersheds treated in the 15 year planning period	Basis and Priority of Treatment Areas
Alternative A*	None	1. Reduction of hazardous fuels around communities
Alternative B	10	1. Restore or maintain properly functioning watershed condition and ecosystems within priority watersheds 2. Reduce hazardous fuels within the areas identified in the Community Wildfire Protection Plans (CWPPs)
Alternative C	10	1. Restore or maintain properly functioning watershed condition and ecosystems within priority watersheds 2. Reduce hazardous fuels within the areas identified in the Community Wildfire Protection Plans (CWPPs)
Alternative D	10	1. Restore or maintain properly functioning watershed condition and ecosystems within priority watersheds
*1987 forest plan as currently implemented		

Roads and Recreation Activities

Alternative Comparison

The road system analyzed is the same for all alternatives. Basic road maintenance is to be competed on at least 20 percent of passenger vehicle roads per year, and 10 percent of all high clearance roads per year. Watershed condition would be affected by the miles of open road and the level of use of all roads, which potentially can vary by alternative. In addition, there are hundreds of miles of unauthorized roads throughout the forest. Restoration objectives would consider rehabilitating the network of unauthorized roads.

Alternative C and B have the highest potential, followed by Alternatives D and A, for increased traffic as well as the most open roads based on the amount of acres that are planned to treat mechanically. Maintenance Level 1 roads are opened only during management activities, such as mechanical restoration treatments, to access and remove products. Opening these roads may provide up to 10 times the amount of roads open within a watershed, providing opportunities for increases in sediment to the stream system.

Alternative B, C and D implement most treatments within priority watersheds while Alternatives A does not emphasize treatments in these watersheds. Road needs would be analyzed for implementation of projects and non-system roads would be identified for removal. Road networks would potentially be reduced to reduce sediment and loss of soil productivity, thereby reducing the degrading factors caused by too many or poor condition roads.

Reduction in road density would be an objective in all action alternatives to increase soil productivity and reduce potential impacts to water quality from sediment. See table below.

Table 4. Objectives for road removal in miles by alternative.

Objective Description	Alternative A (miles)	Alternative B (miles)	Alternative C (miles)	Alternative D (miles)
Miles of road removed from riparian areas over 15 year planning period	Opportunity	4	Opportunity	4
Miles of non-system or un-needed level one roads to be removed each year	Opportunity	2	3	3
Note: Road removal from existing condition does not include the results of any TMR decision				

The potential area available for new road and trail construction that could add to loss of soil productivity and loss of water quality for any reason is highest in Alternative A followed by C then B then D (Transportation Specialist Report).

For all alternatives, during maintenance of structures and road surfacing, BMPs would be effective in reducing sediment and improving watershed conditions. The forests would implement BMPs for road maintenance to mitigate sediment and limit the road system footprint (Transportation Specialist's Report).

Recreation emphasis in alternative C would favor motorized recreation opportunities and developed campgrounds. Alternative D favors non-motorized recreation opportunity and dispersed camping. Alternative B and A provide a mix. Emphasis in motorized opportunities could result in more roads and routes available for use, with potentially more opportunity for soil and water degradation. Concentration of recreationist may allow more site disturbance (compaction, loss of vegetation, erosion, human and pet waste), but impacts would be on less area. Dispersed camping would tend to spread impacts over a larger area, however, waste and trash facilities are not usually provided.

Grazing Activities

Alternative Comparison

There are possible difference between alternatives as related to improvement of watershed condition from livestock grazing activities within priority watersheds as found in Alternative B and D. Improvement of forage resources is expected due to overstory vegetation improvement, thereby potentially reducing grazing pressure on riparian and other sensitive areas within the focus watershed, and improving upland ground cover levels and its beneficial effect on overall watershed condition. Alternative A would result in the long-term the least improved forage condition, and alternative C would improve condition in only a few vegetation types, however, without focused effort, there may little to no detectable improvement to any specific 6^{th} level HUC watershed. Failure to halt overstory canopy closure in forests, woodlands, and grasslands reduces forage production (Vegetation Specialist Report; Jameson, D. 1967; Thill, R. et.al. 1983) resulting in more use on existing herbaceous vegetation and eventual reduction in grazing capacity and, if not mitigated, may reduce watershed conditions. See Vegetation Specialist Report (2012) for detailed discussion of how forage within each vegetation type would potentially be improved by each alternative.

