

# FISHERIES REPORT FOR THE DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR PUBLIC MOTORIZED TRAVEL MANAGEMENT PLAN

**This specialist report is being prepared for the NEPA document (DEIS) for the implementation of the Travel Management Rule. Alternatives, including the no action, will be analyzed. The report does not replicate the descriptions for the purpose and need, proposed action, and alternatives; these are discussed in detail in chapters one and two of the DEIS, and this NEPA document provides the basis for this analysis. This report will outline what analysis methodologies were used, and the impacts to fish and their habitats resulting from the alternatives analyzed.**

**All of the action alternatives would amend the forests plan and designate motorized roads and trails, and provide motorized access for dispersed camping within road corridors. Three of the action alternatives would provide for cross-country motorized access for big game retrieval and areas. This analysis includes all the various components of the proposed alternatives, which includes changes to cross-country motorized travel, designating motorized use areas, designating motorized corridors for dispersed camping and big game retrieval, adding and/or opening roads/trails to the existing transportation system, and closing roads/trails from the existing transportation system, and converting roads within the existing transportation system from roads open to all motorized use to administrative use and permitted activity use only.**

## **ANALYSIS AREA**

**The analysis area includes the entire area of the ASNFs and also areas adjacent to the ASNFs that could be impacted downstream from activities occurring on the ASNFs. This analysis area will vary by the species present within and downstream of the ASNFs, and the extent and location of proposed actions within the various alternatives on the ASNFs. When impacts to species and their habitats are discussed under the alternatives, more detailed discussion and descriptions of the action and analysis areas will be provided.**

## **ANALYSIS QUESTIONS TO BE ANSWERED**

**Questions identified for this analysis that require discussion and disclosure are: compliance and consistency with the ASNFs forest plan, ensuring the species viability requirement of the National Forest Management Act (sensitive species analyses), compliance with the Endangered Species Act (ESA), significant issue #3 as described within chapter one of the DEIS, and ensure consistency with the June 10, 2005, Biological Opinion for the *Continued***

*Implementation of the LRMPs for the 11 National Forests and Grasslands of the Southwestern Region* for any ASNFs plan amendments within the proposed actions.

**Impacts (direct, indirect, and cumulative effects) to endangered, threatened, proposed, candidate, and sensitive fish species and their habitats will be evaluated for the proposed alternatives. Where possible impacts from the various alternatives will be quantified to compare and contrast their relative impacts to fish and their habitats where possible and appropriate. It should be recognized that any and all literature, surveys of habitat conditions, surveys and monitoring for the presence and distribution of fish species, and other sources of data all have aspects that may or may not be relevant and specifically applicable to this analysis. Data and other information being used in this analysis are recognized to have differences in analyses approaches, designs, scales (both temporal and spatial), methods, levels of significance and confidence; this results in limits to inferences and conclusions relative to the proposed actions and their potential impacts to fish species and their habitats.**

## FISHERIES AND AQUATIC HABITAT EXISTING CONDITIONS

Aquatic and riparian habitat on the ASNFs is extremely limited in its extent (less than 1.5 percent of the ASNFs), and it has been subjected to significant alterations from past and current management practices. Both the quantity and quality of riparian and aquatic habitat is reduced and altered from historical conditions. This is reflected in the historic and recent (last 20 years) declines and fragmentation of fish species and populations throughout the ASNFs. Twenty four of the 33 fifth code watersheds on the ASNFs historically contained one or more fish species. Currently only 16 of these 24 watersheds contain any native fish; and most of those that still contain native fish, have suffered losses of one to several species (Table 1).

**Table 1. Current and historical occurrences for native fish species by fourth and fifth hydrologic unit code (HUCs) within the ASNFs.**

Fourth Hydrologic Unit Code (HUC) Name	Fifth Hydrologic Unit Code (HUC) Name	Native Fish Species†										Total native species (Historic)	Total native species (Current)			
		Longfin dace*	Sonora sucker*	Little Colorado sucker*	Gila chub†	Roundtail chub+	Little Colorado sninedace f	Spikedace f	Apache trout†	Gila trout†	Desert sucker*			Bluehead sucker*	Speckled dace	Loach minnow†
Little Colorado River Headwaters	Nutriosio Creek		H		H	C		H			C	C			6	3
	South Fork Little Colorado River															
	Colorado River Headwaters		H			H		H			C	C			5	2
	Coyote Creek									C						1
	Carnero Creek-Little Colorado River Headwaters															0
Upper Little Colorado River	Big Hollow Wash														0	
	Oso Draw									C						1
Silver Creek	Show Low Creek		H		H	H					H	C			5	1
	Upper Silver Creek					H					H	H	H		4	0

	Cottonwood Creek	H	H	H	H	H	5	0
Middle Little Colorado River	Phoenix Park Wash-Dry Lake							0
	Upper Clear Creek	C	H	C	C	C	5	4
	Lower Clear Creek	C	H	H	C	C	5	3
Chevelon Canyon	Upper Chevelon Canyon	C	C	H	C	C	5	4
	Black Canyon	H	H	H	H	H	5	0
	Lower Chevelon Canyon	H	H	H	H	H	5	0
Mangus Creek-Upper Gila River	Apache Creek-Upper Gila River							0

**Table 1. Continued**

Fourth Hydrologic Unit Code (HUC) Name	Fifth Hydrologic Unit Code (HUC) Name	Native Fish Species†														
		Longfin dace*	Sonora sucker*	Little Colorado sucker*	Gila chub <sup>f</sup>	Roundtail chub+	Little Colorado spinedace <sup>f</sup>	Spikedace <sup>f</sup>	Apache trout <sup>f</sup>	Gila trout <sup>f</sup>	Desert sucker*	Bluehead sucker*	Speckled dace	Loach minnow <sup>f</sup>	Razorback sucker	Total native species (Historic)
San Francisco River	Centerfire Creek-San Francisco River	H	H							H		H			4	0
	Upper Blue River	C	C		H	H			C	C	C	C	C		9	7
	Pueblo Creek-San Francisco River															0
	Lower Blue River	C	C		H	H		H		C		C	C	H	9	5
	Mule Creek-San Francisco River	C	C		C	H		H		C		C	H	H	9	5
	Chase Creek-San Francisco River	C	C		H	H		H		C		C	H	H	9	4
Upper Gila River-San Carlos Reservoir	Willow Creek															0
	Upper Eagle Creek	C	C		C	C		C		H	C	C	C	H	10	8
	Lower Eagle Creek	C	C		H	H		H		C		C	H	H	9	4
Black River	Upper Black River		C			C			C	C		C	C			6
	Middle Black River		C			C			C	C		C				5
White River	Upper North Fork White River															0
	East Fork White River															0
Upper Salt River	Canyon Creek															0
Carrizo Creek	Corduroy Creek															0
	Carrizo Creek (local drainage)															0
Tonto Creek	Haigler Creek-Tonto Creek															0

† C = Species currently occurs within watershed & H = species historically occurred within watershed

\* = Sensitive species – these are species for which management actions may be necessary to prevent listing under the Endangered Species Act (ESA)

+ = Sensitive species and candidate under the ESA

<sup>f</sup> = Threatened and Endangered (T&E) – Species that are federally listed as T&E under the ESA

# = Endangered species that was introduced in the 1980s, but did not persist and is no longer considered present

There are presently 14 native fish species, and 25 non-native fish species occurring throughout the ASNFs. Seven of the 14 fish species are protected under the Endangered Species Act (ESA); the Gila trout, Gila chub, and razorback sucker are listed as endangered species, and the Little Colorado spinedace, Apache trout, spikedace, and loach minnow are listed as threatened species. The roundtail chub is a candidate species under ESA, and is also on the USDA Forest Service Southwestern Region Sensitive Animals List dated September, 21, 2007. Other sensitive fish species on this list include bluehead sucker, Desert sucker, Little Colorado River sucker, longfin dace, and Sonora sucker. Table 1 includes both the current and historical distributions of native fish species on the ASNFs by fourth (sub-basin) and fifth (watershed) hydrologic unit codes. The speckled dace, which has the greatest distribution across the ASNFs, has no ESA designation and is not considered sensitive.

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## Multi-State, Statewide, and Basin Wide Population/Distribution Information

Both historical and more recent data are very limited for fish species populations, abundances, and habitat conditions; and the data that are available vary considerably in their analysis approaches, scales, and other types of information gathered and analyzed. Information usually occurs across large spatial and temporal scales for species population and distribution changes and trends, and habitat information is usually collected at much smaller temporal and spatial scales. These approaches and limitations should be considered and recognized for the brief summaries provided here.

Olden and Poff (2005) characterized the temporal trends in native fish distributions within the Lower Colorado River Basin, including 13 of the 14 (93 percent) native fish species on the ASNFs (not including the Little Colorado sucker). Ten of these 13 (71 percent) native fish species have undergone declines in distribution across the basin, with the remaining three showing slight increases. The species that have declined are primarily threatened, endangered, and candidate species; which include Apache trout, Gila chub, Gila trout, loach minnow, razorback sucker, roundtail chub, and spinedace. The three species that increase included the threatened Little Colorado spinedace; the Desert sucker, which is sensitive, and the speckled dace. Within national forests in Arizona, 26 percent of stream reaches with occurrences of 5 or more native fish species occur on the ASNFs. The Alpine and Clifton RDs, in particular, have significant lengths of streams with occurrences of 5 or more native fish species. Additionally, 63 stream reaches (ranging from less than one to 49 miles in length) on the ASNFs have occurrences of native fish species, with the number of species in each reach ranging from 1 to 9 (Vander Lee et al. 2006). This information is important as it highlights the general and continued decline of most native fish species across their entire ranges, and emphasizes the importance of the remaining populations that occur mainly on federal lands and the ASNFs.

The recent report, “*Ecological Assessment of Arizona’s Streams and Rivers, 2000-2004*” (Robinson et al. 2006) has documented existing conditions for aquatic vertebrates and invertebrates. Most of Arizona’s stream length was assessed to be in the most-disturbed ecological condition; 70 percent was in most-disturbed condition based on the aquatic vertebrate index of biotic integrity (IBI), and 57 percent was in most-disturbed based on a macroinvertebrate IBI. While this assessment did not specifically address any causative agents relative to these changes; it is likely that they have resulted from the numerous changes and impacts that have occurred throughout the states watersheds, along with the past and ongoing introductions of non-native invertebrate and vertebrate species.

The spinedace, spokedace, and loach minnow have been recognized as declining range wide. Although these species are currently listed as threatened, the U.S. Fish and Wildlife Service has determined that uplisting these species to endangered status is warranted (U. S. Fish and Wildlife Service 2008). The roundtail chub is a candidate species under ESA, and along with the Little Colorado sucker and the bluehead sucker have recently been included within a multi-state Conservation Agreement to attempt to improve their status and potentially prevent them from future listing under ESA (Arizona Game and Fish Department 2006). The longfin dace, Sonora sucker, desert sucker, and speckled dace are also declining in their numbers and/or distributions across the ASNFs.

## ASNFs Population, Distribution, and Habitat Information

The recently completed Nature Conservancy report (Vander Lee et al. 2006) "*Ecological and Biological Diversity of the Apache-Sitgreaves National Forests*" states: "According to the Arizona Freshwater assessment, 14 native fish species have occurrences on one or more stream reaches on the ASNFs. Together, these 14 species have occurrences on approximately 477 miles (63 percent) of the 763 miles of perennial streams that exist on the forests. Overall, the ASNFs account for 41 percent of the perennial streams and 38 percent of the stream reaches with native fish occurrences that exist on National Forests in Arizona."

The speckled dace, Sonora sucker, and desert sucker have the largest distributions on the ASNFs, while the Gila trout, Gila chub, and spikedace have the smallest. All of the streams with occurrences of the loach minnow on national forests in Arizona are on the ASNFs. In addition, within national forests in Arizona, over two-thirds of the stream reaches with occurrences of the bluehead sucker (95 percent), Apache trout (80 percent), Gila trout (71 percent), Little Colorado sucker (70 percent), and Little Colorado spinedace (66 percent ) occur on the ASNFs (Vander Lee et al. 2006). This was information that was provided by analyses conducted by the Nature Conservancy to assist the ASNFs in the forest plan revision process, and highlights the significance and importance of the fisheries resources on the ASNFs at various scales.

Current information regarding aquatic/riparian habitat information and aquatic biota information primarily consists of surveys and studies completed by State and Federal agencies over the last 10-20 years (e.g., Novy and Lopez 1989-1991, see the project record for a complete list). The current forest plan provides a management emphasis for surveying fish species and aquatic and riparian habitat using the Habitat Condition Index (HCI). The HCI is a multivariate rating of existing habitat conditions based on several factors; pool frequency and occurrence, substrate conditions and types, and stream bank cover, soil, and vegetation stability. The HCI evaluates the streams existing habitat conditions relative to its potential. As required in the forest plan, minimum conditions (values) for the HCI should be 60 percent. Based on survey data that are currently analyzed and available (Novy and Lopez 1989-1990), approximately 60-70 percent of the stream reaches that have been surveyed are not meeting the minimum standard of 60 percent; and where repeat surveys have occurred, approximately 50-70 percent of those stream reaches surveyed have declined in their HCI rating. As most streams and aquatic and riparian habitats have experienced considerable degradation and alteration from various anthropogenic and management related activities; their ability to recover and improve has been compromised, especially as ongoing and new impacts occur. Habitat quality and complexity have primarily resulted from loss of pool habitat, loss of large wood within the stream from roads and other riparian area impacts, channel alterations and down cutting through numerous management actions, and the increased sedimentation rates that can adversely impact habitat and species from negative impacts to water quantity and quality. Fish population surveys and sampling efforts have also shown declines for some species, while some non-native species have shown increases.

Historical impacts (e.g., grazing, water developments and diversions, timber harvest and roads, fire suppression) that occurred 20-100+ years ago resulted in significant impacts to aquatic communities and their watersheds, and the species and habitats of today have not recovered from these prior actions and impacts. Fish populations have been reduced from large interconnected populations, to isolated populations within severely altered and degraded habitats. These species and populations lack the resiliency to survive environmental perturbations from either natural or anthropogenic (e.g., fire and suppression of fire, climate variation, degraded watersheds and aquatic habitat, altered hydrologic conditions, loss of riparian and aquatic habitat, recreational demands, non-native species introductions, roads, etc.) actions that occur over space and time.

The watersheds and ecosystems upon which these aquatic species and their habitats and populations depend are also altered and departed from their historical conditions; and while most of these impacts have occurred slowly over many decades, their individual and collective impacts still remain.

The threats facing aquatic ecosystems and fish habitat include, but are not limited to: water diversions and impoundments (e.g., lakes, reservoirs, stock ponds); degraded watershed and hydrologic conditions; highly altered infiltration rates associated with soil compaction and loss of vegetative ground cover; excessive sedimentation associated with roads and significantly increased drainage densities, loss of vegetative ground cover, and stream channel down cutting; altered vegetative conditions and fire regimes; large-scale stream channel down cutting and the lowering of the water table; the loss of perennial and intermittent streams, and the conversion of perennial streams to perennially-interrupted or intermittent streams; highly altered and degraded riparian conditions, and riparian vegetation and soil conditions; non-native fish species, and crayfish; and the lack of aquatic habitat diversity, productivity, and resiliency. Unless these threats to aquatic habitat conditions and fish species are addressed population fragmentation and declines will continue.

Existing fish and their overall populations and habitat conditions are the product of all the biophysical legacies and processes that have occurred over many scales of space and time. Present aquatic species distributions and population conditions across the ASNFs do not provide for the resiliency necessary for the long-term persistence of most native fish and their communities; and declining conditions will continue to be exacerbated by myriad threats and risks at the watershed and landscape scale. All of the native aquatic biota will continue to decline across the ASNFs, unless by incorporating their specific needs (e.g., aquatic/riparian habitat quantity and quality, restoration of aquatic habitat processes and functions, species specific recovery plans and conservation agreements) along with the improvement and recognition of their dependence on healthy functioning ecosystems, will negative trends stop and begin to reverse.

Non-native species also currently present a significant threat to all native fish species on the ASNFs. Several are coldwater species that generally do not occur below 6500 feet in elevation, especially the trout species. Most are warm water centrarchid and cyprinid species that occur below 8000 feet elevation. Introduced fish species include arctic grayling, black bullhead, black crappie, bluegill, brook trout, brown trout, channel catfish, common carp, cutthroat trout, fathead minnow, flathead catfish, golden shiner, goldfish, green sunfish, largemouth bass, mosquitofish, northern pike, rainbow trout, redear sunfish, red shiner, Rio Grande sucker, smallmouth bass, walleye, white crappie, and yellow perch. Crayfish are also widely distributed across the ASNFs, and when they occur they are usually found in high densities. They are usually not found above 9500 feet elevation.

## **DESCRIBE RELEVANT LAWS, REGULATIONS AND POLICY THAT APPLY**

### **Forest Service Manual and Handbook 2600 and Endangered Species Act:**

**Any alternative selected in the record of decision for this analysis in the FEIS cannot lead to the loss of viability or result in a move toward federal listing for any sensitive species. For any federally listed species, the selected alternative cannot jeopardize the continued existence of the listed species.**

**The endangered Species Act of 1973 requires all federal agencies to conserve threatened species and endangered species and the habitats on which they depend, and to consult with the Fish and Wildlife service, on all actions authorized, funded, or carried out by the agency to ensure that the action will not likely jeopardize the continued existence of any threatened and endangered species or destroy or adversely modify critical habitat (FSM 2670). The forest service requires an evaluation of effects on federal candidate and Forest Service sensitive species and habitat (FSM 2672.4). This evaluation is necessary to ensure that Forest Service actions do not contribute to the loss of viability of any native or desired non-native plant or animal species or cause any species to move toward federal listing.**

### **Apache-Sitgreaves National Forests Land and Resource Management Plan:**

**The information below is summarized from Appendix A, where a complete list of all applicable direction and guidance from the ASNFs forest plan relevant to this analysis. The summary below emphasizes ESA compliance, maintaining species viability, and standard and guidelines for Management Area 3 (Riparian).**

#### **Management direction:**

**Maintain habitat to maintain viable populations of wildlife and fish species and improve habitat for selected species. This is accomplished directly through habitat management and indirectly through coordination of habitat management in conjunction with other resource activities**

**Improve habitat for listed threatened, endangered, or sensitive species of plants and animals and other species as they become threatened or endangered. Work toward recovery and declassification of species.**

**Identify and protect areas that contain threatened, endangered, and sensitive species of plants and animals.**

**Improve vegetation in riparian areas. This is an emphasis area for the plan. Improvements will be accomplished by reducing or, in some cases, eliminating adverse impacts from grazing, vehicles, and over-use by man.**

**Management Area 3 (Riparian) management emphasis; Recognize the importance and distinctive values of riparian areas when implementing management activities. Give preferential consideration to riparian dependent resources in cases of unsolvable conflicts. Manage to maintain or improve riparian areas to satisfactory riparian condition. Other resource activities may occur to the extent they support or do not adversely affect riparian**

**dependent resources. Management emphasis will be directed at areas with riparian dependent resources in the following order of priority: 1. Threatened and Endangered Species; 2. Cold water fisheries; 3. Warm water fisheries; and 4. All other riparian areas.**

**Management Area 3 Standards and guidelines:**

**For Priority 1 and Priority Riparian Areas for Aquatic resources: 1. Manage for and maintain at least 80 percent of near natural shade over water surfaces; 2. Manage for and maintain at least 80 percent of streambank total linear distance in stable condition; 3. Prevent siltation not to exceed 20 percent fines (<855mm) in riffle areas; 4. Maintain 80 percent of the spawning gravel surface free of inorganic sediment; 5. Manage for stream temperatures not to exceed 68 degrees F, unless not technically feasible; and 6. Manage for and maintain at least a 80 Biotic Condition Index on all perennial streams.**

**For Priority 1 and 2 Riparian Areas for vegetation resource (where the site is capable of supporting woody plants): 1. Manage for and maintain at least 60 percent of the woody plant composition in three or more riparian species; 2. Manage for and maintain at least three age classes of riparian woody plants, with at least 10 percent of the woody plant cover in sprouts, seedlings, and saplings; 3. Manage for and maintain at least 60 percent near natural shrub and tree crown cover; and 4. Determine need and rehabilitate riparian areas through seeding and planting woody species in areas that are in unsatisfactory condition.**

**Manage for or maintain at least 60% of potential habitat capability for Apache trout, rainbow trout, brook trout, brown trout, loach minnow, and Little Colorado Spinedace.**

## ALTERNATIVE SUMMARIES AND MITIGATION MEASURES

### Alternatives Considered in Detail

In addition to no action (Alternative A) and modified proposed action (Alternative B), the forests developed three additional action alternatives to address the issues identified during scoping.

#### Alternative A — No Action

The National Environmental Policy Act (NEPA) regulations require no action to be included as a baseline for comparison to all action alternatives. This alternative proposes no change to the existing motorized transportation system. Cross-country travel off of system roads on approximately 1.6 million acres would continue to be allowed (although not legal under TMR). Existing motorized prohibitions would remain in place (see Appendix F).

Alternative A would have a total of 2,832 miles of NFSRs open for motorized vehicle use and 156 miles of motorized NFSTs designated for motor vehicles 50” and less in width (see table 2 and Appendix A for maps).

#### Alternative B – Modified Proposed Action

The modified proposed (see the Public Involvement section for information on why original proposed action was modified) addresses the purpose and need by providing motorized access while protecting resources. It responds to Issue # 1 and #3. There would be 2,673 miles of NFSRs open for motor vehicle use and 268 miles of NFSTs designated for vehicles 50” or less in width. The alternative would:

- Amend the Apache-Sitgreaves forest plan to: (1) prohibit cross-country motorized travel off the designated system of roads, trails, and areas except as identified on the MVUM, as required by 36 CFR 261.13 and to be consistent with the language and intent of 36 CFR 212.50 and 261.13, and, (2) remove obsolete references to using the
- RATM process (see Appendix D which summarizes the proposed changes to the forest plan).
- Allow motorized big game retrieval within 1 mile of designated roads open to all motorized vehicles and motorized trails, and on NFS lands adjacent to open roads managed by other state and federal agencies except where motorized restrictions exist.
- Designate five motorized use areas (totaling 459 acres) on the Black Mesa and Lakeside Districts as open to all motorized vehicles.
- Designate 300’ wide corridors along either side of 658 miles of road for motorized vehicles for the sole purpose of dispersed camping per 36 CFR 212.51(b).
- Add 53 miles of unauthorized routes as roads open to all motorized vehicles (of which 28 miles provides access to identified dispersed camping)
- Open 358 miles of closed roads and designate as open to all motorized vehicles.
- Convert 60 miles of closed road to motorized trails for vehicles 50 “or less in width.

- Convert 16 miles of open road to motorized trails for vehicles 50” or less in width.
- Add 34 miles of unauthorized routes as motorized trails for vehicles 50” or less in width.
- Construct 2 miles of new motorized trail on the Lakeside District for vehicles 50” or less in width.
- Close 493 miles of open roads to all motor vehicle use for resource protection.
- Restrict 78 miles of roads open to all motorized vehicles to administrative and permitted use only.
- Add 7 miles of closed road for administrative and permitted use only.
- Add 1 mile of unauthorized road for administrative and permitted use only.

### **Alternative C**

Alternative C responds to issues #1 and #2 as it most closely resembles the existing transportation system. Cross country motorized use would be eliminated in order to make the alternative consistent with the TMR. The miles of road open to motorized travel is similar to the existing system and no additional roads would be closed. To compensate for the loss of cross-country motorized use, miles of road would be added to access dispersed camping and a motorized corridor to access big game retrieval would be allowed. There would be a total of 2,860 miles of NFSRs open for motor vehicle use and 156 miles of motorized NFSTs open to vehicles 50” and less in width: Alternative C would:

- Amend the Apache-Sitgreaves forest plan to: (1) prohibit cross-country motorized travel off the designated system of roads, trails, and areas except as identified on the MVUM, as required by 36 CFR 261.13 and to be consistent with the language and intent of 36 CFR 212.50 and 261.13, and, (2) remove obsolete references to using the RATM process (see Appendix D which summarizes the proposed changes to the forest plan).
- Allow motorized big game retrieval within 1 mile of designated roads open to all motorized vehicles and motorized trails, and on NFS lands adjacent to open roads managed by other state and federal agencies except where motorized restrictions exist.
- Add 28 miles of unauthorized routes as roads open to all motorized vehicles(also provides access to identified dispersed camping)

### **Alternative D**

Alternative D was developed to address issues #3. It increases motorized access for dispersed camping with corridors and motorized routes that access camping. The alternative adds miles of NFSRs and NFSTs, adds motorized use areas and allows motorized big game retrieval. It closes roads for resource protection.

Alternative D would have a forest-wide transportation system that included 2,730 miles of roads open for motor vehicle use and 302 miles of motorized trails for vehicles 50” or less in width. The alternative would:

- Amend the Apache-Sitgreaves forest plan to: (1) prohibit cross-country motorized travel off the designated system of roads, trails, and areas except as identified on the MVUM, as required by 36 CFR 261.13 and to be consistent with the language and intent of 36 CFR 212.50 and 261.13, and, (2) remove obsolete references to using the RATM process (see Appendix D which summarizes the proposed changes to the forest plan).
- Allow motorized big game retrieval within ¼ mile of designated roads open to all motorized vehicles and motorized trails, and on NFS lands adjacent to open roads managed by other state and federal agencies except where motorized restrictions exist.
- Designate five motorized use areas (totaling 459 acres) on the Black Mesa and Lakeside Districts as open to all motorized vehicles.
- Designate 300' wide corridors along either side of 2,034 miles of road for motorized vehicles for the sole purpose of dispersed camping per 36 CFR 212.51(b).
- Open 415 miles of closed roads and designate as open to all motorized vehicles.
- Add 37 miles of unauthorized routes as roads open to all motorized vehicles (provides general access and access to identified dispersed camping).
- Convert 64 miles of closed road to motorized trails for vehicles 50 "or less in width.
- Convert 19 miles of open road to motorized trails for vehicles 50 "or less in width.
- Add 62 miles of unauthorized route for motorized vehicles 50" or less in width.
- Construct 1 mile of trail for motorized vehicles 50" or less in width on the Black Mesa District.
- Close 479 miles of road open to all motor vehicles for resource protection.
- Restrict 59 miles of road open to all motor vehicles to administrative and permitted activity use only.
- Add 5 miles of closed road as a road open to administrative and permitted use only.
- Add 11 miles of unauthorized route as a road open to administrative and permitted use only.

## **Alternative E**

Alternative E was developed to address issue #3. Alternative E adds miles of NFSRs and NFSTs but includes minimal miles of motorized corridors and roads that would access identified dispersed camping locations. It closes roads for resource protection and would not allow motorized big game retrieval.

Alternative E would have a forest-wide transportation system that included 2,473 miles of NFSRs open for motor vehicle use and 206 miles of NFSTs for vehicles less than 50" in width. The alternative would:

- Amend the Apache-Sitgreaves forest plan to: (1) prohibit cross-country motorized travel off the designated system of roads, trails, and areas except as identified on the MVUM, as required by 36 CFR 261.13 and to be consistent with the language and intent of 36 CFR 212.50 and 261.13, and, (2) remove obsolete references to using the

RATM process (see Appendix D which summarizes the proposed changes to the forest plan).

- Designate 300' wide corridors along either side of 118 miles of road for motorized vehicles for the sole purpose of dispersed camping per 36 CFR 212.51(b).
- Add 64 miles of unauthorized routes as roads open to all motorized vehicles (provides general access and access to identified dispersed camping)
- Open 220 miles of closed roads and designate as open to all motorized vehicles
- Convert 14 miles of closed road to motorized trails for vehicles 50 "or less in width.
- Convert 14 miles of open road to motorized trails for vehicles 50 "or less in width.
- Add 20 miles of unauthorized route as motorized trails for vehicles 50" or less in width.
- Construct 1 mile of trail for motorized vehicles 50" and less in width on the Black Mesa District.
- Close 559 miles of road open to all motor vehicles open road for resource protection.
- Convert 79 miles of roads open to all motorized vehicles to administrative and permitted activity use only.
- Add 5 miles of closed road as roads open to administrative and permitted activity only.
- Add less than 1 mile of unauthorized road as a road open to administrative and permitted activity only.

## **METHODOLOGY AND ANALYSIS PROCESS**

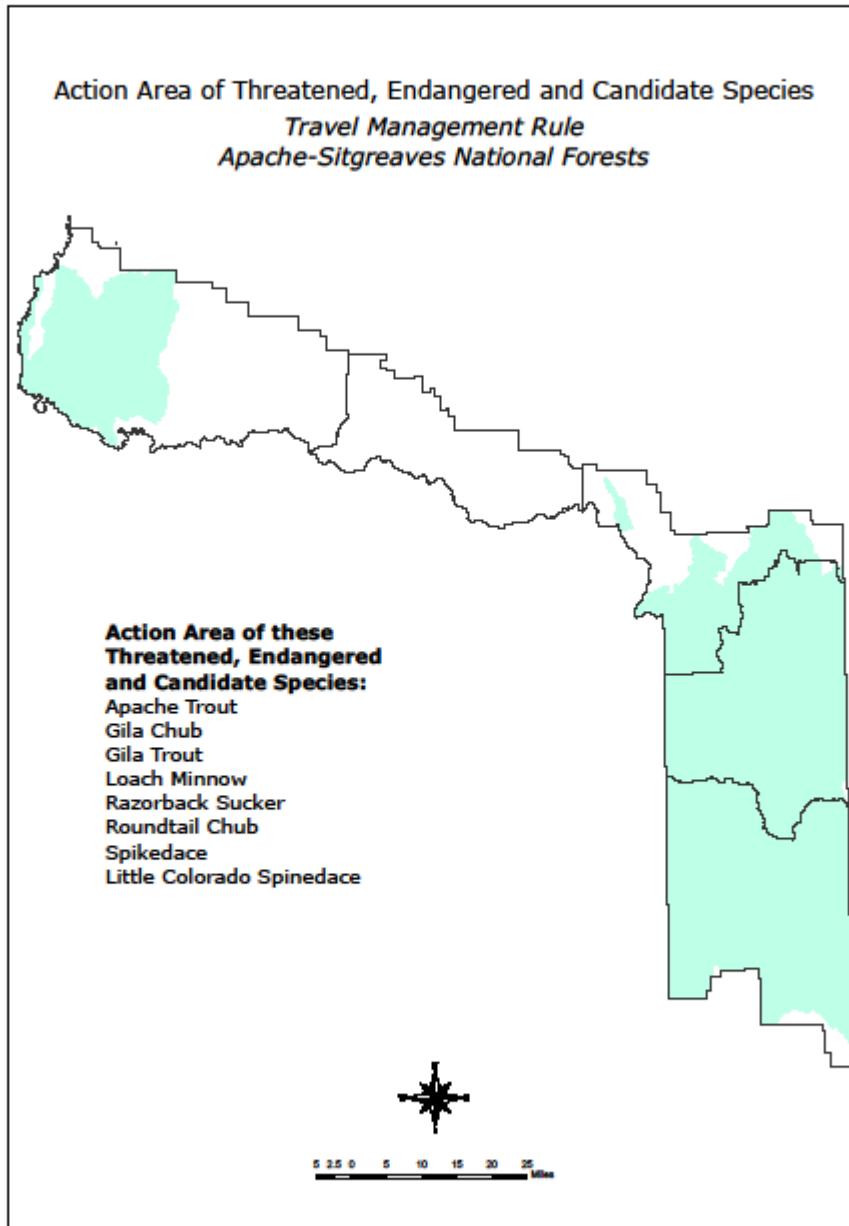
Analysis areas were defined for all of the native fish species occurring across the ASNFs. These analyses areas included all of the portions of the watersheds that drain into habitat that is occupied by the species or has been identified as recovery habitat for reintroduction of the species. For each species the analysis areas were kept separate for analyses purposes where the populations were discrete and no interactions occur or are possible. GIS layers were created for each species that contain all of the analyses areas for that species. A total of 13 fish species are being analyzed; two endangered, five threatened, one candidate, and five sensitive. These 13 species were derived from the latest concurrence list from the U. S. Fish and Wildlife service dated June 20, 2008, and the latest Regional Foresters Sensitive Animals list dated September 21, 2007. These documents, along with other supporting data and information, are located within the project record.

The approach by analyses area was to quantify the various components for each alternative contained within the analysis area. The components of the alternatives were quantified based on three different parameters. The first was if they occurred within a 250 meter buffer of the species habitat. The second was if they occurred within a 250 meter buffer of any drainage that occurs upstream and drains into the species habitat. The third was all the other actions that occur outside the areas associated with the first two parameters (i.e., all upland areas that drain into ephemeral, intermittent, and perennial drainages within the analysis area).

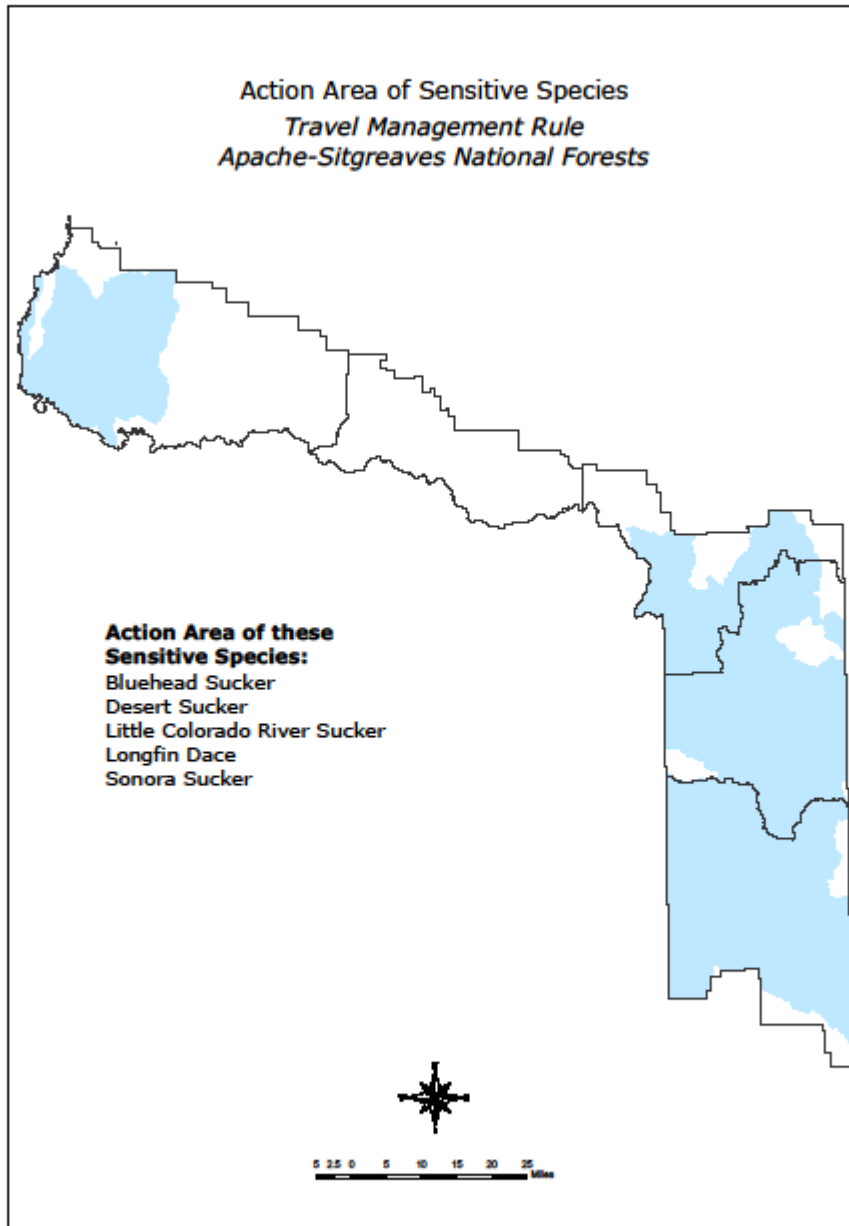
For the threatened, endangered, and candidate species the population mapping process resulted in a total of 47 analyses areas across the ASNFs; 19 for the Apache trout, 3 for the Gila chub, 8 for the Gila trout, 5 for the loach minnow, 2 for the razorback sucker, 3 for the roundtail chub, 2 for spikedace, and 5 for Little Colorado spinedace. For the sensitive species the population mapping process resulted in a total of 25 analyses areas across the ASNFs; 5 for the bluehead sucker, 6 for the Desert sucker, 3 for the Little Colorado River sucker, 5 for the longfin dace, and 6 for the Sonora sucker. Appendix B contains maps of the ASNFs that show the action areas for each individual species being analyzed, and two separate maps that show the overall action areas for all of the sensitive species and one that covers all of the threatened, endangered, and candidate species.

The two maps (Figures 1 and 2) below display the areas within the ASNFs boundaries that will be analyzed for fish species and their habitats. For each alternative the impacts from the proposed actions will be evaluated and used to assess and compare the differences for all the alternatives. No threatened, endangered, proposed, or candidate species occur on the Lakeside Ranger District. Approximately 40 percent of the Black Mesa Ranger District contains action areas for the threatened Little Colorado spinedace and several sensitive fish species. Approximately 50% of the Springerville Ranger District contains action areas for several threatened species and several sensitive fish species. Most of both the Alpine and Clifton Ranger Districts include action areas for most (12) of the threatened, endangered, candidate, and sensitive fish species: with listed species covering approximately 95 percent of each district, and sensitive fish covering 85% of the Alpine District and approximately 90 percent of the Clifton Ranger District.

**Figure 1. Map of ASNFs showing areas being analyzed that have the potential to impact threatened, endangered, and candidate fish species or their habitats.**



**Figure 2. Map of ASNFs showing areas being analyzed that have the potential to impact sensitive fish species or their habitats.**



Past and current management has resulted in Apache and Gila trout populations that either will provide for recovery or currently are occupied by the species. Most of the populations and their habitat are being managed above barriers that have been constructed to reduce and limit the ability of fish downstream of the constructed barrier to gain access to the habitat above. A few of the populations are above falls or natural barriers, that currently reduce and limit movement of fish species above them. Other threatened, endangered, and sensitive fish species have not been intensively managed like the trout species, and occur across the ASNFs where they have been capable of persisting with little or no active management of these species or their habitats.

Apache trout occur within 19 populations whose action areas (watersheds) range in size from 220 acres to 15,852 acres, and total 145,591 acres. Gila chub have three populations, ranging in size from 13,604 acres to 57,829 acres, with a total of 93,774 acres. Gila trout have eight populations identified for potential recovery, ranging from 2,022 acres to 9,711 acres; for a total of 51,686 acres. Loach minnow consists of four populations that total 773,657 acres across the ASNFs. Spikedace (and razorback sucker) likely no longer occur on the ASNFs, but spikedace may currently be persisting in the lower portion of Eagle Creek; so this drainage along with the Blue River have been identified for potential recovery of these species for a total of 528,470 acres. Roundtail chub occur within three streams on the ASNFs; the Black River, Chevelon Creek, and Eagle Creek, which cover 548,471 acres on the ASNFs. Little Colorado Spinedace have five areas identified for the recovery or that could impact of this species, which includes approximately 341,731 acres across the ASNFs.