BMPs and SWCPs are effective in retaining protective ground cover and will be implemented under all alternatives. Again, general improvement of vegetation condition (reduced canopy and increased herbaceous cover) potentially allows for improvement of rangeland condition.

Special Uses

The effects of special uses to watershed health would be the same in all alternatives. Site specific BMPs would be prescribed and would be effective in mitigating effects to soil and water quality components of watershed condition. Impacts to watershed condition can occur from group events, powerline and water transmission corridors and access roads, mineral extraction, fuelwood gathering, and cultural or religious uses.

Climate Change

Based on current climate models, the climate change factors that may influence watershed condition are changes in water distribution, timing of precipitation, availability, storage, watershed management, and human water uses, (See Appendix A of the proposed land management plan). These indicate the need to improve forest health, conserve water, and reduce fire risk, as well as preparing for increased use of forest materials and the greater demand for recreation. Concentrating restoration treatments within watersheds reduces the risk to watershed and ecological condition within entire watersheds. Alternative B and D move vegetation conditions towards desired conditions and reduce the risk of uncharacteristic wildfire within priority watersheds. Alternatives A and C will reduce risk to lands treated, but not on a watershed basis, limiting the effectiveness of treatments to improve and protect water quality.

Cumulative Environmental Consequences

Cumulative effects to watershed conditions are many. As seen in table 2, almost all of the watersheds associated with the forests have private inholdings and areas outside of the forest boundary. Many of the impacts discussed above occur on lands of other ownership, such as unpaved roads, grazing, materials mining and fuel treatments that may result in reduced watershed conditions. Large scale industry such as industrial mining and power generating, as well as medium to large urban areas, require large quantities of water for their operations, and can impact ground water dependent resources (Local and state governments, non-governmental land stewardship groups as well as private groups and citizens are active within the watersheds associated with the forests. These entities are critical in removing degrading factors in at-risk or impaired watersheds. **All alternatives** would maintain or improve watershed conditions and help mitigate the effects of off-forest activities that are outside the Agency's control. Management of focus watersheds emphasizes using an "all lands" approach to enhance coordination with external agencies and partners in watershed management and aquatic species recovery efforts. See table 5 in Appendix A for a list of threats and risks to ecological sustainability that potentially occurs from activities outside the control of the agency.

Adaptive Management

The Watershed Condition Framework includes steps to track accomplishments and verify and monitor watershed improvement. The forests have the ability to adjust the priority watersheds and locate restoration treatments based on new information.

Other Planning Efforts

Little Colorado River Plateau RC & D and Apache Natural Resource Conservation District are developing a plan to restore function to Coyote Creek through the Coyote Creek Watershed Improvement Committee.

References

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Appendix A

Table 5. Threats and estimated risk to ecological sustainability by fifth hydrologic unit code (HUC) watersheds within the Little Colorado River System on the ASNFs. Threats are categorized as either under agency management authority or outside agency management.

Threat	Threat Type	Estimated Risk†		Little Colorado River System Fifth Hydrologic Unit Code (HUC) Watershed														
		Likelihood of occurrence	Severity	Nutrioso Ck	South Fork Little Colorado Riv-Little Colorado Riv Headwaters	Coyote Ck	Carnero Ck-Little Colorado Riv Headwaters	Big Hollow Wash	Oso Draw	Show Low Ck	Upper Silver Ck	Cottonwood Ck	Phoenix Park Wash-Dry Lake	Upper Clear Ck	Lower Clear Ck	Upper Chevelon Canyon	Black Canyon	Lower Chevelon Canyon
Under Agency Management Authority																		
Channelization/material removal	Habitat conversion	low (L)	high (H)							✓		✓					✓	
Fire suppression	Modification of natural processes	H	H	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Flooding (diversions, dams & impoundments)	Habitat conversion	H	H	✓	✓		✓			✓				✓		✓		
Forest management practices (vegetation treatments)	Consumptive biological use	moderate (M)	M	✓	✓				✓	✓		✓				✓	✓	
Unauthorized livestock grazing	Consumptive biological use	M	H	✓	✓	✓	✓		✓	✓	✓	✓	✓				✓	✓
Noxious & invasive plant species	Invasive species/ habitat conversion	H	M	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Driving off roads & trails	Non-consumptive biological use	M	H	✓	✓					✓	✓	✓	✓	✓		✓	✓	
Recreation activities	Non-consumptive biological use	M	M		✓					✓						✓		

Threat	Threat Type	Estimated Risk†		Little Colorado River System Fifth Hydrologic Unit Code (HUC) Watershed															
		Likelihood of occurrence	Severity	Nutrioso Ck	South Fork Little Colorado Riv-Little Colorado Riv Headwaters	Coyote Ck	Carnero Ck-Little Colorado Riv Headwaters	Big Hollow Wash	Oso Draw	Show Low Ck	Upper Silver Ck	Cottonwood Ck	Phoenix Park Wash-Dry Lake	Upper Clear Ck	Lower Clear Ck	Upper Chevelon Canyon	Black Canyon	Lower Chevelon Canyon
Roads, highways & utility corridors	Transportation/ habitat conversion	H	H			✓	✓	✓	✓	✓	✓	✓				✓		
Outside Agency Management Authority																		
Drought	Habitat conversion	M	M	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Excessive ungulate grazing/browsing	• Consumptive biological use	•	M•	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	
Flooding	Habitat conversion	M	M								✓						✓	
Groundwater depletion/ contamination	Habitat conversion	H	H	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Human caused fire	Habitat conversion	H	H	✓	✓					✓	✓	✓					✓	
Insect, disease, parasites &/or pathogens epidemic	Invasive species/ habitat conversion	H	H	✓	✓	✓												
Uncharacteristic erosion	Habitat conversion	M	H							✓		✓	✓				✓	
Uncharacteristic sedimentation	Habitat conversion	M	H							✓		✓	✓				✓	
Uncharacteristic wildfire	Habitat conversion	M	H	✓	✓	✓	✓		✓	✓		✓	✓	✓		✓	✓	
Urban development	Habitat conversion	H	H	✓	✓					✓		✓					✓	
Water withdrawal	Abiotic resource use	L	H	✓	✓		✓		✓	✓	✓	✓						
Total (under/outside agency management authority)				7/7	8/7	4/5	5/5	3/3	5/5	10/8	6/5	8/8	4/6	4/4	2/2	7/4	7/8	3/2

† Estimated Risk is divided into Likelihood of Occurrence (defined as the probability of a significant departure from reference conditions) & Severity (defined as the magnitude of the departure from reference conditions)

Table 6. Threats and estimated risk to ecological sustainability by fifth hydrologic unit code (HUC) watersheds within the Gila and Salt River System on the ASNFs. Threats are categorized as either under agency management authority or outside agency management authority as well as threat type and estimated risk of high, moderate, or low.

Threat	Threat Type	Estimated Risk†		Gila and Salt River System Fifth Hydrologic Unit Code (HUC) Watersheds															
		Likelihood of occurrence	Severity	Apache Ck-Upper Gila Riv	Centerfire Ck-San Francisco Riv	Upper Blue Riv	Pueblo Ck-San Francisco Riv	Lower Blue Riv	Mule Ck-San Francisco Riv	Chase Ck-San Francisco Riv	Upper Eagle Ck	Lower Eagle Ck	Upper Black Riv	Middle Black Riv	Upper North Fork White Riv	Canyon Ck	Corduroy Ck	Carrizo Ck (local drainage)	Haigler Ck-Tonto Ck
Under Agency Management Authority																			
Channelization/material removal	Habitat conversion	low (L)	high (H)			✓													
Fire suppression	Modification of natural processes	H	H	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Flooding (diversions, dams & impoundments)	Habitat conversion	H	H		✓	✓					✓	✓							
Forest management practices (vegetation treatments)	Consumptive biological use	moderate (M)	M		✓	✓		✓	✓		✓					✓			
Unauthorized livestock grazing	Consumptive biological use	M	H					✓	✓	✓	✓	✓	✓				✓	✓	
Noxious & invasive plant species	Invasive species/ habitat conversion	H	M	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Driving off roads & trails	Non-consumptive biological use	M	H																
Recreation activities	Non-consumptive biological use	M	M		✓	✓					✓		✓	✓					
Roads, highways & utility corridors	Transportation/ habitat conversion	H	H			✓			✓										