Sensitive species generally occur in more streams and have larger distributions, resulting in larger analysis and action areas for these species. Bluehead suckers occur in three drainages that encompass 242,462 acres. Desert and Sonora suckers have similar distributions across the ASNFs, and the five watersheds in which they occur cover approximately 847,153 acres. The Little Colorado River only occurs within three drainages on the Chevelon Ranger District, where their watersheds cover approximately 242,462 acres. Longfin dace occur within the Blue River, Eagle Creek, and San Francisco River; and these watersheds cover substantial portions of the Alpine and Clifton Ranger Districts, approximately 853,944 acres.

**Assumptions used in the evaluation of all impacts associated with the proposed actions:**

**The effects of the alternatives are discussed for all threatened, endangered, proposed, candidate, and sensitive species; except those that do not have habitat and/or are not known to occupy the project or analysis area.**

**Maintenance level 3, 4, and 5 roads receive some level of maintenance activity every year such as grading, culvert cleaning, etc. Deferred maintenance activities, such as resurfacing or pavement repair, are not occurring.**

**Approximately 20-25% of maintenance level 2 roads are maintained every year. This typically results in maintenance that occurs once every five years.**

**Direct effects are considered to be everything within the 250 meter buffer of occupied habitat.**

**Indirect effects are considered to be everything outside the 250 meter buffer of occupied habitat.**

**Management level 1 roads are considered to be closed for the duration of this decision (i.e., if they are opened in the future that will need to be analyzed as it is not covered here).**

**Although proposed actions have been designated on project maps (e.g., road segments being added to the transportation system), they are spatially discontinuous across the ASNFs and are too numerous to analyze site specifically. Therefore, the meaningful comparison of alternatives is limited to their changes relative to the existing conditions for the transportation system and cross-country travel. Similarly, impacts to fish species cannot be quantified relative to the existing condition or any of the alternatives; this also limits this analysis to relative comparisons of potential impacts associated with proposed actions.**

**No ground disturbing actions are associated, authorized, or evaluated with any of the proposed actions within any of the alternatives; with the one described below (i.e., Lakeside Ranger District ATV trail).**

**There is one motorized trail on the Lakeside Ranger District that will require some ground disturbing activities and vegetation removal, and no other ground disturbing activities are associated or authorized under any of the alternatives.**

**Cumulative watershed effects are discussed at the 5<sup>TH</sup> HUC level in the watershed specialist report, and are not included within this report.**

**There is one motorized trail on the Lakeside Ranger District that will require some ground disturbing activities and vegetation removal, and no other ground disturbing activities are associated or authorized under any of the alternatives.**

**As part of the NEPA decision making process, Forest Service programs or activities are reviewed to determine how they may affect any USFWS candidate, proposed, endangered, threatened, or Forest Service sensitive species. The review is conducted to ensure that Forest Service actions do not contribute to a loss of species viability or cause a species to move toward federal listing. These species are listed because of concerns due to population status and threats to their long-term viability. The biological assessment (BA) is the**

document that addresses the threatened, endangered, proposed, and candidate species and their habitats by conducting the review and documenting the findings in the analysis for the preferred alternative.

Although current habitat and population conditions are largely unknown for most species; habitat conditions and population trends are likely declining for most if not all fish species both range wide and within the ASNFs. Existing conditions are indicative of past and ongoing management emphasis and intensity. Watershed and hydrologic conditions, along with riparian and aquatic conditions, no longer provide the resiliency and ecological processes and functions (especially disturbance) across multiple temporal and spatial scales. The existing conditions now limit populations and habitats at these same scales, and exacerbate the complexity and difficulty of analyzing and assessing impacts associated with proposed activities and/or changes in management. Myriad factors contribute to this analysis problem; therefore, some aspects of this assessment cannot be addressed through a quantifiable or site specific approach. This has resulted in some aspects and components of the proposed actions being analyzed in limited or minimal extent or only qualitatively or how they may incrementally increase impacts relative to the existing condition.

## **EFFECTS ANALYSIS**

### **EFFECTS OF NOT IMPLEMENTING THE PROJECT ACTIONS (NO ACTION)**

To comply with the Travel Management Rule, the ASNFs proposes to designate a system of roads and motorized trails along with the prohibition of general cross-country travel. The Travel management Rule was developed in response to the substantial increase in use of motorized vehicles on National Forest System lands and the related damage to forest resources caused by this unmanaged use over the last several decades. Although regulations require that temporary roads be closed and re-vegetated after use; roads are generally difficult to close and maintain as closed, especially when the current ASNFs forest plan direction is that roads are managed as “open unless designated closed”.

The continued growth and use of unauthorized and closed routes along with cross-country motorized travel will result in increased impacts to overall watershed health, maintenance of water and soil quality, maintenance and protection of fish and aquatic species, and maintaining resilience to invasions by non-native fish and other aquatic species. Management activities associated with routes and cross-country motor vehicle use can accelerate erosion and sediment beyond the historic range of variation and natural geological rate (Satterlund and Adams 1992). Without the disturbances caused by roads and associated activities, stream channel characteristics, such as channel and floodplain configuration, substrate embeddedness, riparian condition, amount and distribution of woody debris, stream flow, and temperature regime, are less likely to be altered (Furniss et al. 1991). Although the rate and site-specific locations associated with continued cross-country use cannot be quantified, they are increasing across the landscape, and will continue to do so. Both existing and unauthorized routes will increase the likelihood and potential of introducing invasive species to aquatic systems and riparian areas. Invasive plants can directly impact riparian areas, and invasive species can directly and indirectly impact native aquatic species and fish, as well as their habitats. Although both intentional and unintentional introductions of species are unpredictable, uncontrolled and unlimited access presents greater risks and threats, with limited management opportunities.

Off road motorized use causes soil impacts similar to new trail or road construction. When users travel off road with motor vehicles, soil is compacted, infiltration is reduced, and

greater water runoff and erosion occurs. Roads have also been recognized as a primary source of human-caused soil and water quality disturbances, especially in forested areas. Roads serve as a means of dispersal for many non-native invasive plant species, with seed or plant parts inadvertently transported into previously unaffected areas. Ground disturbance associated with roads and other road-related activities provides additional opportunities for establishment of invasive non-native plant species. Continued road expansion would allow a corresponding increase in the adverse ecological effects associated with establishment of invasive species, such as habitat alteration, replacement of native species, and alteration of ecosystem processes. Road crossings associated with the existing transportation system, and continued cross-country travel will increase these impacts. Riparian areas are highly susceptible and the most likely areas for invasive species to be introduced and become established. Invasive plants can displace native species and alter habitat conditions and stream channel stability, reducing the quantity and quality of habitat available for native species. Road crossings and their associated riparian areas and water features receive relatively high levels of use compared to upland areas across the ASNFs. Although these impacts cannot be quantified and addressed site specifically, uncontrolled and increased access across large landscapes provides substantial opportunities for new species introductions to occur.

Currently there are 2,832 miles of authorized roads and 156 miles of motorized trails on the ASNFs. There are approximately an additional 3372 miles of closed roads, and potentially thousands of miles of user created roads that have not been inventoried. For Alternative A, cross-country travel off of system roads on approximately 1,624,246 acres would continue to be allowed. This would continue the current direction that the forest is legally “open to cross-country motor vehicle use unless posted closed” as stated in the Travel Analysis Report for Apache-Sitgreaves National Forests (Page 12, dated January 30, 2008). The existing condition (Alternative A) for the fishery resource on the ASNFs is discussed below relative to two primary components being addressed through the Travel Management Rule; the transportation system, and cross-country motorized travel.

Although it is unknown the total extent and impacts associated with motorized cross-country travel, unauthorized routes created by forest users, and the continued use of closed and decommissioned roads; we do know that these are continuing to increase across the ASNFs as overall and off road use has dramatically increased over the last decade. There are approximately 3372 miles of roads that are currently closed, but an unknown number of these will continue to be used and subject to increased use under current management and existing conditions. Indirect impacts from this use can alter watershed and hydrologic conditions, resulting in changes in the quality and quantity of fish habitat. Direct impacts are associated with road crossings and where roads are located within or in close proximity to drainages. These impacts can include alterations of riparian vegetation, channel morphology, water quality, resulting in negative impacts to fish and their habitats.

High road densities, and where roads are located along streams and riparian areas, are where the greatest potential for these negative impacts to occur. Highest road densities occur and are associated with past and ongoing timber harvest and vegetation management activities. Apache trout and Little Colorado spinedace have likely been impacted the most by these activities and the associated transportation system. Roads along the Blue River, Eagle Creek, and San Francisco River; have had considerable negative impacts to the fish species and populations within these drainages, along with the associated riparian habitat and corridors. The threatened loach minnow and spikedace populations have likely been impacted by in these areas, along with the Gila and roundtail chubs, which are sensitive

species. All fish species and their habitats have been impacted directly and indirectly from roads and cross-country travel, and this will continue under the existing transportation system. While indirect impacts may not be distinguishable from other impacts across the landscape, they cannot be discounted; as they are short and long term, and chronic sources of sediment and altered hydrologic conditions that will remain as long as roads and motorized travel continue.

#### *Routes Open and Closed Within the Existing Transportation System*

##### **Threatened, Endangered, and Candidate Species**

For Apache trout there are currently 243.7 miles of open routes for a current open road density of 1.4 miles/square mile; and there are 389.1 miles of closed routes, for a current closed road density of 1.7 miles/square mile. For Gila chub there are currently 81.4 miles of open routes for a current open road density of 0.6 miles/square mile; and there are 26.9 miles of closed routes, for a current closed road density of 0.2 miles/square mile. For Gila trout there are currently 41.2 miles of open routes for a current open road density of 0.5 miles/square mile; and there are 56.6 miles of closed routes, for a current closed road density of 0.7 miles/square mile. For loach minnow there are currently 652.4 miles of open routes for a current open road density of 0.5 miles/square mile; and there are 547.8 miles of closed routes, for a current closed road density of 0.5 miles/square mile. For spikedace and razorback sucker there are currently 346.8 miles of open routes for a current open road density of 0.4 miles/square mile; and there are 191.2 miles of closed routes, for a current closed road density of 0.2 miles/square mile. For roundtail chub there are currently 949.5 miles of open routes for a current open road density of 1.1 miles/square mile; and there are 1,261.2 miles of closed routes, for a current closed road density of 1.5 miles/square mile. For Little Colorado spinedace there are currently 784.4 miles of open routes for a current open road density of 1.5 miles/square mile; and there are 1038.8 miles of closed routes, for a current closed road density of 1.9 miles/square mile.

Stream crossings associated with the route mileages discussed in the paragraph above are as follows: For Apache trout there are currently 384 road crossings within their watersheds, 143 are open and 241 are closed. For Gila chub there are currently 129 crossings, 111 are open and 18 are closed. For Gila trout there are currently 67 crossings, 35 are open and 32 are closed. For loach minnow there are currently 1127 road crossings, 699 are open and 428 are closed. For roundtail chub there are currently 1512 crossings, 619 are open and 893 are closed. For spikedace and razorback sucker there are currently 466 crossings, 318 are open and 148 are closed. For Little Colorado spinedace there are 948 crossings, 392 open and 556 are closed.

Roads and their drainage crossings within the species action areas are important indicators of the potential extent of direct, indirect, and cumulative impacts to aquatic and riparian habitat when they occur within the watersheds where fish species or their habitat is present. Where they occur upstream of occupied habitat, increased sedimentation rates can impact downstream reaches, both short and long term; and the amounts and rates of additional sediment are dependent on several factors, and will vary in intensity and duration over time. No site specific information regarding the conditions and potential impacts to fish and their habitats for the existing crossings was available for the analysis other than location. As with roads, their crossings occur widely and sporadically throughout the landscape; precluding the ability to quantify their impacts individually, collectively, and cumulatively to fish and their habitat.

## Sensitive Species

For bluehead sucker there are currently 869.9 miles of open routes for a current open road density of 1.4 miles/square mile; and there are 1,125.5 miles of closed routes, for a current closed road density of 1.8 miles/square mile. For desert and Sonora sucker there are currently 845.7 miles of open routes for a current open road density of 0.6 miles/square mile; and there are 974.3 miles of closed routes, for a current closed road density of 0.7 miles/square mile. For Little Colorado River sucker there are currently 615.9 miles of open routes for a current open road density of 1.6 miles/square mile; and there are 837.4 miles of closed routes, for a current closed road density of 2.2 miles/square mile. For longfin dace there are currently 442.2 miles of open routes for a current open road density of 0.4 miles/square mile; and there are 201.2 miles of closed routes, for a current closed road density of 0.2 miles/square mile.

Stream crossings associated with the route mileages discussed in the paragraph above are as follows: For bluehead sucker there are currently 1019 road crossings within their watersheds, 446 are open and 573 are closed. For desert and Sonora sucker there are currently 1639 crossings, 810 are open and 829 are closed. For the Little Colorado River sucker there are currently 620 crossings, 238 are open and 382 are closed. For the longfin dace there are currently 669 road crossings, 507 are open and 162 are closed. Road crossings within the species action areas are important indicators of the potential extent of direct impacts to aquatic and riparian habitat when they occur within fish species habitat that is occupied. Where they occur upstream of occupied habitat, increased sedimentation rates can impact downstream reaches; amounts and rates of additional sediment are dependent on several factors, and will vary in intensity and duration over time. No site specific information regarding these crossings was available for the analysis other than location. As with roads, their crossings occur widely and sporadically throughout the landscape; precluding the ability to quantify their impacts individually, collectively, and cumulatively to fish and their habitat.

### *Cross-country Motorized Travel*

On the ASNFs there are currently 1,624,246 acres that are open to general cross-country motorized use for dispersed recreational activities, which includes big game retrieval and dispersed camping.

## Threatened, Endangered, and Candidate Species

Apache trout habitat on the ASNFs consists of 19 populations that contain a total of 145,591 acres on the Alpine and Springerville Ranger Districts. Cross-country motorized travel within this area is currently allowed on 101,698 acres (70%). Gila chub habitat on the ASNFs consists of three populations that contain a total of 93,774 acres primarily on the Clifton Ranger District. Cross-country motorized travel within this area is currently allowed on 90,155 acres (96%). Gila trout habitat on the ASNFs consists of seven populations that contain a total of 51,686 acres on the Alpine and Clifton Ranger Districts. Cross-country motorized travel within this area is currently allowed on 17,192 acres (33%). Loach minnow habitat on the ASNFs consists of five populations areas that contain a total of 772,031 acres on the Alpine, Clifton, and Springerville Ranger Districts. Cross-country motorized travel within this area is currently allowed on 541,519 acres (70%). For spikedace and razorback habitat on the ASNFs consists of two populations that contain a

total of 528,470 acres on the Alpine and Clifton Ranger Districts. Cross-country motorized travel within this area is currently allowed on 327,513 acres (62%). Roundtail chub habitat on the ASNFs consists of three populations that contain a total of 548,471 acres, and are located on the Alpine, Black Mesa, Clifton, and Springerville Ranger Districts. Cross-country motorized travel within this area is currently allowed on 467,625 acres (85%). Little Colorado spinedace habitat on the ASNFs consists of five populations that contain a total of 341,373 acres on the Alpine, Black Mesa, and Springerville Ranger Districts. Cross-country motorized travel within this area is currently allowed on 258,753 acres (76%).

### **Sensitive Species**

Bluehead sucker habitat on the ASNFs consists of five populations that contain a total of 390,752 acres; which are located on the Alpine, Springerville, and Black Mesa Ranger Districts. Cross-country motorized travel within this area is currently allowed on 283,897 acres (73%). Desert and Sonora sucker habitat on the ASNFs consists of six populations that contain a total of 853,944 acres on the Alpine, Clifton, and Springerville Ranger Districts. Cross-country motorized travel within this area is currently allowed on 619,558 acres (73%). LCR sucker habitat on the ASNFs consists of three populations that contain a total of 242,462 acres on the Black Mesa Ranger District. Cross-country motorized travel within this area is currently allowed on 180,951 acres (75%). Longfin dace habitat on the ASNFs consists of five populations that contain a total of 639,090 acres on the Alpine and Clifton Ranger Districts. Cross-country motorized travel within this area is currently allowed on 434,912 acres (68%).

No data or information are available that could either quantitatively or qualitatively characterize or describe the existing impacts from motorized cross-country travel to threatened, endangered, candidate, or sensitive fish species or their habitats. Motorized cross-country use is most likely to be disparately concentrated within riparian areas and all areas where water is present. Topography and vegetative conditions also likely limit or preclude accessibility to some areas across the ASNFs. Increasing recreational use, especially off road use; increases the potential for adding additional impacts to the existing direct, indirect, and cumulative effects from the current transportation system and motorized cross-country travel and use. This use can directly damage riparian and aquatic habitat, and certain life stages of fish with no or limited mobility. These same impacts can indirectly impact downstream habitat primarily through increased sediment and water quality, as well as other changes in hydrologic conditions.

## **EFFECTS COMMON TO ALL ACTION ALTERNATIVES**

### **Impacts of Roads and Motorized Travel**

Trombulak and Frissell (2000) reviewed the scientific literature on the ecological effects of roads and found support for the general conclusion that they are associated with negative effects on biotic integrity in both terrestrial and aquatic ecosystems. Roads of all kinds have seven general effects: mortality from road construction, mortality from collisions with vehicles, modification of animal behavior, alteration of the physical environment, alteration of the chemical environment, spread of exotics, and increased use of areas by humans. Roads change soil density, temperature, soil water content, light levels, dust, surface waters, patterns of runoff, and sedimentation; as well as adding heavy metals (especially lead), salts, organic molecules, ozone, and nutrients to roadside environments. Roads promote the

dispersal of exotic species by altering habitats, stressing native species, and providing movement corridors. Roads also promote increased hunting, fishing, passive harassment of animals, and landscape modifications. Not all species and ecosystems are equally affected by roads, but overall the presence of roads is highly correlated with changes in species composition, population sizes, and hydrologic and geomorphic processes that shape aquatic and riparian systems.

Forman and Alexander (1998) also conducted a review of roads and their major ecological effects. Road networks crossing landscapes cause local hydrologic and erosion effects, whereas stream networks and distant valleys receive major peak-flow and sediment impacts. Alteration of flows can have major physical and/or chemical effects on aquatic ecosystems. Water runoff and sediment yield are the key physical processes whereby roads have an impact on streams and other aquatic systems, and the resulting effect distances can vary widely. Roads on upper hillslopes concentrate water flow, which in turn form channels higher on slopes than in the absence of roads. This process leads to smaller, more elongated first-order drainages and longer total length of the channel network. Water rapidly runs off relatively impervious road surfaces, especially in storm and snowmelt events. Surface water is then carried by roadside ditches, some of which connect directly to streams while others drain to culverts which can form gullies below their outlets. Increased runoff associated with roads may increase the rates and extent of erosion, reduce percolation and aquifer recharge rates, alter channel morphology, and increase stream discharge rates. Peak discharges or floods then restructure riparian areas by rearranging channels, logs, branches, boulders, fine sediment deposits, and pools.