Threat	Threat Type	Estimated Risk†		Gila and Salt River System Fifth Hydrologic Unit Code (HUC) Watersheds																
		Likelihood of occurrence	Severity	Apache Ck-Upper Gila Riv	Centerfire Ck-San Francisco Riv	Upper Blue Riv	Pueblo Ck-San Francisco Riv	Lower Blue Riv	Mule Ck-San Francisco Riv	Chase Ck-San Francisco Riv	Upper Eagle Ck	Lower Eagle Ck	Upper Black Riv	Middle Black Riv	Upper North Fork White Riv	Canyon Ck	Corduroy Ck	Carrizo Ck (local drainage)	Haigler Ck-Tonto Ck
Outside Agency Management Authority																				
Drought	Habitat conversion	M	M	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Excessive ungulate grazing/browsing	Consumptive biological use	M	H		✓	✓							✓	✓						
Flooding	Habitat conversion	M	M			✓		✓	✓	✓	✓	✓								
Groundwater depletion/ contamination	Habitat conversion	H	H																	
Human caused fire	Habitat conversion	H	H		✓	✓					✓	✓								
Insect, disease, parasites &/or pathogens epidemic	Invasive species/ habitat conversion	H	H		✓								✓	✓						
Uncharacteristic erosion	Habitat conversion	M	H			✓					✓		✓							
Uncharacteristic sedimentation	Habitat conversion	M	H			✓					✓		✓							
Uncharacteristic wildfire	Habitat conversion	M	H		✓	✓					✓		✓	✓						✓
Urban development	Habitat conversion	H	H		✓	✓														
Water withdrawal	Abiotic resource use	L	H		✓	✓					✓									
Total (under/outside agency management authority)				2/1	6/6	8/8	2/1	4/2	5/2	3/2	7/6	5/2	4/6	3/4	2/1	3/1	3/1	3/1	2/2	

† Estimated Risk is divided into Likelihood of Occurrence (defined as the probability of a significant departure from reference conditions) & Severity (defined as the magnitude of the departure from reference conditions)

Table 7. 4th, 5th and 6th Level Hydrologic Unit Code Watersheds Associated with the ASNFs.