Sediment and chemicals enter streams primarily where roads cross. The fixed stream location at a bridge or culvert reduces both the amount and variability of stream migration across a floodplain. Therefore, with altered flow rates, pool riffle sequences, and scour; these impacts can reduce habitat-forming debris and aquatic organisms. The volume of sediment yield from a road depends on sediment supply and transport capacity. Sediment yield is determined by road geometry, slope, length, width, surface area, and maintenance; in addition to soil properties and vegetation cover. Road surfaces, cutbanks, fillslopes, bridge/culvert sites, and ditches are all sources of sediment associated with roads. The exposed soil surfaces, as well as the greater sediment-transport capacity of increased hydrologic flows, result in higher erosion rates and sediment yields. Fine sediment increases turbidity, which disrupts stream ecosystems in part by inhibiting aquatic plants, macroinvertebrates, and fish. During low flow periods, fine sediment deposits tend to fill pools and embed gravel beds, degrading habitats and spawning sites for some fish species. During high discharge events, accumulated sediment tends to be flushed out and deposited downstream in larger streams. Roads accelerate water flows and sediment transport, which raise flood levels and degrade aquatic ecosystems by altering riparian conditions, channel morphology, or aquatic habitat. Localized hydrologic and erosion effects along roads are dispersed across the landscape, whereas major impacts are concentrated in the stream network downstream in higher order stream reaches. Most chemical transport from roads occurs in stormwater runoff through or over soil. Runoff pollutants alter soil chemistry, may be absorbed by plants, can affect stream ecosystems, where they are dispersed and diluted over considerable distances. Typical water-quality responses to road runoff include altered levels of heavy metals, salinity, turbidity, and dissolved oxygen. These water quality changes can be sporadic and localized due to fluctuations in water quantity.

Road density has been considered a useful index of several ecological effects of roads in a landscape. Effects are evident for faunal movement, population fragmentation, human

access, hydrology, aquatic ecosystems, and fire patterns. Hydrologic effects, such as altered groundwater conditions and impeded drainage upslope, are sensitive to road densities. Increased peak flows in streams and macroinvertebrate diversity may be impacted with increasing road densities. Road density is an overall index that averages patterns over an area; its effects probably are sensitive to road type and width, traffic density, and network connectivity.

Road density in a watershed affects the collection and transport of water out of the watershed (Burroughs and King 1984). The potential for increases in runoff rates increases with more miles of road. Road closures would be beneficial to water quality if the roads were properly decommissioned and well maintained after closure. A well-maintained, closed road system would result in less sediment from road surface erosion. Roads not proposed for designation as a motor vehicle route in the project area may have long-term adverse effects on water quality if they are not properly maintained.

### Cumulative Effects Common to All Action Alternatives

The cumulative effects analysis geographic boundary is the ASNFs boundary as this area includes all actions associated with implementation of the TMR for this analysis. The following list summarizes the past, present, and future activities that would add to the total cumulative effects. The foreseeable extent of these activities on the ASNFs can be determined from the most up-to-date schedule of proposed actions, which can be found in the project record. As specific impacts of the various effects are unknown, they are described generally to give the reader an idea of the significance of the activity. Since the implementation of the TMR is on a Forests-wide basis, the activities will be discussed generally.

- *Timber Harvest and Vegetation Management:* These types of projects include timber harvest, vegetation treatments, fuel reductions and treatments, wildland urban interface treatments, forest restoration treatments, and fuelwood harvesting. Past timber harvest activities have resulted in substantial impacts to watersheds, hydrologic conditions, riparian and aquatic habitat, and fish species across the ASNFs (especially in vegetated areas with high timber resources (e.g., ponderosa pine, mixed-conifer, spruce-fir, etc.)). This activity has resulted in most of the existing transportation system present today, especially management level 1 and 2 roads. More recent vegetation treatments likely have had less impacts, but can still contribute cumulative effects, especially given resource conditions and ecological processes that have been highly altered from legacy impacts. Fuelwood collecting and harvesting is also a very widespread activity occurring across the ASNFs. It occurs extensively within timber harvest areas, but also occurs as part of or within vegetation treatments in woodland areas as well.
- *Recreation and Recreation Management:* Recreational activities occur throughout the ASNFs, and are continuing to increase. Developed recreation sites, dispersed camping, hiking, fishing, hunting, driving, boating, wildlife viewing, and many other types of recreational activities occur across the ASNFs. Riparian areas, lakes, and streams are very popular areas for recreational activities and dispersed camping; this can result in deteriorated resource conditions from the concentrated use (e.g. loss of vegetation and soil compaction), and can also impact water quality.
- *Fire Suppression and Fire Management Projects:* Fire suppression activities have been in place for decades, and have resulted in unnatural vegetative conditions and have altered ecological processes across most of the ASNFs. Suppression activities are ongoing and will continue well into the future, as vegetation structure and composition has been altered so that

allowing it to burn will result in uncharacteristic and unacceptable resource impacts. Fire suppression activities can also impact water resources and species dependent upon them by removing water, which usually occurs during the driest part of the year. Prescribed fire and burns have been occurring for the last 10-20 years, and have increased considerable in their extent and impacts over the last 5-10 years. Fire management can have both short and long term impacts that are both positive and negative, and cumulatively these impacts will be dependent on the existing resource conditions and the future environmental conditions.

- *Livestock Grazing:* Grazing livestock has likely occurred for over a century across the ASNFs. Historically unrestricted and unregulated resulted in overgrazing, especially within riparian areas, has likely contributed to the degraded riparian and aquatic habitat conditions that occur throughout the ASNFs. Livestock grazing is continuing over most of the ASNFs, although some areas are excluded for resource recovery reasons. Infrastructure development and maintenance associated with livestock grazing allotments is substantial. Thousands of miles of fences and thousands of stock tanks occur throughout the ASNFs. Impacts to aquatic habitat and species, hydrologic conditions and processes, and riparian and upland conditions have occurred; and this will continue as long as livestock management and the associated infrastructure remains in place, and contributes cumulative effects to fish and their habitats.
- *Road and Trail Construction and Maintenance:* As previously stated past timber activities and harvest primarily accounted for road development and placement, and this is still reflected in the existing transportation system. Over 8,000 roads and almost 1,000 miles of hiking trails occur on the ASNFs. While roads and trails are necessary for the use, enjoyment, and management of the ASNFs, they also are responsible for considerable landscape scale changes to the functioning and maintaining of ecological processes and values. Maintenance activities for roads and trails are limited by available funding, and can result in both positive and negative benefits, depending on when it occurs and how often. These impacts will continue as long as the roads/trails are in place, and are a major contributor to cumulative effects on the ASNFs.
- *Special Uses and Permits/Minerals Management/Land Exchanges:* Hundreds of special uses permits have been issued across the ASNFs. These include permits for outfitter and guiding activities fuelwood and Christmas tree cutting, road easements, plant and minerals collection, church and youth camps, gravel and cinder pits, ditch bill easements, communications sites, and other uses as well. All of these activities can result in impacts to watersheds riparian areas, and aquatic habitat and species; and contribute to cumulative effects, especially water development and diversion projects. Land exchanges have resulted in the acquisition of riparian habitat (and in some cases associated water rights) that could help improve or maintain the status of some aquatic species.
- *Dam and Reservoir Development/Water Developments and Diversions:* These projects have resulted in considerable impacts to aquatic habitat and species both directly and indirectly. Dam and reservoir development began in the late 1800's and continued into the 1950's. Most of this activity was to provide for downstream (and off ASNFs) water use and irrigation, and to provide for recreational opportunities. Most dams and water diversions have detrimental impacts to aquatic species and habitats, and have isolated or separated populations, and dewatered or introduced non-native species into upstream and downstream habitats.
- *Fisheries and Wildlife:* Fisheries habitat improvement work in streams began in the 1930s on the ASNFs. These efforts were in response to degraded habitat conditions (likely from grazing livestock) and were focused on higher elevation trout streams, and intended to stabilize streams and provide pool habitat that had been reduced. Later efforts did not occur until the 1970s thru the 1980s, and these efforts were largely focused on areas that had been heavily impacted by past management activities and concentrated recreational use (e.g., East Fork Black River and West fork Little Colorado River). Considerable efforts were made in

the 1990s to improve habitat conditions for Apache trout recovery by installing habitat improvement structures within several streams on the ASNFs, primarily on the Springerville Ranger District.

## **EFFECTS UNIQUE TO EACH ACTION ALTERNATIVE, AND THE DIFFERENCE AMONG THE ACTION ALTERNATIVES**

### **Alternative B**

**This alternative would result in an existing motorized transportation system that consists of 2,673 miles of roads, and 268 miles of trails. Compared to the existing condition (Alternative A), this is a decrease in roads of 159 miles (6%), and an increase in trails of 112 miles (72%). These changes are the result of opening or adding 358 miles of roads, and 112 miles of trails to the existing motorized transportation system; while closing 493 miles of roads currently open within the existing transportation system. This alternative would prohibit general cross-country motorized travel on the 1,624,246 acres where it is currently allowed; while maintaining cross-country travel for big game retrieval within one mile of any motorized road or trail within the proposed transportation system. This alternative includes five “Areas” that cover 459 acres on the Black Mesa and Lakeside Ranger Districts that would provide for general cross-country motorized travel. This alternative would also include the designation of 658 miles of “Corridors”, which are for the sole purpose of providing for dispersed camping 300 feet from the edge of any authorized route.**

#### *Routes Being Added and Removed within the Transportation System*

##### **Direct and indirect effects for threatened, endangered and candidate species**

**For this alternative motorized routes (358 miles of roads, and 112 miles or trails) are being added to the road system and routes are being removed (493 miles) from the existing road system. For each species being analyzed the routes were quantified relative to their direct or indirect effects within the species analyses areas. Direct effects include route changes within the species habitat, and indirect effects include route changes upstream and within the uplands.**

**For Apache trout 4.1 miles of routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and 3.5 miles of routes are being removed that could result in direct positive impacts to this species. Routes being added with the potential for negative indirect impacts total 62.6 miles, and those with beneficial impacts that are being removed total 6.4 miles. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. Streams and populations impacted would include Boggy/Centerfire/Wildcat Creeks, Conklin Creek, Fish Creek, Hayground Creek, Home Creek, and Mineral Creek. Indirect impacts could occur in all 19 Apache trout populations, and would include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.**

**For Gila chub 0.4 miles of routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and no routes are being removed that could result in direct positive impacts to this species. Routes being added with the potential for negative indirect impacts total 16.4 miles, and those with beneficial impacts that are being removed total 0.6 miles. Direct negative impacts could include**

**impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. Streams and populations impacted would include Dix Creek, Eagle Creek, and Harden Cienega Creek. Indirect impacts could occur in the same three populations, and would include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.**

**For Gila trout 0.8 miles of routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and no routes are being removed that could result in direct positive impacts to this species. Routes being added with the potential for negative indirect impacts total 7.5 miles, and those with beneficial impacts that are being removed total 0.6 miles. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. Streams and populations impacted would only include the Castle/Buckalou Creek watershed. Indirect impacts could also occur in the Castle/Buckalou and Coleman Creek watersheds; and would include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.**

**For loach minnow 0.6 miles of routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and 0.1 miles of routes are being removed that could result in direct positive impacts to this species. Routes being added with the potential for negative indirect impacts total 113.5 miles, and those with beneficial impacts that are being removed total 28.1 miles. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. Streams and populations impacted would include the Blue River, Campbell Blue River, Eagle Creek, and San Francisco River. In addition to those streams with direct impacts, indirect impacts could also occur in the East Fork Black River; and would include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.**

**For spikedace and razorback sucker 0.3 miles of routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and 0.1 miles of routes are being removed that could result in direct positive impacts to this species. Routes being added with the potential for negative indirect impacts total 36.2 miles, and those with beneficial impacts that are being removed total 12.9 miles. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. Streams and populations impacted would include the Blue River and Eagle Creek. Indirect impacts could also occur in the Blue River and Eagle Creek, and would include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.**

**For roundtail chub 0.6 miles of routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and 0.1 miles of routes are being removed that could result in direct positive impacts to this species. Routes being added with the potential for negative indirect impacts total 155.1 miles, and those with beneficial impacts that are being removed total 119.9 miles. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. Streams and populations impacted would include the Black River and Eagle Creek. Indirect impacts could also occur in the Black River, Chevelon Creek, and Eagle Creek; and would include changes in**

**habitat conditions and impacts to species from increased sedimentation and alterations in water quality.**

**For Little Colorado spinedace 0.3 miles of routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and 1.4 miles of routes are being removed that could result in direct positive impacts to this species. Routes being added with the potential for negative indirect impacts total 96.1 miles, and those with beneficial impacts that are being removed total 162.8 miles. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. Streams and populations impacted would only include Nutrioso Creek. Indirect impacts could also occur in the Chevelon Creek, Leonard Canyon, Nutrioso Creek, and West Chevelon Creek; and would include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.**

#### **Direct and Indirect Effects for Sensitive Species**

**For bluehead sucker 0.2 miles of routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and 2.8 miles of routes are being removed that could result in direct positive impacts to this species. Routes being added with the potential for negative indirect impacts total 100.8 miles, and those with beneficial impacts that are being removed total 175.6 miles. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. Streams and populations impacted would only include Chevelon Creek. Indirect impacts could also occur in Chevelon Creek and Willow, and could include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.**

**For desert and Sonora sucker 1.5 miles of routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and 0.3 miles of routes are being removed that could result in direct positive impacts to this species. Routes being added with the potential for negative indirect impacts total 167.1 miles, and those with beneficial impacts that are being removed total 36.4 miles. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. Streams and populations that could be directly impacted under this alternative are the Black River, Blue River, Campbell Blue Creek, and North Fork East Fork Black River. Indirect impacts could potentially occur in these same streams; and could include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.**

**For the Little Colorado River sucker no routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and no routes are being removed that could result in direct positive impacts to this species. Routes being added with the potential for negative indirect impacts total 46.4 miles, and those with beneficial impacts that are being removed total 160.3 miles. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. No streams and populations would be directly impacted under this alternative. Indirect impacts could potentially occur in Chevelon Creek, and could include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.**

For longfin dace 1.7 miles of routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and 0.1 miles of routes are being removed that could result in direct positive impacts to this species. Routes being added with the potential for negative indirect impacts total 37.1 miles, and those with beneficial impacts that are being removed total 17.9 miles. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. Streams and populations that could potentially be directly impacted under this alternative are the Blue River and Campbell Blue Creek. Indirect impacts could also occur in these same two streams; and could include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.

### **Road Mileage Changes and Road Densities**

Within the watersheds where Apache trout populations and their habitat occurs the amount of motorized routes open will increase 66.7 miles to a total of 310.4 miles, which is an increase of 27%. This will increase the road density within the watersheds of Apache trout from a current density of 1.1 miles/square mile to a new density of 1.4 miles/square mile. Routes that are being closed to motorized use will increase 9.9 miles (3%), to the new total of 399 miles. This will increase the closed road density from 1.7 miles/square mile to 1.8 miles/square mile. The routes being added will result in three road crossings, one each in the headwaters of Boggy, Home, and Wildcat Creeks.

Within the watersheds where Gila chub populations and their habitat occurs the amount of motorized routes open would increase 16.8 miles to a total of 98.2 miles, which is an increase of 21%. This would increase the road density within the watersheds of Gila chub trout from a current density of 0.6 miles/square mile to a new density of 0.7 miles/square mile. Routes that are being closed to motorized use will increase 0.6 miles (2%), to the new total of 26.9 miles. This would maintain the current road density, which is 0.2 miles/square mile.

Within the watersheds where Gila trout populations and their habitat occurs the amount of motorized routes open will increase 8.3 miles to a total of 49.5 miles, which is an increase of 20%. This would increase the road density within the watersheds of Gila trout from a current density of 0.5 miles/square mile to a new density of 0.6 miles/square mile. Routes that are being closed to motorized use would increase 0.6 miles (1%), to the new total of 57.2 miles. This would maintain the current road density of 0.7 miles/square mile.

Within the watersheds where loach minnow populations and their habitat occurs the amount of motorized routes open would increase 114.1 miles to a total of 766.5 miles, which is an increase of 17%. This would increase the road density within the watersheds of loach minnow from a current density of 0.5 miles/square mile to a new density of 0.6 miles/square mile. Routes that are being closed to motorized use would increase 28.2 miles (5%), to the new total of 576 miles. This would maintain the current road density, which is 0.5 miles/square mile.

Within the watersheds where spikedace and razorback sucker populations and their habitat occurs the amount of motorized routes open would increase 36.5 miles to a total of 383.3 miles, which is an increase of 11%. This would increase the road density within the watersheds of spikedace and razorback sucker from a current density of 0.4 miles/square mile to a new density of 0.5 miles/square mile. Routes that are being closed to motorized

use would increase 13 miles (7%), to the new total of 204.2 miles. This would maintain the current road density, which is 0.2 miles/square mile.

Within the watersheds where roundtail chub populations and their habitat occurs the amount of motorized routes open would increase 155.7 miles to a total of 1105.2 miles, which is an increase of 16%. This would increase the road density within the watersheds of roundtail chub from a current density of 1.1 miles/square mile to a new density of 1.3 miles/square mile. Routes that are being closed to motorized use would increase 120 miles (10%), to the new total of 1381.2 miles. This would increase the closed road density from 1.5 miles/square mile to 1.6 miles/square mile.

Within the watersheds where Little Colorado spinedace populations and their habitat occurs the amount of motorized routes open would increase 96.4 miles to a total of 880.8 miles, which is an increase of 12%. This would increase the road density within the watersheds of Little Colorado spinedace from a current density of 1.5 miles/square mile to a new density of 1.6 miles/square mile. Routes that are being closed to motorized use would increase 164.2 miles (16%), to the new total of 1203 miles. This would increase the closed road density from 1.9 miles/square mile to 2.3 miles/square mile.

Within the watersheds where bluehead sucker populations and their habitat occurs the amount of motorized routes open would increase 101 miles to a total of 869.9 miles, which is an increase of 12%. This would increase the road density within the watersheds of bluehead sucker from a current density of 1.4 miles/square mile to a new density of 1.6 miles/square mile. Routes that are being closed to motorized use would increase 178.4 miles (16%), to the new total of 1303.9 miles. This would increase the closed road density from 1.8 miles/square mile to 2.1 miles/square mile.

Within the watersheds where desert and Sonora sucker populations and their habitat occurs the amount of motorized routes open would increase 168.6 miles to a total of 1,014.3 miles, which is an increase of 20%. This would increase the road density within the watersheds of desert and Sonora sucker from a current density of 0.6 miles/square mile to a new density of 0.8 miles/square mile. Routes that are being closed to motorized use would increase 36.7 miles (4%), to the new total of 1,011 miles. This would increase the closed road density from 0.7 miles/square mile to 0.8 miles/square mile.

Within the watersheds where Little Colorado sucker populations and their habitat occurs the amount of motorized routes open would increase 46.4 miles to a total of 662.3 miles, which is an increase of 8%. This would increase the open road density within the watersheds of Little Colorado River sucker from a current density of 1.6 miles/square mile to a new density of 1.7 miles/square mile. Routes that are being closed to motorized use would increase 160.3 miles (19%), to the new total of 997.7 miles. This will increase the closed road density from 2.2 miles/square mile to 2.6 miles/square mile.

Within the watersheds where longfin dace populations and their habitat occurs the amount of motorized routes open would increase 38.8 miles to a total of 481 miles, which is an increase of 9%. This would increase the road density within the watersheds of longfin dace from a current density of 0.4 miles/square mile to a new density of 0.5 miles/square mile. Routes that are being closed to motorized use would increase 18 miles (9%), to the new total of 219.2 miles. This would maintain the current road density, which is 0.2 miles/square mile.

Roads and their drainage crossings within the species action areas are important indicators of the potential extent of direct, indirect, and cumulative impacts to aquatic and riparian habitat when they occur within the watersheds where fish species or their habitat is present. Where they occur upstream of occupied habitat, increased sedimentation rates can impact downstream reaches, both short and long term; and the amounts and rates of additional sediment are dependent on several factors, and will vary in intensity and duration over time. No site specific information regarding the conditions and potential impacts to fish and their habitats for the existing crossings was available for the analysis other than location. As with roads, their crossings occur widely and sporadically throughout the landscape; precluding the ability to quantify their impacts individually, collectively, and cumulatively to fish and their habitat.