HUC4 Number SubBasin	HUC4 NAME	HUC5 Number Watershed	HUC5 NAME	HUC6 Number Subwatershed	HUC6 NAME
15020001	Little Colorado River Headwaters	1502000101	Nutrioso Creek	150200010101	Auger Creek
				150200010102	Colter Creek
				150200010103	Paddy Creek-Nutrioso Creek
				150200010104	Rudd Creek
				150200010105	Riggs Creek-Nutrioso Creek
				150200010106	Dry Lakes-Nutrioso Creek
				150200010107	Picnic Creek-Nutrioso Creek
		1502000102	South Fork Little Colorado River-Little Colorado River	150200010201	West Fork Little Colorado River
				150200010202	East Fork Little Colorado River
				150200010203	Hall Creek-Little Colorado River
				150200010204	South Fork Little Colorado River
				150200010205	Fish Creek-Little Colorado River
				150200010206	Water Canyon Creek
				150200010207	Grapevine Creek-Little Colorado River
				150200010208	Becker Lake-Little Colorado River
		1502000103	Coyote Creek	150200010302	Canovas Creek-Coyote Creek
				150200010303	Pratt Lake
				150200010304	Long Lake
		1502000104	Canero Creek-Little Colorado River	150200010401	Cheney Lake
				150200010402	Upper Carnero Creek
				150200020201	Wildcat Creek
15020002	Upper Little Colorado River	1502000202	Big Hollow Wash	150200020202	Upper Mallory Draw
		1502000204	Oso Draw	150200020401	Pulcifer Creek
				150200020402	Neal Spring
				150200020403	Sepulveda Creek
				150200020404	Upper Mineral Creek
				150200020406	Windsor Valley
15020005	Silver Creek	1502000501	Show Low Creek	150200050101	Billy Creek
				150200050102	Porter Creek
				150200050103	Fools Hollow
				150200050104	Show Low Lake-Show Low Creek
				150200050105	Long Lake
				150200050106	Linden Draw
				150200050107	Bagnal Draw-Show Low Creek
				150200050108	Bull Hollow
				150200050109	Thistle Hollow-Show Low Creek
				150200050110	Schoens Crossing-Show Low Creek
		1502000502	Upper Silver Creek	150200050201	Ortega Draw
				150200050202	Upper Brown Creek
				150200050204	Lower Brown Creek
				150200050205	Upper Rocky Arroyo
				150200050206	Lower Rocky Arroyo
				150200050207	Upper Silver Creek-White Mountain Lake
				150200050208	Mexican Lake-Silver Creek
		1502000503	Cottonwood Creek	150200050301	Stinson Wash
				150200050302	West Fork Cottonwood Wash-Cottonwood Wash
				150200050303	Upper Day Wash
				150200050304	Lower Day Wash
				150200050305	Dalton Tank-Cottonwood Wash

				150200050306	Town Draw
				150200050307	Walker Lake-Cottonwood Wash
				150200050308	Mortensen Wash
				150200050309	Dodson Wash
				150200050310	Ballard Tank-Cottonwood Wash
15020008	Middle Little Colorado River	1502000801	Phoenix Park Wash-Dry Lake	150200080101	Decker Wash
				150200080102	Upper Phoenix Park Wash
				150200080103	Scott Wash
				150200080104	Lower Phoenix Park Wash
		1502000803	Upper Clear Creek	150200080305	Gentry Canyon
				150200080306	Upper Willow Creek
				150200080307	Leonard Canyon
				150200080308	Cabin Draw
				150200080309	Wilkins Canyon
				150200080310	Lower Willow Creek
				150200080311	East Clear Creek-Clear Creek
		1502000804	Lower Clear Creek	150200080401	Tillman Draw
				150200080402	Sand Draw
				150200080403	Echinique Draw-Clear Creek
				150200080404	Pablo Canyon
15020001	Chevelon Canyon	1502001001	Upper Chevelon Canyon	150200100101	Woods Canyon and Willow Springs Canyon
				150200100102	Long Tom Canyon-Chevelon Canyon
				150200100103	Upper Wildcat Canyon
				150200100104	Upper Chevelon Canyon-Chevelon Canyon Lake
				150200100105	Middle Wildcat Canyon
				150200100106	Alder Canyon
				150200100107	Upper West Chevelon Canyon
				150200100108	Lower West Chevelon Canyon
				150200100109	Lower Wildcat Canyon
				150200100110	Durfee Draw-Chevelon Canyon
		1502001002	Black Canyon	150200100201	West Fork Black Canyon
				150200100202	Buckskin Wash
				150200100203	Bear Canyon-Black Canyon
				150200100204	Upper Pierce Wash
				150200100205	Upper Brookbank Canyon
				150200100206	Long Draw
				150200100207	Lower Pierce Wash
				150200100208	Long Hollow Tank-Black Canyon
				150200100209	Lower Brookbank Canyon
				150200100210	Squaw Wash-Black Canyon
		1502001003	Lower Chevelon Canyon	150200100301	Upper Potato Wash
				150200100302	Lower Potato Wash
				150200100303	Trap Tank-Chevelon Canyon
15040002	Mangus Creek-Upper Gila River	1504000208	Apache Creek-Gila River	150400020804	Apache Creek
				150400020806	Cottonwood Creek
				150400020807	C A Bar Creek
				150400020808	Cold Creek
				150400020809	Buzzard Roost Canyon
				150400020810	Rattlesnake Canyon
15040004	San Francisco River	1504000403	Centerfire Creek-San Francisco River	150400040301	San Francisco River-Luna Lake
				150400040302	Trout Creek
				150400040303	Stone Creek-San Francisco River
		1504000405	Upper Blue	150400040501	Coleman Creek
				150400040502	Dry Blue Creek

			River	150400040503	Campbell Blue Creek
				150400040504	Centerfire Creek-Blue River
				150400040505	Foote Creek
				150400040506	Steeple Canyon-Blue River
				150400040507	Grant Creek
				150400040508	KP Creek
				150400040509	Raspberry Creek-Blue River
		1504000406	Pueblo Creek-San Francisco River	150400040601	Upper Pueblo Creek
				150400040602	Lower Pueblo Creek
				150400040603	Keller Canyon
				150400040604	Vigil Canyon
				150400040606	Wendy Flat-San Francisco River
		1504000407	Lower Blue River	150400040701	Strayhorse Creek
				150400040702	Squaw Creek
				150400040703	Dutch Blue Creek
				150400040704	Little Blue Creek
				150400040705	Oak Creek-Blue River
				150400040706	Clear Creek
				150400040707	Turkey Creek
				150400040708	Pigeon Creek
				150400040709	Alder Creek-Blue River
				150400040710	Cienega Creek-Blue River
		1504000408	Mule Creek-San Franciso River	150400040806	Citizen Canyon
				150400040807	Big Pine Canyon-San Francisco River
				150400040808	Harden Cienega Creek
				150400040809	Coal Creek
				150400040810	Dix Creek
				150400040811	Coalson Creek-San Francisco River
		1504000409	Chase Creek-San Franciso River	150400040901	Sardine Creek
				150400040902	Orejana Canyon-San Francisco River
				150400040903	Chase Creek
				150400040904	Limestone Gulch-San Francisco River
15040005	Upper Gila River-San Carlos Reservoir	1504000502	Upper Eagle Creek	150400050201	Dry Prong Creek
				150400050202	East Eagle Creek
				150400050204	Middle Prong Creek
				150400050205	Bear Canyon
				150400050206	Mud Springs Canyon-Eagle Creek
		1504000503	Lower Eagle Creek	150400050301	Sheep Wash
				150400050302	Bee Canyon-Eagle Creek
				150400050304	Cottonwood Canyon-Eagle Creek
				150400050305	Whitewater Creek
				150400050306	Tule Creek-Eagle Creek
				150400050308	Knight Creek
				150400050309	Pistol Creek-Eagle Creek
15060101	Black River	1506010101	Upper Black River	150601010101	Boneyard Creek
				150601010102	North Fork East Fork Black River
				150601010103	Coyote Creek
				150601010104	Upper West Fork Black River
				150601010105	Lower West Fork Black River
				150601010106	East Fork Black River
				150601010107	Upper Beaver Creek
				150601010108	Lower Beaver Creek
				150601010109	Centerfire Creek
				150601010110	Fish Creek
				150601010111	Bear Creek-Black River
		1506010103	Middle	150601010301	Reservation Creek
				150601010303	Snake Creek-Black River

			Black River	150601010304	Bear Wallow Creek
15060102	White River	1506010201	Upper North Fork White River	150601020102	Snake Creek-North Fork White River
				150601020104	Horseshoe Creek-North Fork White River
15060103	Upper Salt River	1506010303	Canyon Creek	150601030301	Bull Flat Canyon
				150601030302	Canyon Creek Headwaters
15060104	Carrizo Creek	1506010401	Corduroy Creek	150601040302	Buckskin Canyon-Carrizo Creek
15060105	Tonto Creek	1506010502	Haigler Creek-Tonto Creek	150601050202	Gordon Canyon
				150601050203	Christopher Creek
				150601050204	Horton Creek-Tonto Creek
				150601050205	Haigler Creek