*Continued Cross-country Motorized Travel for Big Game Retrieval*

Relative to Alternative A, the 1,624,246 acres that are open to cross-country travel would no longer be open for use. Although motorized access for big game retrieval and dispersed access will still be allowed, and as both of these are defined and determined by corridors from routes, the overall acreage for both activities will be reduced for this alternative. Specific reductions for each species and their action areas are discussed below.

Apache trout habitat on the ASNFs consists of 19 analysis (i.e., populations) areas that contain a total of 145,591 acres on the Alpine and Springerville Ranger Districts. Motorized access for big game retrieval for this alternative (94,564 acres) is a 7% reduction from the existing condition of 101,698 acres. Gila chub habitat on the ASNFs consists of three action areas that contain a total of 93,774 acres primarily on the Clifton Ranger District. Motorized access for big game retrieval for this alternative (38,813 acres) is a 57% reduction from the existing condition of 90,155 acres. Gila trout habitat on the ASNFs consists of seven analysis areas that contain a total of 51,686 acres on the Alpine and Clifton Ranger Districts. Motorized access for big game retrieval for this alternative (14,518 acres) is a 16% reduction from the existing condition of 17,192 acres. Loach minnow habitat on the ASNFs consists of five analysis areas that contain a total of 772,031 acres on the Alpine, Clifton, and Springerville Ranger Districts. Motorized access for big game retrieval for this access for big game retrieval for this alternative (115,989 acres) is a 65% reduction from the existing condition of 327,513 acres. Roundtail chub habitat on the ASNFs consists of three analysis areas that contain a total of 548,471 acres, and are located on the Alpine, Black Mesa, Clifton, and Springerville Ranger Districts. Motorized access for big game retrieval for this alternative (352,253 acres) is a 25% reduction from the existing condition of 467,625 acres. Little Colorado spinedace habitat on the ASNFs consists of five analysis areas that contain a total of 341,373 acres on the Alpine, Black Mesa, and Springerville Ranger Districts. Motorized access for big game retrieval for this alternative (250,325 acres) is a 3% reduction from the existing condition of 258,753 acres.

Bluehead sucker habitat on the ASNFs consists of five analysis areas that contain a total of 390,752 acres, which are located on the Alpine, Springerville, and Black Mesa Ranger Districts. Motorized access for big game retrieval for this alternative (274,903 acres) is a 4% reduction from the existing condition of 283,897 acres. Desert and Sonora sucker habitat on the ASNFs consists of six analysis areas that contain a total of 853,944 acres on the Alpine, Clifton, and Springerville Ranger Districts. Motorized access for big game retrieval for this alternative (333,683 acres) is a 46% reduction from the existing condition of 619,558 acres. LCR sucker habitat on the ASNFs consists of three analysis areas that contain a total of 242,462 acres on the Black Mesa Ranger District. Motorized access for

big game retrieval for this alternative (175,621 acres) is a 3% reduction from the existing condition of 180,951 acres. Longfin dace habitat on the ASNFs consists of five analysis areas that contain a total of 639,090 acres on the Alpine and Clifton Ranger Districts. Motorized access for big game retrieval for this alternative (158,126 acres) is a 64% reduction from the existing condition of 434,912 acres.

Direct and indirect impacts associated with motorized cross-country travel are unknown, and cannot be determined for this alternative as well. Although specific impacts cannot be quantified, given the substantial reductions that would result in some areas; potential impacts and disturbance to fish species, riparian and aquatic habitat, and hydrologic conditions should be reduced. Species most likely to have positive effects would be the Gila chub, loach minnow, roundtail chub, desert and Sonora suckers, and longfin dace.

#### *Designated Corridors for Motorized Travel for Dispersed Camping Access*

Apache trout habitat on the ASNFs consists of 19 analysis (i.e., populations) areas that contain a total of 145,591 acres on the Alpine and Springerville Ranger Districts. Motorized access for dispersed camping for this alternative (1,853 acres) is a 98% reduction from the existing condition of 101,698 acres. Gila chub habitat on the ASNFs consists of three action areas that contain a total of 93,774 acres primarily on the Clifton Ranger District. Motorized access for dispersed camping for this alternative (788 acres) is a 99% reduction from the existing condition of 90,155 acres. Gila trout habitat on the ASNFs consists of seven analysis areas that contain a total of 51,686 acres on the Alpine and Clifton Ranger Districts. Motorized access for dispersed camping for this alternative (18 acres) is a 99.9% reduction from the existing condition of 17,192 acres. Loach minnow habitat on the ASNFs consists of five analysis areas that contain a total of 772,031 acres on the Alpine, Clifton, and Springerville Ranger Districts. Motorized access for dispersed camping for this alternative (8,064 acres) is a 98% reduction from the existing condition of 541,519 acres. For spikedace and razorback habitat on the ASNFs consists of two analysis areas that contain a total of 528,470 acres on the Alpine and Clifton Ranger Districts. Motorized access for dispersed camping for this alternative (6,863 acres) is a 98% reduction from the existing condition of 327,513 acres. Roundtail chub habitat on the ASNFs consists of three analysis areas that contain a total of 548,471 acres, and are located on the Alpine, Black Mesa, Clifton, and Springerville Ranger Districts. Motorized access for dispersed camping for this alternative (19,049 acres) is a 96% reduction from the existing condition of 467,625 acres. Little Colorado spinedace habitat on the ASNFs consists of five analysis areas that contain a total of 341,373 acres on the Alpine, Black Mesa, and Springerville Ranger Districts. Motorized access for dispersed camping for this alternative (19,281 acres) is a 92% reduction from the existing condition of 258,753 acres.

Bluehead sucker habitat on the ASNFs consists of five analysis areas that contain a total of 390,752 acres, which are located on the Alpine, Springerville, and Black Mesa Ranger Districts. Motorized access for dispersed camping for this alternative (20,776 acres) is a 92% reduction from the existing condition of 283,897 acres. Desert and Sonora sucker habitat on the ASNFs consists of six analysis areas that contain a total of 853,944 acres on the Alpine, Clifton, and Springerville Ranger Districts. Motorized access for dispersed camping for this alternative (9,430 acres) is a 98% reduction from the existing condition of 619,558 acres. LCR sucker habitat on the ASNFs consists of three analysis areas that contain a total of 242,462 acres on the Black Mesa Ranger District. Motorized access for dispersed camping for this alternative (18,590 acres) is an 89% reduction from the existing condition of 180,951 acres. Longfin dace habitat on the ASNFs consists of five analysis

**areas that contain a total of 639,090 acres on the Alpine and Clifton Ranger Districts. Motorized access for dispersed camping for this alternative (6,674 acres) is a 99% reduction from the existing condition of 463,912 acres.**

**As described above, substantial reductions in acreages available for dispersed camping would occur within all the action areas for all the fish species being analyzed. Although specific impacts cannot be quantified, given the substantial reductions that would result throughout the ASNFs; potential impacts and disturbance to fish species, riparian and aquatic habitat, and hydrologic conditions should be reduced.**

#### *Areas Open to all Motorized Vehicles*

**Under this alternative, five motorized use areas (totaling 459 acres) would be designated on the Black Mesa and Lakeside Ranger Districts. For the areas being designated, approximately 45 acres are within the action area of any fish species. These 45 acres are located in the uppermost headwaters of Wildcat Canyon on the Black Mesa Ranger District, and they are 0.1-0.3 miles from the closest intermittent drainage. Wildcat Canyon flows for approximately 25 miles before it enters Chevelon Creek approximately 0.5 miles south of the ASNFs boundary. Given the distances from the potential activities associated with the 45 acres within the area, there are no potential impacts to any fish species downstream, and could potentially contribute only a very small impact to cumulative effects (45 acres compared to the analysis area of 173,048 acres).**

#### Cumulative Effects

Changes in the amounts and classifications of motorized routes, areas available and accessible for dispersed camping and big game retrieval would contribute to cumulative effects for this alternative. As with direct and indirect effects, cumulative impacts cannot be quantified specifically for fish species or their habitat for this analysis. Although unquantifiable to species and aquatic habitat, changes to the existing transportation system would contribute additional cumulative effects across the ASNFs. To provide an assessment for issue #3 and cumulative effects for each alternative, the total amount of roads being added and removed relative to the existing condition was determined for comparative purposes. For Apache trout there would be a 27% increase in open roads, and a 3% increase in closed roads. For Gila chub there would be a 21% increase in open roads, and a 2% increase in closed roads. For Gila trout there would be a 20% increase in open roads, and a 1% increase in closed roads. For loach minnow there would be a 17% increase in open roads, and a 5% increase in closed roads. For spikedace and razorback sucker there would be an 11% increase in open roads, and a 7% increase in closed roads. For roundtail chub there would be a 16% increase in open roads, and a 10% increase in closed roads. For Little Colorado spinedace and bluehead sucker there would be a 12% increase in open roads, and a 16% increase in closed roads. For desert and Sonora suckers there would be a 20% increase in open roads, and a 4% increase in closed roads. For the Little Colorado River sucker there would be an 8% increase in open roads, and a 19% increase in closed roads. For the longfin dace there would be a 9% increase in open roads, and a 9% increase in closed roads. This information, along with additional information, is summarized below in Table 1.

#### *Alternative B Summary*

This alternative would result in direct, indirect, and cumulative effects to all the 13 fish species being analyzed, with the only exception is that there would be no direct effects to the Little Colorado River sucker. Both short and long-term impacts from adding roads to the existing

transportation system could result in negative effects to Apache trout, Gila chub, Gila trout, loach minnow, roundtail chub, spikedace, Little Colorado spinedace, and razorback sucker. Beneficial effects to these same species could result from roads being closed, the prohibition of general cross-country travel, and reductions in the acres available for motorized big game retrieval and dispersed camping. Table 1 below summarizes impacts associated with changes in the motorized transportation to the thirteen threatened, endangered, candidate, and sensitive species for this alternative. **This alternative may affect, and is likely to adversely affect Apache trout, Gila chub and its critical habitat, Gila trout, loach minnow and its critical habitat, Little Colorado spinedace and its critical habitat, roundtail chub, and spikedace. For the razorback sucker, this alternative may affect, but is not likely to adversely affect this species or its critical habitat.** All the sensitive fish species would be similarly impacted by this alternative as described for the threatened, endangered, and candidate species above. Although the current population and habitat conditions for these species are largely unknown, it is unlikely that this alternative would trend toward federal listing or result in the loss of viability to any of these species. Impacts would be primarily indirect and cumulative, and impacts associated with increased sedimentation to the species habitat will be the greatest concern. Although these impacts cannot be quantified, most are within the uplands and are occur throughout the watersheds, and are not concentrated within the species habitats or drainages upstream. Therefore, for the sensitive fish species (bluehead sucker, desert sucker, longfin dace, Little Colorado River sucker, and Sonora sucker), this alternative may impact individuals or habitat but will not likely contribute to a trend toward federal listing or cause a loss of viability to the populations or species.

Table 1. Summary by species of road changes for Alternative B. Direct effects are within the species habitat (i.e. 250 meter buffer), and indirect effects are upstream or within the uplands that drain into the species habitat.

Alternative B Compared to the Existing Condition (Alternative A)	Direct		Indirect		Cumulative Effects		
	Roads Added	Roads Closed	Roads Added	Roads Closed	Roads Added	Roads Closed	Percent Change
Apache Trout	4.1	3.5	62.6	6.4	66.7	9.9	27/3
Gila Chub	0.4	0	16.4	0.6	16.8	0.6	21/2
Gila Trout	0.8	0	7.5	0.6	8.3	0.6	20/1
Loach Minnow	0.6	0.1	113.5	28.1	114.1	28.2	17/5
Razorback Sucker	0.3	0.1	36.2	12.9	36.5	13	11/7
Roundtail Chub	0.6	0.1	155.1	119.9	155.7	120	16/10
Spikedace	0.3	0.1	36.2	12.9	36.5	13	11/7
Little Colorado Spinedace	0.3	1.4	96.1	162.8	96.4	164.2	12/16
Bluehead Sucker	0.2	0.8	100.8	175.6	101	178.4	12/16
Desert Sucker	1.5	0.3	167.1	205.3	168.6	36.7	20/4
Longfin Dace	1.7	0.1	37.1	56.7	38.8	18	9/9
Little Colorado River Sucker	0	0	46.4	160.3	46.4	160.3	8/19
Sonora Sucker	1.5	0.3	167.1	205.3	168.6	36.7	20/4

### Alternative C

**This alternative would amend the ASNFs plan to prohibit general motorized cross-country travel on the 1,624,246 acres that are currently open to motorized cross-country travel. Cross-country motorized travel would continue to be allowed within one mile of all routes open to motorized use for big game retrieval. No areas or corridors are included within this**

alternative, but 28 miles of roads would be added to the transportation system to provide for dispersed camping.

*Continued Cross-country Motorized Travel for Big Game Retrieval*

Relative to Alternative A, 1,624,246 acres that are open to cross-country travel would no longer be open for use. Although motorized access for big game retrieval and dispersed camping would still be allowed, and as both of these are defined and determined by corridors for routes, the overall acreage for both activities will be reduced for this alternative. Specific reductions for each species and their action areas are discussed below.

Apache trout habitat on the ASNFs consists of 19 populations that contain a total of 145,591 acres on the Alpine and Springerville Ranger Districts. Motorized access for big game retrieval for this alternative (94,374 acres) is a 7% reduction from the existing condition of 101,698 acres. Gila chub habitat on the ASNFs consists of three populations that contain a total of 93,774 acres primarily on the Clifton Ranger District. Motorized access for big game retrieval for this alternative (37,054 acres) is a 59% reduction from the existing condition of 90,155 acres. Gila trout habitat on the ASNFs consists of seven populations that contain a total of 51,686 acres on the Alpine and Clifton Ranger Districts. Motorized access for big game retrieval for this alternative (14,386 acres) is a 16% reduction from the existing condition of 17,192 acres. Loach minnow habitat on the ASNFs consists of five populations that contain a total of 772,031 acres on the Alpine, Clifton, and Springerville Ranger Districts. Motorized access for big game retrieval for this alternative (240,796 acres) is a 56% reduction from the existing condition of 541,519 acres. For spikedace and razorback habitat on the ASNFs consists of two populations that contain a total of 528,470 acres on the Alpine and Clifton Ranger Districts. Motorized access for big game retrieval for this alternative (113,688 acres) is a 65% reduction from the existing condition of 327,513 acres. Roundtail chub habitat on the ASNFs consists of three populations that contain a total of 548,471 acres, and are located on the Alpine, Black Mesa, Clifton, and Springerville Ranger Districts. Motorized access for big game retrieval for this alternative (343,994 acres) is a 26% reduction from the existing condition of 467,625 acres. Little Colorado spinedace habitat on the ASNFs consists of five populations areas that contain a total of 341,373 acres on the Alpine, Black Mesa, and Springerville Ranger Districts. Motorized access for big game retrieval for this alternative (248,241 acres) is a 4% reduction from the existing condition of 258,753 acres.

Bluehead sucker habitat on the ASNFs consists of five populations that contain a total of 390,752 acres, which are located on the Alpine, Springerville, and Black Mesa Ranger Districts. Motorized access for big game retrieval for this alternative (272,291 acres) is a 4% reduction from the existing condition of 283,897 acres. Desert and Sonora sucker habitat on the ASNFs consists of six populations that contain a total of 853,944 acres on the Alpine, Clifton, and Springerville Ranger Districts. Motorized access for big game retrieval for this alternative (324,802 acres) is a 48% reduction from the existing condition of 619,558 acres. LCR sucker habitat on the ASNFs consists of three analysis areas that contain a total of 242,462 acres on the Black Mesa Ranger District. Motorized access for big game retrieval for this alternative (175,621 acres) is a 3% reduction from the existing condition of 180,951 acres. Longfin dace habitat on the ASNFs consists of five populations that contain a total of 639,090 acres on the Alpine and Clifton Ranger Districts. Motorized access for big game retrieval for this alternative (158,126 acres) is a 64% reduction from the existing condition of 434,912 acres.

Direct and indirect impacts associated with motorized cross-country travel are unknown, and cannot be determined for this alternative as well. Although specific impacts cannot be quantified, given the substantial reductions that would result in some areas; potential impacts and disturbance to fish species, riparian and aquatic habitat, and hydrologic conditions should be reduced. Species most likely to have positive effects would be the Gila chub, loach minnow, spikedace, roundtail chub, desert and Sonora suckers, and longfin dace.

#### *Designated Corridors for Motorized Travel for Dispersed Camping*

Under this alternative there would be no 300 foot corridors designated for the sole purpose of dispersed camping. Twenty-eight miles of roads are being added to provide for dispersed camping under this alternative, and are discussed below.

#### *Routes Being Added to the Transportation System*

##### **Direct and Indirect Effects for Threatened, Endangered and Candidate Species**

Under this alternative motorized routes (28 miles) are being added to the transportation system and no routes are being removed from the existing transportation system. For each species being analyzed the routes were quantified relative to their direct or indirect effects within the species analyses areas. Direct effects include route changes within the species habitat, and indirect effects include route changes upstream and within the uplands.

For Apache trout 0.3 miles of routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and no routes are being removed under this alternative. Routes being added with the potential for negative indirect impacts total 4.2 miles, for a total of 4.5 miles of routes being added to the transportation system that could impact this species. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. Streams and populations impacted would include Coleman Creek, Fish Creek, and Mineral Creek. Indirect impacts could also occur in all 19 of the Apache trout populations; and could include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.

For Gila chub 0.1 miles of routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and no routes are being removed under this alternative. Routes being added with the potential for negative indirect impacts total 0.3 miles, for a total of 0.4 miles of routes being added to the transportation system that could impact this species. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. Streams and populations impacted would only include East Eagle Creek. Indirect impacts could also occur in East Eagle Creek and Harden Cienega Creek; and could include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.

For Gila trout 0.3 miles of routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and no routes are being removed under this alternative. Routes being added with the potential for negative indirect impacts total 0.8 miles, for a total of 1.1 miles of routes being added to the transportation system that could impact this species. Direct negative impacts could include impacts to

individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. Streams and populations impacted would only include Castle/Buckalou Creeks and Coleman Creek. Indirect impacts could also occur in Castle/Buckalou Creeks, Coleman Creek and KP Creek; and could include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.

For loach minnow 0.2 miles of routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and no routes are being removed under this alternative. Routes being added with the potential for negative indirect impacts total 8.2 miles, for a total of 8.4 miles of routes being added to the transportation system that could impact this species. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. Streams and populations impacted would include the Campbell Blue Creek and Blue River. Indirect impacts could also occur in Campbell Blue Creek, Blue River, Eagle Creek, and North Fork East Fork Black River; and could include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.

For spinedace and razorback sucker 0.3 miles of routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and no routes are being removed under this alternative. Routes being added with the potential for negative indirect impacts total 3.7 miles, for a total of 4.0 miles of routes being added to the transportation system that could impact this species. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. No streams or populations would be impacted under this alternative. Indirect impacts could occur in the Blue River and Eagle Creek; and could include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.

For roundtail chub 0.1 miles of routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and no routes are being removed under this alternative. Routes being added with the potential for negative indirect impacts total 10.9 miles, for a total of 11.0 miles of routes being added to the transportation system that could impact this species. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. Streams and populations impacted would only include the Black River. Indirect impacts could also occur in Black River and Eagle Creek; and could include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.

For Little Colorado spinedace no routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and no routes are being removed under this alternative. Routes being added with the potential for negative indirect impacts total 4.4 miles, for a total of 4.4 miles of routes being added to the transportation system that could impact this species. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. No streams and populations would be directly impacted under this alternative. Indirect impacts could potentially occur in Nutrioso Creek; and could include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.

## **Direct and Indirect Effects for Sensitive Species**

**For bluehead sucker no routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and no routes are being removed under this alternative. Routes being added with the potential for negative indirect impacts total 5.5 miles, for a total of 5.5 miles of routes being added to the transportation system that could impact this species. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. No streams and populations would be directly impacted under this alternative. Indirect impacts could potentially occur in Willow Creek; and could include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.**

**For desert and Sonora sucker 0.9 miles of routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and no routes are being removed under this alternative. Routes being added with the potential for negative indirect impacts total 12.5 miles, for a total of 13.4 miles or routes being added to the transportation system that could impact this species. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. Streams and populations that could be directly impacted under this alternative are the Black River, Blue River, Campbell Blue Creek, and North Fork East Fork Black River. Indirect impacts could potentially occur in these same streams; and could include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.**

**For the Little Colorado River sucker no routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and no routes are being removed under this alternative. Routes being added with the potential for negative indirect impacts total 2.8 miles, for a total of 2.8 miles of routes being added to the transportation system that could impact this species. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. No streams and populations would be directly impacted under this alternative. Indirect impacts could potentially occur in Chevelon Creek, and could include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.**

**For longfin dace 0.5 miles of routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and no routes are being removed under this alternative. Routes being added with the potential for negative indirect impacts total 4.6 miles, for a total of 5.1 miles of routes being added to the transportation system that could impact this species. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. Streams and populations that could potentially be directly impacted under this alternative are the Blue River and Campbell Blue Creek. Indirect impacts could also occur in these same two streams; and could include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.**

## **Road Mileage Changes and Road Densities**

**Although 28 miles of roads are being added to the transportation system, these are short roads being added to access dispersed camping locations (1094 sites) across the ASNFs. The road distances added that impact species are discussed above, and do contribute to cumulative impacts; but these additions are not large enough to show any differences in road densities as compared to the existing condition (Alternative A). For the 28 miles of roads being added the following are the impacts by species: 4.5 miles for Apache trout, 0.4 miles for Gila chub, 1.1 miles for Gila trout, 8.4 miles for loach minnow, 4 miles for spikedace and razorback sucker, 11 miles for roundtail chub, 4.4 miles for Little Colorado spinedace, 5.5 miles for bluehead sucker, 13.4 miles for desert and Sonora sucker, 2.8 miles for Little Colorado River sucker, and 5.1 miles for longfin dace.**

**For the 28 miles of motorized routes being added for this alternative, only three of the 1094 roads would cross drainages. Two would cross ephemeral drainages, and one crosses an intermittent drainage. These three crossings occur in the headwaters of Castle Creek, which is a stream identified for recovery of Gila trout. The 1094 roads being added to access dispersed camping have an average length of 135 feet, with a maximum length of 566 feet.**

**Roads and their drainage crossings within the species action areas are important indicators of the potential extent of direct, indirect, and cumulative impacts to aquatic and riparian habitat when they occur within the watersheds where fish species or their habitat is present. Where they occur upstream of occupied habitat, increased sedimentation rates can impact downstream reaches, both short and long term; and the amounts and rates of additional sediment are dependent on several factors, and will vary in intensity and duration over time. No site specific information regarding the conditions and potential impacts to fish and their habitats for the existing crossings was available for the analysis other than location. As with roads, their crossings occur widely and sporadically throughout the landscape; precluding the ability to quantify their impacts individually, collectively, and cumulatively to fish and their habitat.**

#### Cumulative Effects

Changes in the amounts and classifications of motorized routes, areas available and accessible for dispersed camping and big game retrieval would contribute to cumulative effects for this alternative. As with direct and indirect effects, cumulative impacts cannot be quantified specifically for fish species or their habitat for this analysis. Although unquantifiable to species and aquatic habitat, changes to the existing transportation system would contribute additional cumulative effects across the ASNFs. To provide an assessment for issue #3 and cumulative effects for each alternative, the total amount of roads being added and removed relative to the existing condition was determined for comparative purposes. For Apache trout there would be a 2% increase in open roads, and no change in the amount of closed roads. For Gila chub there would be a 0.5% increase in open roads, and no change in the amount of closed roads. For Gila trout there would be a 3% increase in open roads, and no change in the amount of closed roads. For loach minnow there would be a 1% increase in open roads, and no change in the amount of closed roads. For spikedace and razorback sucker there would be a 1% increase in open roads, and no change in the amount of closed roads. For roundtail chub there would be a 1% increase in open roads, and no change in the amount of closed roads. For Little Colorado spinedace and bluehead sucker there would be a 0.6% increase in open roads, and no change in the amount of closed roads. For desert and Sonora suckers there would be a 2% increase in open roads, and no change in the amount of closed roads. For the Little Colorado River sucker there would be a 0.5% increase in open roads, and no change in the amount of closed roads. For longfin dace there

would be 1% increase in open roads, and no change in the amount of closed roads. This information, along with additional information, is summarized below in Table 2.

*Alternative C Summary*

This alternative would result in some minimal direct, indirect, and cumulative effects to all of the 13 fish species being analyzed, with the exceptions that there would be no direct effects to the Little Colorado River sucker, bluehead sucker, and Little Colorado spinedace. Both short and long-term impacts from adding roads to the existing transportation system could result in negative effects to Apache trout, Gila chub, Gila trout, loach minnow, razorback sucker, roundtail chub, spikedace, and Little Colorado spinedace. Beneficial effects to these same species could result from the prohibition of general cross-country travel (which includes dispersed camping), and reductions in the acres available for motorized big game retrieval. Table 2 below summarizes impacts associated with changes in the motorized transportation to the thirteen threatened, endangered, candidate, and sensitive species for this alternative. **This alternative may affect, and is likely to adversely affect Apache trout, Gila chub and its critical habitat, Gila trout, loach minnow and its critical habitat, Little Colorado spinedace and its critical habitat, roundtail chub, and spikedace. For the razorback sucker, this alternative may affect, but is not likely to adversely affect this species or its critical habitat.** All the sensitive fish species would be similarly impacted by this alternative as described for the threatened, endangered, and candidate species above. Although the current population and habitat conditions for these species are largely unknown, it is unlikely that this alternative would trend toward federal listing or result in the loss of viability to any of these species. Impacts would be primarily indirect and cumulative, and impacts associated with increased sedimentation to the species habitat would be the greatest concern. Although these impacts cannot be quantified, most are within the uplands and are occur throughout the watersheds, and are not concentrated within the species habitats or drainages upstream. Therefore, for the sensitive fish species (bluehead sucker, desert sucker, longfin dace, Little Colorado River sucker, and Sonora sucker), this alternative may impact individuals or habitat but will not likely contribute to a trend toward federal listing or cause a loss of viability to the populations or species.

Table 2. Summary by species of road changes for Alternative C. Direct effects are within the species habitat (i.e. 250 meter buffer), and indirect effects are upstream or within the uplands that drain into the species habitat.

Alternative C Compared to the Existing Condition (Alternative A)	Direct		Indirect		Cumulative Effects		
	Roads Added	Roads Closed	Roads Added	Roads Closed	Roads Added	Roads Closed	Percent Change
Apache Trout	0.3	0	4.2	0	4.5	0	2/0
Gila Chub	0.1	0	0.3	0	0.4	0	0.5/0
Gila Trout	0.3	0	0.8	0	1.1	0	3/0
Loach Minnow	0.2	0	8.2	0	8.4	0	1/0
Razorback Sucker	0.3	0	3.7	0	4.0	0	1/0
Roundtail Chub	0.1	0	10.9	0	11.0	0	1/0
Spikedace	0.3	0	3.7	0	4.0	0	1/0
Little Colorado Spinedace	0	0	4.4	0	4.4	0	0.6/0
Bluehead Sucker	0	0	5.5	0	5.5	0	0.6/0
Desert Sucker	0.9	0	12.5	0	13.4	0	2/0
Longfin Dace	0.5	0	4.6	0	5.1	0	1/0
Little Colorado River Sucker	0	0	2.8	0	2.8	0	0.5/0
Sonora Sucker	0.9	0	12.5	0	13.4	0	2/0

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## Alternative D

This alternative would result in an existing motorized transportation system that consists of 2,730 miles of roads, and 302 miles of trails. Compared to the existing condition (Alternative A), this is a decrease in roads of 102 miles (4%), and an increase in trails of 146 miles (94%). These changes are the result of opening or adding 415 miles of roads, and 146 miles of trails to the existing motorized transportation system; while closing 479 miles of roads currently open within the existing transportation system. This alternative would prohibit general cross-country motorized travel on the 1,624,246 acres where it is currently allowed; while maintaining cross-country travel for big game retrieval within one-quarter mile of any motorized road or trail within the proposed transportation system. This alternative includes five “Areas” that cover 459 acres on the Black Mesa and Lakeside Ranger Districts, and would provide for general cross-country motorized travel. This alternative would also include the designation of 2,034 miles of “Corridors”, which are for the sole purpose of providing for dispersed camping 300 feet from the edge of any authorized route.

### *Routes Being Added and Removed within the Transportation System*

#### **Direct and Indirect Effects for Threatened, Endangered and Candidate Species**

For this alternative motorized routes (415 miles of roads and 146 miles of trails) are being added to the road system and routes are being removed (479 miles) from the road system. For each species being analyzed the routes were quantified relative to their direct or indirect effects within the species analyses areas. Direct effects include route changes within the species habitat, and indirect effects include route changes upstream and within the uplands.

For Apache trout 5.3 miles of routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and 1.5 miles of routes are being removed that could result in direct positive impacts to this species. Routes being added with the potential for negative indirect impacts total 77.5 miles, and those with potential beneficial impacts that are being removed total 6.4 miles. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. Streams and populations impacted would include Boggy/Centerfire/Wildcat Creeks, Hayground Creek, East Fork Little Colorado River, Home Creek, Mineral Creek, Stinky Creek, and the West Fork Black River. Indirect impacts could occur in all 19 Apache trout populations, and would include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.

For Gila chub 0.3 miles of routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and no routes are being removed that could result in direct positive impacts to this species. Routes being added with the potential for negative indirect impacts total 16.1 miles, and those with potential beneficial impacts that are being removed total 0.6 miles. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. Streams and populations

impacted would include Dix Creek and Eagle Creek. Indirect impacts could occur in Dix Creek, Eagle Creek, and Harden Cienega Creek; and would include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.

For Gila trout 0.4 miles of routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and no routes are being removed that could result in direct positive impacts to this species. Routes being added with the potential for negative indirect impacts total 8.9 miles, and those with potential indirect beneficial impacts that are being removed total 1.4 miles. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. Streams and populations impacted would only include the Castle/Buckalou Creek watershed. Indirect impacts could also occur in the Castle/Buckalou and Coleman Creek watersheds; and would include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.

For loach minnow 1.1 miles of routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and 0.1 miles of routes are being removed that could result in direct positive impacts to this species. Routes being added with the potential for negative indirect impacts total 125.9 miles, and those with potential indirect beneficial impacts that are being removed total 28.6 miles. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. Streams and populations impacted would include the Blue River and Eagle Creek. In addition to those streams with direct impacts, indirect impacts could also occur in the Campbell Blue Creek and East Fork Black River; and would include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.

For spikedace and razorback sucker 0.8 miles of routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and 0.1 miles of routes are being removed that could result in direct positive impacts to this species. Routes being added with the potential for negative indirect impacts total 39.3 miles, and those with potential indirect beneficial impacts that are being removed total 12.4 miles. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. No streams or populations would be directly impacted. Indirect impacts could potentially occur in the Blue River and Eagle Creek, and would include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.

For roundtail chub 2.3 miles of routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and 0.1 miles of routes are being removed that could result in direct positive impacts to this species. Routes being added with the potential for negative indirect impacts total 192 miles, and those with potential indirect beneficial impacts that are being removed total 116 miles. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. No streams and populations would be directly impacted. Indirect impacts could also occur in the Black River, Chevelon Creek, and Eagle Creek; and would include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.

**For Little Colorado spinedace 0.3 miles of routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and 1.4 miles of routes are being removed that could result in direct positive impacts to this species. Routes being added with the potential for negative indirect impacts total 100.2 miles, and those with potential indirect beneficial impacts that are being removed total 165.6 miles. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. Streams and populations impacted would only include Nutrioso Creek. Indirect impacts could also occur in the Leonard Canyon, Nutrioso Creek, and West Chevelon Creek; and would include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.**

#### **Direct and Indirect Effects for Sensitive Species**

**For bluehead sucker 0.2 miles of routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and 2.6 miles of routes are being removed that could result in direct positive impacts to this species. Routes being added with the potential for negative indirect impacts total 126.7 miles, and those with potential indirect beneficial impacts that are being removed total 164.6 miles. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. No streams and populations would be directly impacted. Indirect impacts could also occur in Chevelon Creek, Leonard Canyon, and Willow Creek, and could include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.**

**For desert and Sonora sucker 3.3 miles of routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and 0.3 miles of routes are being removed that could result in direct positive impacts to this species. Routes being added with the potential for negative indirect impacts total 184.5 miles, and those with potential indirect beneficial impacts that are being removed total 34.5 miles. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. Streams and populations that could be directly impacted under this alternative are the Blue River, Eagle Creek, and the West Fork Black River. Indirect impacts could also potentially occur in these same streams along with the Black River, Campbell Blue Creek, North Fork East Fork Black River, and Pigeon Creek; and could include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.**

**For the Little Colorado River sucker no routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and no routes are being removed that could result in direct positive impacts to this species. Routes being added with the potential for negative indirect impacts total 48.2 miles, and those with potential indirect beneficial impacts that are being removed total 158.9 miles. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. No streams and populations would be directly impacted under this alternative. Indirect impacts could potentially occur in Chevelon Creek, Leonard Canyon, and Willow Creek; and could**

**include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.**

**For longfin dace 1.0 miles of routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and 0.1 miles of routes are being removed that could result in direct positive impacts to this species. Routes being added with the potential for negative indirect impacts total 41.8 miles, and those with potential indirect beneficial impacts that are being removed total 17.5 miles. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. Streams and populations that could potentially be directly impacted under this alternative are the Blue River and Eagle Creek. Indirect impacts could also occur in these same two streams along with Campbell Blue Creek, San Francisco River, and Pigeon Creek; and could include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.**

#### **Road Mileage Changes and Road Densities**

**Within the watersheds where Apache trout populations and their habitat occurs the amount of motorized routes open would increase 82.8 miles to a total of 326.5 miles, which is an increase of 34%. This would increase the open road density within the watersheds of Apache trout from a current density of 1.1 miles/square mile to a new density of 1.4 miles/square mile. Routes that are being closed to motorized use would increase 7.9 miles (2%), to the new total of 397 miles. This would increase the closed road density, but not enough to change from the current 1.7 miles/square mile. The routes being added would result in three road crossings, one each in the headwaters of Boggy, Home, and Wildcat Creeks.**

**Within the watersheds where Gila chub populations and their habitat occurs the amount of motorized routes open would increase 16.4 miles to a total of 97.8 miles, which is an increase of 20%. This would increase the open road density within the watersheds of Gila chub trout from a current density of 0.6 miles/square mile to a new density of 0.7 miles/square mile. Routes that are being closed to motorized use would increase 0.6 miles (2%), to the new total of 27.5 miles. This would increase the current closed road density, but not enough to change the existing density of 0.2 miles/square mile.**

**Within the watersheds where Gila trout populations and their habitat occurs the amount of motorized routes open would increase 9.3 miles to a total of 50.5 miles, which is an increase of 23%. This would increase the open road density within the watersheds of Gila trout from a current density of 0.5 miles/square mile to a new density of 0.6 miles/square mile. Routes that are being closed to motorized use would increase 1.4 miles (2%), to the new total of 58 miles. This slight increase would maintain the current road density of 0.7 miles/square mile.**

**Within the watersheds where loach minnow populations and their habitat occurs the amount of motorized routes open would increase 127 miles to a total of 779.4 miles, which is an increase of 19%. This would increase the open road density within the watersheds of loach minnow from a current density of 0.5 miles/square mile to a new density of 0.6 miles/square mile. Routes that are being closed to motorized use would increase 28.7 miles (5%), to the new total of 576.5 miles. This slight increase would maintain the current road density, which is 0.5 miles/square mile.**

Within the watersheds where spinedace and razorback sucker populations and their habitat occurs the amount of motorized routes open would increase 40.1 miles to a total of 386.9 miles, which is an increase of 12%. This would increase the open road density within the watersheds of spinedace and razorback sucker from a current density of 0.4 miles/square mile to a new density of 0.5 miles/square mile. Routes that are being closed to motorized use would increase 12.5 miles (7%), to the new total of 203.7 miles. This minimal increase would maintain the current road density, which is 0.2 miles/square mile.

Within the watersheds where roundtail chub populations and their habitat occurs the amount of motorized routes open would increase 194.3 miles to a total of 1143.8 miles, which is an increase of 20%. This would increase the open road density within the watersheds of roundtail chub from a current density of 1.1 miles/square mile to a new density of 1.3 miles/square mile. Routes that are being closed to motorized use would increase 116.1 miles (9%), to the new total of 1377.3 miles. This would increase the closed road density from 1.5 miles/square mile to 1.6 miles/square mile.

Within the watersheds where Little Colorado spinedace populations and their habitat occurs the amount of motorized routes open would increase 100.5 miles to a total of 884.9 miles, which is an increase of 13%. This would increase the open road density within the watersheds of Little Colorado spinedace from a current density of 1.5 miles/square mile to a new density of 1.7 miles/square mile. Routes that are being closed to motorized use would increase 167 miles (16%), to the new total of 1205.8 miles. This would increase the closed road density from 1.9 miles/square mile to 2.3 miles/square mile.

Within the watersheds where bluehead sucker populations and their habitat occurs the amount of motorized routes open would increase 126.9 miles to a total of 996.8 miles, which is an increase of 15%. This would increase the open road density within the watersheds of bluehead sucker from a current density of 1.4 miles/square mile to a new density of 1.6 miles/square mile. Routes that are being closed to motorized use would increase 167.2 miles (15%), to the new total of 1292.7 miles. This would increase the closed road density from 1.8 miles/square mile to 2.1 miles/square mile.

Within the watersheds where desert and Sonora sucker populations and their habitat occurs the amount of motorized routes open would increase 187.8 miles to a total of 1,033.5 miles, which is an increase of 22%. This would increase the open road density within the watersheds of desert and Sonora sucker from a current density of 0.6 miles/square mile to a new density of 0.8 miles/square mile. Routes that are being closed to motorized use would increase 34.8 miles (4%), to the new total of 1,009.1 miles. This would increase the closed road density from 0.7 miles/square mile to 0.8 miles/square mile.

Within the watersheds where Little Colorado sucker populations and their habitat occurs the amount of motorized routes open would increase 48.2 miles to a total of 664.1 miles, which is an increase of 8%. This would increase the open road density within the watersheds of Little Colorado River sucker from a current density of 1.6 miles/square mile to a new density of 1.8 miles/square mile. Routes that are being closed to motorized use would increase 158.9 miles (19%), to the new total of 996.3 miles. This would increase the closed road density from 2.2 miles/square mile to 2.6 miles/square mile.

Within the watersheds where longfin dace populations and their habitat occurs the amount of motorized routes open would increase 42.8 miles to a total of 485 miles, which is an

increase of 10%. This would increase the open road density within the watersheds of longfin dace from a current density of 0.4 miles/square mile to a new density of 0.5 miles/square mile. Routes that are being closed to motorized use would increase 17.6 miles (9%), to the new total of 218.8 miles. This increase would maintain the current road density, which is 0.2 miles/square mile.

Roads and their drainage crossings within the species action areas are important indicators of the potential extent of direct, indirect, and cumulative impacts to aquatic and riparian habitat when they occur within the watersheds where fish species or their habitat is present. Where they occur upstream of occupied habitat, increased sedimentation rates can impact downstream reaches, both short and long term; and the amounts and rates of additional sediment are dependent on several factors, and will vary in intensity and duration over time. No site specific information regarding the conditions and potential impacts to fish and their habitats for the existing crossings was available for the analysis other than location. As with roads, their crossings occur widely and sporadically throughout the landscape; precluding the ability to quantify their impacts individually, collectively, and cumulatively to fish and their habitat.

#### *Continued Cross-country Motorized Travel for Big Game Retrieval*

Relative to Alternative A, the 1,624,246 acres that are open to cross-country travel would no longer be open for use. Although motorized access for big game retrieval and dispersed access would still be allowed, and as both of these are defined and determined by corridors from routes, the overall acreage for both activities would be reduced for this alternative. Specific reductions for each species and their action areas are discussed below. For this alternative, big game retrieval is being considered for a distance of one-quarter mile from any authorized route, while Alternatives B and C considered a distance of one mile.

Apache trout habitat on the ASNFs consists of 19 analysis (i.e., populations) areas that contain a total of 145,591 acres on the Alpine and Springerville Ranger Districts. Motorized access for big game retrieval for this alternative (61,478 acres) is a 40% reduction from the existing condition of 101,698 acres. Gila chub habitat on the ASNFs consists of three action areas that contain a total of 93,774 acres primarily on the Clifton Ranger District. Motorized access for big game retrieval for this alternative (18,406 acres) is a 80% reduction from the existing condition of 90,155 acres. Gila trout habitat on the ASNFs consists of seven analysis areas that contain a total of 51,686 acres on the Alpine and Clifton Ranger Districts. Motorized access for big game retrieval for this alternative (10,511 acres) is a 39% reduction from the existing condition of 17,192 acres. Loach minnow habitat on the ASNFs consists of five analysis areas that contain a total of 772,031 acres on the Alpine, Clifton, and Springerville Ranger Districts. Motorized access for big game retrieval for this alternative (137,247 acres) is a 75% reduction from the existing condition of 541,519 acres. For spikedeace and razorback habitat on the ASNFs consists of two analysis areas that contain a total of 528,470 acres on the Alpine and Clifton Ranger Districts. Motorized access for big game retrieval for this alternative (63,422 acres) is a 81% reduction from the existing condition of 327,513 acres. Roundtail chub habitat on the ASNFs consists of three analysis areas that contain a total of 548,471 acres, and are located on the Alpine, Black Mesa, Clifton, and Springerville Ranger Districts. Motorized access for big game retrieval for this alternative (199,847 acres) is a 57% reduction from the existing condition of 467,625 acres. Little Colorado spinedace habitat on the ASNFs consists of five analysis areas that contain a total of 341,373 acres on the Alpine, Black

**Mesa, and Springerville Ranger Districts. Motorized access for big game retrieval for this alternative (137,069 acres) is a 47% reduction from the existing condition of 258,753 acres.**

**Bluehead sucker habitat on the ASNFs consists of five analysis areas that contain a total of 390,752 acres, which are located on the Alpine, Springerville, and Black Mesa Ranger Districts. Motorized access for big game retrieval for this alternative (153,692 acres) is a 46% reduction from the existing condition of 283,897 acres. Desert and Sonora sucker habitat on the ASNFs consists of six analysis areas that contain a total of 853,944 acres on the Alpine, Clifton, and Springerville Ranger Districts. Motorized access for big game retrieval for this alternative (187,857 acres) is a 70% reduction from the existing condition of 619,558 acres. LCR sucker habitat on the ASNFs consists of three analysis areas that contain a total of 242,462 acres on the Black Mesa Ranger District. Motorized access for big game retrieval for this alternative (97,616 acres) is a 46% reduction from the existing condition of 180,951 acres. Longfin dace habitat on the ASNFs consists of five analysis areas that contain a total of 639,090 acres on the Alpine and Clifton Ranger Districts. Motorized access for big game retrieval for this alternative (81,461 acres) is a 81% reduction from the existing condition of 434,912 acres.**

*Designated Corridors for Motorized Travel for Dispersed Camping Access*

**Apache trout habitat on the ASNFs consists of 19 analysis (i.e., populations) areas that contain a total of 145,591 acres on the Alpine and Springerville Ranger Districts. Motorized access for dispersed camping for this alternative (14,975 acres) is a 85% reduction from the existing condition of 101,698 acres. Gila chub habitat on the ASNFs consists of three action areas that contain a total of 93,774 acres primarily on the Clifton Ranger District. Motorized access for dispersed camping for this alternative (3,259 acres) is a 96% reduction from the existing condition of 90,155 acres. Gila trout habitat on the ASNFs consists of seven analysis areas that contain a total of 51,686 acres on the Alpine and Clifton Ranger Districts. Motorized access for dispersed camping for this alternative (2,778 acres) is a 84% reduction from the existing condition of 17,192 acres. Loach minnow habitat on the ASNFs consists of five analysis areas that contain a total of 772,031 acres on the Alpine, Clifton, and Springerville Ranger Districts. Motorized access for dispersed camping for this alternative (33,033 acres) is a 94% reduction from the existing condition of 541,519 acres. For spikedace and razorback habitat on the ASNFs consists of two analysis areas that contain a total of 528,470 acres on the Alpine and Clifton Ranger Districts. Motorized access for dispersed camping for this alternative (15,436 acres) is a 95% reduction from the existing condition of 327,513 acres. Roundtail chub habitat on the ASNFs consists of three analysis areas that contain a total of 548,471 acres, and are located on the Alpine, Black Mesa, Clifton, and Springerville Ranger Districts. Motorized access for dispersed camping for this alternative (46,450 acres) is a 90% reduction from the existing condition of 467,625 acres. Little Colorado spinedace habitat on the ASNFs consists of five analysis areas that contain a total of 341,373 acres on the Alpine, Black Mesa, and Springerville Ranger Districts. Motorized access for dispersed camping for this alternative (32,487 acres) is a 87% reduction from the existing condition of 258,753 acres.**

**Bluehead sucker habitat on the ASNFs consists of five analysis areas that contain a total of 390,752 acres, which are located on the Alpine, Springerville, and Black Mesa Ranger Districts. Motorized access for dispersed camping for this alternative (37,159 acres) is a 87% reduction from the existing condition of 283,897 acres. Desert and Sonora sucker habitat on the ASNFs consists of six analysis areas that contain a total of 853,944 acres on the Alpine, Clifton, and Springerville Ranger Districts. Motorized access for dispersed**

**camping for this alternative (44,597 acres) is a 93% reduction from the existing condition of 619,558 acres. LCR sucker habitat on the ASNFs consists of three analysis areas that contain a total of 242,462 acres on the Black Mesa Ranger District. Motorized access for dispersed camping for this alternative (24,610 acres) is an 86% reduction from the existing condition of 180,951 acres. Longfin dace habitat on the ASNFs consists of five analysis areas that contain a total of 639,090 acres on the Alpine and Clifton Ranger Districts. Motorized access for dispersed camping for this alternative (20,080 acres) is a 96% reduction from the existing condition of 463,912 acres.**

**As described above, substantial reductions in acreages available for dispersed camping would occur within all the action areas for all the fish species being analyzed. Although specific impacts cannot be quantified, given the substantial reductions that would result throughout the ASNFs; potential impacts and disturbance to fish species, riparian and aquatic habitat, and hydrologic conditions should be reduced.**

#### *Areas Open to all Motorized Vehicles*

**Under this alternative, five motorized use areas (totaling 459 acres) would be designated on the Black Mesa and Lakeside Ranger Districts. For the areas being designated, approximately 45 acres are within the action area of any fish species. These 45 acres are located in the uppermost headwaters of Wildcat Canyon on the Black Mesa Ranger District, and they are 0.1-0.3 miles from the closest intermittent drainage. Wildcat Canyon flows for approximately 25 miles before it enters Chevelon Creek approximately 0.5 miles south of the ASNFs boundary. Given the distances from the potential activities associated with the 45 acres within the area, there are no potential impacts to any fish species downstream, and would contribute only a very small impact to cumulative effects (45 acres compared to the analysis area of 173,048 acres).**

#### Cumulative Effects

Changes in the amounts and classifications of motorized routes, areas available and accessible for dispersed camping and big game retrieval would contribute to cumulative effects for this alternative. As with direct and indirect effects, cumulative impacts cannot be quantified specifically for fish species or their habitat for this analysis. Although unquantifiable to species and aquatic habitat, changes to the existing transportation system would contribute additional cumulative effects across the ASNFs. To provide an assessment for issue #3 and cumulative effects for each alternative, the total amount of roads being added and removed relative to the existing condition was determined for comparative purposes. For Apache trout there would be a 34% increase in open roads, and a 2% increase in closed roads. For Gila chub there would be a 20% increase in open roads, and a 2% increase in closed roads. For Gila trout there would be a 23% increase in open roads, and a 2% increase in closed roads. For loach minnow there would be a 19% increase in open roads, and a 5% increase in closed roads. For spikedace and razorback sucker there would be an 11% increase in open roads, and a 7% increase in closed roads. For roundtail chub there would be a 20% increase in open roads, and a 9% increase in closed roads. For Little Colorado spinedace sucker there would be a 13% increase in open roads, and a 16% increase in closed roads. For bluehead sucker there would be a 15% increase in open roads, and a 15% increase in closed roads. For desert and Sonora suckers there would be a 22% increase in open roads, and a 4% increase in closed roads. For the Little Colorado River sucker there would be an 8% increase in open roads, and a 19% increase in closed roads. For longfin dace there would be a 10% increase in open roads, and a 9% increase in closed roads. This information, along with additional information, is summarized below in Table 3.

*Alternative D Summary*

This alternative would result in direct, indirect, and cumulative effects to all the 13 fish species being analyzed, with the only exception is that there would be no direct effects to the Little Colorado River sucker. Both short and long-term impacts from adding roads to the existing transportation system could result in negative effects to Apache trout, Gila chub, Gila trout, loach minnow, roundtail chub, spokedace, Little Colorado spinedace, and razorback sucker. Beneficial effects to these same species could result from roads being closed, the prohibition of general cross-country travel, and reductions in the acres available for motorized big game retrieval and dispersed camping. Table 3 below summarizes impacts associated with changes in the motorized transportation to the thirteen threatened, endangered, candidate, and sensitive species for this alternative. **This alternative may affect, and is likely to adversely affect Apache trout, Gila chub and its critical habitat, Gila trout, loach minnow and its critical habitat, Little Colorado spinedace and its critical habitat, roundtail chub, and spokedace. For the razorback sucker, this alternative may affect, but is not likely to adversely affect this species or its critical habitat.** All the sensitive fish species would be similarly impacted by this alternative as described for the threatened, endangered, and candidate species above. Although the current population and habitat conditions for these species are largely unknown, it is unlikely that this alternative would trend toward federal listing or result in the loss of viability to any of these species. Impacts would be primarily indirect and cumulative, and impacts associated with increased sedimentation to the species habitat will be the greatest concern. Although these impacts cannot be quantified, most are within the uplands and are occur throughout the watersheds, and are not concentrated within the species habitats or drainages upstream. Therefore, for the sensitive fish species (bluehead sucker, desert sucker, longfin dace, Little Colorado River sucker, and Sonora sucker), this alternative may impact individuals or habitat but will not likely contribute to a trend toward federal listing or cause a loss of viability to the populations or species.

Table 3. Summary by species of road changes for Alternative D. Direct effects are within the species habitat (i.e. 250 meter buffer), and indirect effects are upstream or within the uplands that drain into the species habitat.

Alternative D Compared to the Existing Condition (Alternative A)	Direct		Indirect		Cumulative Effects		
	Roads Added	Roads Closed	Roads Added	Roads Closed	Roads Added	Roads Closed	Percent Change
Apache Trout	5.3	1.5	77.5	6.4	82.8	7.9	34/2
Gila Chub	0.3	0	16.1	0.6	16.4	0.6	20/2
Gila Trout	0.4	0	8.9	1.4	9.3	1.4	23/2
Loach Minnow	1.1	0.1	125.9	28.6	127	28.7	19/5
Razorback Sucker	0.8	0.1	39.3	12.4	40.1	12.5	12/7
Roundtail Chub	2.3	0.1	192	116	194.3	116.1	20/9
Spikedace	0.8	0.1	39.3	12.4	36.5	13	11/7
Little Colorado Spinedace	0.3	1.4	100.2	165.6	100.5	167	13/16
Bluehead Sucker	0.2	2.6	126.7	164.6	126.9	167.2	15/15
Desert Sucker	3.3	0.3	184.5	34.5	187.8	34.8	22/4
Longfin Dace	1.0	0.1	41.8	17.5	42.8	17.6	10/9
Little Colorado River Sucker	0	0	48.2	158.9	48.2	158.9	8/19
Sonora Sucker	3.3	0.3	184.5	34.5	187.8	34.8	22/4

## **Alternative E**

**This alternative would result in an existing motorized transportation system that consists of 2,473 miles of roads, and 205 miles of trails. Compared to the existing condition (Alternative A), this is a decrease in roads of 359 miles (13%), and an increase in trails of 49 miles (31%). These changes are the result of opening or adding 220 miles of roads, and 49 miles of trails to the existing motorized transportation system; while closing 559 miles of roads currently open within the existing transportation system. This alternative would prohibit general cross-country motorized travel on the 1,624,246 acres where it is currently allowed; and would not provide cross-country travel for big game retrieval. This alternative would also not include any “Areas” that would provide for general cross-country motorized travel. This alternative would include the designation of 118 miles of “Corridors”, which are for the sole purpose of providing for dispersed camping 300 feet from the edge of any authorized route.**

### *Routes Being Added and Removed to the Transportation System*

#### **Direct and Indirect Effects for Threatened, Endangered, and Candidate Species**

**For this alternative motorized routes (220 miles of roads and 49 miles of trails) are being added to the road system and routes are being removed (559 miles) from the road system. For each species being analyzed the routes were quantified relative to their direct or indirect effects within the species analyses areas. Direct effects include route changes within the species habitat, and indirect effects include route changes upstream and within the uplands.**

**For Apache trout 1.8 miles of routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and 2.8 miles of routes are being removed that could result in direct positive impacts to this species. Routes being added with the potential for negative indirect impacts total 25.8 miles, and those with potential indirect beneficial impacts that are being removed total 15.3 miles. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. Streams and populations impacted would include Boggy/Centerfire/Wildcat Creeks and Mineral Creek. Indirect impacts could occur in all 19 Apache trout populations, and would include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.**

**For Gila chub 0.1 miles of routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and 0.8 miles of routes are being removed that could result in direct positive impacts to this species. Routes being added with the potential for negative indirect impacts total 12.4 miles, and those with potential indirect beneficial impacts that are being removed total 3.9 miles. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. No streams and populations would be directly impacted. Indirect impacts could occur in Dix Creek, Eagle Creek, and Harden Cienega Creek; and would include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.**

**For Gila trout 0.2 miles of routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and 0.4 miles of routes are**

being removed that could result in direct positive impacts to this species. Routes being added with the potential for negative indirect impacts total 1.9 miles, and those with potential indirect beneficial impacts that are being removed total 0.9 miles. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. Streams and populations impacted would only include Castle/Buckalou Creek and Coleman Creek. Indirect impacts could also occur in Castle/Buckalou Creeks, Coleman Creek, and KP Creek; and would include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.

For loach minnow 0.5 miles of routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and 7.7 miles of routes are being removed that could result in direct positive impacts to this species. Routes being added with the potential for negative indirect impacts total 67.3 miles, and those with potential indirect beneficial impacts that are being removed total 38.4 miles. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. Streams and populations impacted would include the Blue River and Campbell Blue Creek. In addition to those streams with direct impacts, indirect impacts could also occur in the Eagle Creek and East Fork Black River; and would include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.

For spikedace and razorback sucker 0.4 miles of routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and 0.7 miles of routes are being removed that could result in direct positive impacts to this species. Routes being added with the potential for negative indirect impacts total 17.8 miles, and those with potential indirect beneficial impacts that are being removed total 27.5 miles. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. No streams or populations would be directly impacted. Indirect impacts could potentially occur in the Blue River and Eagle Creek, and would include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.

For roundtail chub 0.3 miles of routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and 0.1 miles of routes are being removed that could result in direct positive impacts to this species. Routes being added with the potential for negative indirect impacts total 84.1 miles, and those with potential indirect beneficial impacts that are being removed total 155.3 miles. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. No streams and populations would be directly impacted. Indirect impacts could also occur in the Black River, Chevelon Creek, and Eagle Creek; and would include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.

For Little Colorado spinedace no routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and 1.7 miles of routes are being removed that could result in direct positive impacts to this species. Routes being added with the potential for negative indirect impacts total 53 miles, and those with potential indirect beneficial impacts that are being removed total 191.3 miles. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss

and alteration of riparian vegetation, and degraded habitat and water quality. No streams and populations would be directly impacted Creek. Indirect impacts could also occur in Leonard Canyon, Nutrioso Creek, West Chevelon Creek, and Willow Creek; and would include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.

#### **Direct and Indirect Effects for Sensitive Species**

For bluehead sucker 0.2 miles of routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and 3.1 miles of routes are being removed that could result in direct positive impacts to this species. Routes being added with the potential for negative indirect impacts total 59.4 miles, and those with potential indirect beneficial impacts that are being removed total 196.6 miles. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. No streams and populations would be directly impacted. Indirect impacts could also occur in Leonard Canyon and Willow Creek, and could include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.

For desert and Sonora sucker 1.1 miles of routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and 7.8 miles of routes are being removed that could result in direct positive impacts to this species. Routes being added with the potential for negative indirect impacts total 85.5 miles, and those with potential indirect beneficial impacts that are being removed total 69.1 miles. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. Streams and populations that could be directly impacted under this alternative are the Blue River and Campbell Blue Creek. Indirect impacts could also potentially occur in these same streams along with the Black River, Eagle Creek, and North Fork East Fork Black River; and could include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.

For the Little Colorado River sucker no routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and no routes are being removed that could result in direct positive impacts to this species. Routes being added with the potential for negative indirect impacts total 35.2 miles, and those with potential indirect beneficial impacts that are being removed total 183.8 miles. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. No streams and populations would be directly impacted under this alternative. Indirect impacts could potentially occur in Chevelon Creek, Leonard Canyon, and Willow Creek; and could include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.

For longfin dace 0.5 miles of routes are being added to the transportation system that could result in direct negative impacts to the species and/or habitat, and 7.8 miles of routes are being removed that could result in direct positive impacts to this species. Routes being added with the potential for negative indirect impacts total 26 miles, and those with potential indirect beneficial impacts that are being removed total 36.6 miles. Direct negative impacts could include impacts to individuals, changes in channel morphology, loss and alteration of riparian vegetation, and degraded habitat and water quality. Streams and

populations that could potentially be directly impacted under this alternative are the Blue River and Campbell Blue Creek. Indirect impacts could also occur in these same two streams along with Eagle Creek and San Francisco River, and could include changes in habitat conditions and impacts to species from increased sedimentation and alterations in water quality.

#### **Road Mileage Changes and Road Densities**

Within the watersheds where Apache trout populations and their habitat occurs the amount of motorized routes open would increase 27.6 miles to a total of 271.3 miles, which is an increase of 11%. This would increase the open road density within the watersheds of Apache trout from a current density of 1.1 miles/square mile to a new density of 1.2 miles/square mile. Routes that are being closed to motorized use would increase 18.1 miles (5%), to the new total of 407.2 miles. This would increase the closed road density from the current 1.7 miles/square mile to 1.8 miles/square mile. The routes being added would result in three road crossings, one each in the headwaters of Boggy, Home, and Wildcat Creeks.

Within the watersheds where Gila chub populations and their habitat occurs the amount of motorized routes open would increase 12.5 miles to a total of 93.9 miles, which is an increase of 15%. This would increase the open road density within the watersheds of Gila chub trout, but would not change the current density of 0.6 miles/square mile. Routes that are being closed to motorized use would increase 4.7 miles (17%), to the new total of 31.6 miles. This would increase the current closed road density, but not enough to change the existing density of 0.2 miles/square mile.

Within the watersheds where Gila trout populations and their habitat occurs the amount of motorized routes open would increase 2.1 miles to a total of 43.3 miles, which is an increase of 5%. This would increase the open road density within the watersheds of Gila trout, but not change from a current density of 0.5 miles/square mile. Routes that are being closed to motorized use would increase 1.3 miles (2%), to the new total of 57.9 miles. This slight increase would maintain the current road density of 0.7 miles/square mile.

Within the watersheds where loach minnow populations and their habitat occurs the amount of motorized routes open would increase 67.8 miles to a total of 720.2 miles, which is an increase of 10%. This would increase the open road density within the watersheds of loach minnow from a current density of 0.5 miles/square mile to a new density of 0.6 miles/square mile. Routes that are being closed to motorized use would increase 46.1 miles (8%), to the new total of 593.9 miles. This increase would maintain the current road density, which is 0.5 miles/square mile.

Within the watersheds where spikedace and razorback sucker populations and their habitat occurs the amount of motorized routes open would increase 18.2 miles to a total of 365 miles, which is an increase of 5%. This would increase the open road density within the watersheds of spikedace and razorback sucker, but not enough to change the current density of 0.4 miles/square mile. Routes that are being closed to motorized use would increase 28.2 miles (15%), to the new total of 219.4 miles. This would increase the current road density of 0.2 miles/square mile, to 0.3 miles/square mile.

Within the watersheds where roundtail chub populations and their habitat occurs the amount of motorized routes open would increase 84.4 miles to a total of 1033.9 miles, which is an increase of 9%. This would increase the open road density within the watersheds of

roundtail chub from a current density of 1.1 miles/square mile to a new density of 1.2 miles/square mile. Routes that are being closed to motorized use would increase 155.4 miles (12%), to the new total of 1,416.6 miles. This would increase the closed road density from 1.5 miles/square mile to 1.7 miles/square mile.

Within the watersheds where Little Colorado spinedace populations and their habitat occurs the amount of motorized routes open would increase 53 miles to a total of 837.4 miles, which is an increase of 7%. This would increase the open road density within the watersheds of Little Colorado spinedace from a current density of 1.5 miles/square mile to a new density of 1.6 miles/square mile. Routes that are being closed to motorized use would increase 193 miles (19%), to the new total of 1,231.8 miles. This would increase the closed road density from 1.9 miles/square mile to 2.3 miles/square mile.

Within the watersheds where bluehead sucker populations and their habitat occurs the amount of motorized routes open would increase 59.6 miles to a total of 929.5 miles, which is an increase of 7%. This would increase the open road density within the watersheds of bluehead sucker from a current density of 1.4 miles/square mile to a new density of 1.5 miles/square mile. Routes that are being closed to motorized use would increase 199.7 miles (18%), to the new total of 1,325.2 miles. This would increase the closed road density from 1.8 miles/square mile to 2.2 miles/square mile.

Within the watersheds where desert and Sonora sucker populations and their habitat occurs the amount of motorized routes open would increase 86.6 miles to a total of 932.3 miles, which is an increase of 10%. This would increase the open road density within the watersheds of desert and Sonora sucker from a current density of 0.6 miles/square mile to a new density of 0.7 miles/square mile. Routes that are being closed to motorized use would increase 76.9 miles (8%), to the new total of 1,051.2 miles. This would increase the closed road density from 0.7 miles/square mile to 0.8 miles/square mile.

Within the watersheds where Little Colorado sucker populations and their habitat occurs the amount of motorized routes open would increase 35.2 miles to a total of 651.1 miles, which is an increase of 6%. This would increase the open road density within the watersheds of Little Colorado River sucker from a current density of 1.6 miles/square mile to a new density of 1.7 miles/square mile. Routes that are being closed to motorized use would increase 183.8 miles (22%), to the new total of 1,021.2 miles. This would increase the closed road density from 2.2 miles/square mile to 2.7 miles/square mile.

Within the watersheds where longfin dace populations and their habitat occurs the amount of motorized routes open would increase 26.5 miles to a total of 468.7 miles, which is an increase of 6%. This would increase the open road density within the watersheds of longfin dace from a current density of 0.4 miles/square mile to a new density of 0.5 miles/square mile. Routes that are being closed to motorized use would increase 44.4 miles (22%), to the new total of 245.6 miles. This increase, although 22%, would maintain the current road density of 0.2 miles/square mile.

Roads and their drainage crossings within the species action areas are important indicators of the potential extent of direct, indirect, and cumulative impacts to aquatic and riparian habitat when they occur within the watersheds where fish species or their habitat is present. Where they occur upstream of occupied habitat, increased sedimentation rates can impact downstream reaches, both short and long term; and the amounts and rates of additional sediment are dependent on several factors, and will vary in intensity and duration over

time. No site specific information regarding the conditions and potential impacts to fish and their habitats for the existing crossings was available for the analysis other than location. As with roads, their crossings occur widely and sporadically throughout the landscape; precluding the ability to quantify their impacts individually, collectively, and cumulatively to fish and their habitat.

*Designated Corridors for Motorized Travel for Dispersed Camping Access*

Apache trout habitat on the ASNFs consists of 19 analysis (i.e., populations) areas that contain a total of 145,591 acres on the Alpine and Springerville Ranger Districts. Motorized access for dispersed camping for this alternative does not include any acres with the potential to impact Apache trout, which is a 100% reduction from the existing condition of 101,698 acres. Gila chub habitat on the ASNFs consists of three action areas that contain a total of 93,774 acres primarily on the Clifton Ranger District. Motorized access for dispersed camping for this alternative (880 acres) is a 99% reduction from the existing condition of 90,155 acres. Gila trout habitat on the ASNFs consists of seven analysis areas that contain a total of 51,686 acres on the Alpine and Clifton Ranger Districts. Motorized access for dispersed camping for this alternative does not include any acreage that could potentially impact Gila trout, compared to the existing condition of 17,192 acres. Loach minnow habitat on the ASNFs consists of five analysis areas that contain a total of 772,031 acres on the Alpine, Clifton, and Springerville Ranger Districts. Motorized access for dispersed camping for this alternative (3,152 acres) is a 99% reduction from the existing condition of 541,519 acres. For spikedace and razorback habitat on the ASNFs consists of two analysis areas that contain a total of 528,470 acres on the Alpine and Clifton Ranger Districts. Motorized access for dispersed camping for this alternative (2,344 acres) is a 99% reduction from the existing condition of 327,513 acres. Roundtail chub habitat on the ASNFs consists of three analysis areas that contain a total of 548,471 acres, and are located on the Alpine, Black Mesa, Clifton, and Springerville Ranger Districts. Motorized access for dispersed camping for this alternative (3,137 acres) is a 99% reduction from the existing condition of 467,625 acres. Little Colorado spinedace habitat on the ASNFs consists of five analysis areas that contain a total of 341,373 acres on the Alpine, Black Mesa, and Springerville Ranger Districts. Motorized access for dispersed camping for this alternative (2,478 acres) is a 99% reduction from the existing condition of 258,753 acres.

Bluehead sucker habitat on the ASNFs consists of five analysis areas that contain a total of 390,752 acres, which are located on the Alpine, Springerville, and Black Mesa Ranger Districts. Motorized access for dispersed camping for this alternative (2,478 acres) is a 99% reduction from the existing condition of 283,897 acres. Desert and Sonora sucker habitat on the ASNFs consists of six analysis areas that contain a total of 853,944 acres on the Alpine, Clifton, and Springerville Ranger Districts. Motorized access for dispersed camping for this alternative (3,152 acres) is a 99% reduction from the existing condition of 619,558 acres. LCR sucker habitat on the ASNFs consists of three analysis areas that contain a total of 242,462 acres on the Black Mesa Ranger District. Motorized access for dispersed camping for this alternative (2,478 acres) is a 99% reduction from the existing condition of 180,951 acres. Longfin dace habitat on the ASNFs consists of five analysis areas that contain a total of 639,090 acres on the Alpine and Clifton Ranger Districts. Motorized access for dispersed camping for this alternative (3,152 acres) is a 99% reduction from the existing condition of 463,912 acres.

As described above, substantial reductions in acreages available for dispersed camping would occur within all the action areas for all the fish species being analyzed. Although

**specific impacts cannot be quantified, given the substantial reductions that would result throughout the ASNFs; potential impacts and disturbance to fish species, riparian and aquatic habitat, and hydrologic conditions should be reduced.**

#### Cumulative Effects

Changes in the amounts and classifications of motorized routes, areas available and accessible for dispersed camping and big game retrieval would contribute to cumulative effects for this alternative. As with direct and indirect effects, cumulative impacts cannot be quantified specifically for fish species or their habitat for this analysis. Although unquantifiable to species and aquatic habitat, changes to the existing transportation system would contribute additional cumulative effects across the ASNFs. To provide an assessment for issue #3 and cumulative effects for each alternative, the total amount of roads being added and removed relative to the existing condition was determined for comparative purposes. For Apache trout there would be a 11% increase in open roads, and a 5% increase in closed roads. For Gila chub there would be a 15% increase in open roads, and a 17% increase in closed roads. For Gila trout there would be a 5% increase in open roads, and a 2% increase in closed roads. For loach minnow there would be a 10% increase in open roads, and an 8% increase in closed roads. For spinedace and razorback sucker there would be a 5% increase in open roads, and a 15% increase in closed roads. For roundtail chub there would be a 9% increase in open roads, and a 12% increase in closed roads. For Little Colorado spinedace sucker there would be a 7% increase in open roads, and a 19% increase in closed roads. For bluehead sucker there would be a 7% increase in open roads, and a 18% increase in closed roads. For desert and Sonora suckers there would be a 10% increase in open roads, and an 8% increase in closed roads. For the Little Colorado River sucker there would be a 6% increase in open roads, and a 22% increase in closed roads. For longfin dace there would be a 6% increase in open roads, and a 22% increase in closed roads. This information, along with additional information, is summarized below in Table 4.

#### *Alternative E Summary*

This alternative would result in direct, indirect, and cumulative effects to all the 13 fish species being analyzed, with the only exception is that there would be no direct effects to the Little Colorado River sucker. Both short and long-term impacts from adding roads to the existing transportation system could result in negative effects to Apache trout, Gila chub, Gila trout, loach minnow, roundtail chub, spinedace, Little Colorado spinedace, and razorback sucker. Beneficial effects to these same species could result from roads being closed, the prohibition of general cross-country travel, which includes no provisions for big game retrieval and provides a minimal (118 miles) amount of corridors for the sole purpose of dispersed camping. Table 4 below summarizes impacts associated with changes in the motorized transportation to the thirteen threatened, endangered, candidate, and sensitive species for this alternative. **This alternative may affect, and is likely to adversely affect Apache trout, Gila chub and its critical habitat, Gila trout, loach minnow and its critical habitat, Little Colorado spinedace and its critical habitat, roundtail chub, and spinedace. For the razorback sucker, this alternative may affect, but is not likely to adversely affect this species or its critical habitat.** All the sensitive fish species would be similarly impacted by this alternative as described for the threatened, endangered, and candidate species above. Although the current population and habitat conditions for these species are largely unknown, it is unlikely that this alternative would trend toward federal listing or result in the loss of viability to any of these species. Impacts will be primarily indirect and cumulative, and impacts associated with increased sedimentation to the species habitat would be the greatest concern. Although these impacts cannot be quantified, most are within the uplands and occur throughout the watersheds, and are not concentrated within the

species habitats or drainages upstream. Therefore, for the sensitive fish species (bluehead sucker, desert sucker, longfin dace, Little Colorado River sucker, and Sonora sucker), this alternative may impact individuals or habitat but will not likely contribute to a trend toward federal listing or cause a loss of viability to the populations or species.

Table 4. Summary by species of road changes for Alternative E. Direct effects are within the species habitat (i.e. 250 meter buffer), and indirect effects are upstream or within the uplands that drain into the species habitat.

Alternative E Compared to the Existing Condition (Alternative A)	Direct		Indirect		Cumulative Effects		
	Roads Added	Roads Closed	Roads Added	Roads Closed	Roads Added	Roads Closed	Percent Change
Apache Trout	1.8	2.8	25.8	15.3	27.6	18.1	11/5
Gila Chub	0.1	0.8	12.4	3.9	12.5	4.7	15/17
Gila Trout	0.2	0.4	1.9	0.9	2.1	1.3	5/2
Loach Minnow	0.5	7.7	67.3	38.4	67.8	46.1	10/8
Razorback Sucker	0.4	0.7	17.8	27.5	18.2	28.2	5/15
Roundtail Chub	0.3	0.1	84.1	155.3	84.4	155.4	9/12
Spikedace	0.4	0.7	17.8	27.5	18.2	28.2	5/15
Little Colorado Spinedace	0	1.7	53	191.3	53	193	7/19
Bluehead Sucker	0.2	3.1	59.4	196.6	59.6	199.7	7/18
Desert Sucker	1.1	7.8	85.5	69.1	86.6	76.9	10/8
Longfin Dace	0.5	7.8	26	36.6	26.5	44.4	6/22
Little Colorado River Sucker	0	0	35.2	183.8	35.2	183.8	6/22
Sonora Sucker	1.1	7.8	85.5	69.1	86.6	76.9	10/8

## CONCLUSIONS AND COMPARISONS ABOUT ALTERNATIVE EFFECTS

Resource and economic considerations cannot allow for an ever increasing system of routes and unmanaged motorized use on the ASNFs. Alternative A (no action) would allow the continued use of 1,624,246 acres of the ASNFs for cross-country motorized travel. Although specific and quantifiable resource analyses of the historical and ongoing impacts associated with most of the ASNFs being open to cross-country are not complete, it is clear that this continued use is not sustainable. Maintaining existing management under Alternative A would have negative effects to fish and their habitats on the ASNFs. Four action alternatives (B, C, D, and E) were developed to address these fundamental issues as directed by the Travel Management Rule, along with specific issues related to the ASNFs.

Alternative B will provide for a motorized transportation system consisting of 2,673 miles of roads and 268 miles of trails. It will also provide for big game retrieval within one mile of any motorized road or trail, five areas that cover approximately 459 acres, 658 miles of corridors for the sole purpose of providing for dispersed camping; and the addition of 358 miles of roads to the transportation system, and the closing of 493 miles of roads that are currently open within the existing transportation system. Prohibiting cross-country travel and limiting cross-country travel for big game retrieval and dispersed camping will have positive effects to fish and their habitats on the ASNFs. Opening and adding roads to the transportation system will have negative effects to fish and their habitats on the ASNFs. Closing and removing roads from the existing transportation can have positive, neutral, and negative effects to fish and their habitats on the ASNFs. Comparing impacts relative to

issue #3 and the overall effects to fish and their habitats; Alternative B provides less benefits than Alternatives C and E, and greater benefits than Alternative D.

Alternative C will provide for a motorized transportation system consisting of 2,860 miles of roads and 156 miles of trails. It will also provide for big game retrieval within one mile of any motorized road or trail, does not include any areas or corridors for the sole purpose of providing for dispersed camping; and the addition of 28 miles of roads (to access dispersed camping locations) to the transportation system, and does not include the closing of any roads. Prohibiting cross-country travel and limiting cross-country travel for big game retrieval would have positive effects to fish and their habitats on the ASNFs. Opening and adding roads to the transportation system will have negative effects to fish and their habitats on the ASNFs. Comparing impacts relative to issue #3 and the overall effects to fish and their habitats; Alternative C provides the greatest benefits, relative to Alternatives B, D, and E.

Alternative D would provide for a motorized transportation system consisting of 2,730 miles of roads and 302 miles of trails. It would also provide for big game retrieval within one-quarter mile of any motorized road or trail, five areas that cover approximately 459 acres, 2,034 miles of corridors for the sole purpose of providing for dispersed camping; and the addition of 415 miles of roads to the transportation system, and the closing of 479 miles of roads that are currently open within the existing transportation system. Prohibiting cross-country travel and limiting cross-country travel for big game retrieval and dispersed camping would have positive effects to fish and their habitats on the ASNFs. Opening and adding roads to the transportation system will have negative effects to fish and their habitats on the ASNFs. Closing and removing roads from the existing transportation can have positive, neutral, and negative effects to fish and their habitats on the ASNFs. Comparing impacts relative to issue #3 and the overall effects to fish and their habitats; Alternative D provides the least benefits, relative to Alternatives B, C, and E.

Alternative E would provide for a motorized transportation system consisting of 2,473 miles of roads and 205 miles of trails. It does not provide for big game retrieval or designate any areas. It does provide 118 miles of corridors for the sole purpose of providing for dispersed camping; and the addition of 220 miles of roads to the transportation system, and the closing of 559 miles of roads that are currently open within the existing transportation system. Prohibiting cross-country travel and limiting cross-country travel for dispersed camping would have positive effects to fish and their habitats on the ASNFs. Opening and adding roads to the transportation system would have negative effects to fish and their habitats on the ASNFs. Closing and removing roads from the existing transportation can have positive, neutral, and negative effects to fish and their habitats on the ASNFs. Comparing impacts relative to issue #3 and the overall effects to fish and their habitats; Alternative E provides greater benefits than Alternatives B and D, and is less beneficial than Alternative C.

All of the alternatives would not result in the loss of viability and/or trend toward federal listing, or jeopardize the continued existence any federally listed; although this latter determination would only be verified with a non-jeopardy biological opinion from the formal consultation process. Effects of the alternatives also fall within existing ASNFs plan standards and guidelines, and should not result in any irreversible or irretrievable effects.

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SIGNATURE OF PREPARER:

*/s/* Jerry G. Ward

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FISHERIES BIOLIGIST

July 6, 2010

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DATE

## **APPENDIX A**

The following are is a complete list of all the relevant ASNFs forest plan (USDA 1987) concerns, directions, emphasis, and standards and guidelines applicable to the proposed actions in the DEIS:

### **2. Public Issues and Management Concerns**

#### **FISH AND WILDLIFE**

Managers and the public are concerned that grazing, timber harvesting, and associated activities will reduce fish and wildlife habitat or adversely affect animal diversity and populations. At the same time, wildlife is dependent on a variety of age classes and stand conditions that can most efficiently be perpetuated through timber harvest. (Pages 10 and 11)

Many species are dependent upon riparian areas. Conflicts in these areas are occurring between recreation, road construction, grazing, and water use demands. Although riparian areas account for less than 0.1% of our total land area, they receive the heaviest demands. (Page 11)

### **4. Management Direction**

#### **Wildlife and Fish (Page 15)**

Maintain habitat to maintain viable populations of wildlife and fish species and improve habitat for selected species. This is accomplished “directly” through habitat management and “indirectly” through coordination of habitat management in conjunction with other resource activities. Page

Cooperate with the Arizona Game and Fish Department to achieve management goals and objectives specified in the Arizona Wildlife and Fisheries Comprehensive Plan, and on proposals for reintroduction of extirpated species into suitable habitat. Support the Arizona Game and Fish Department in meeting its objectives for the State. No unapproved species are introduced.

Cooperate with the Arizona Game & Fish Department to achieve management goals and objectives in the Arizona Cold Water Fisheries Strategic Plan.

Improve habitat for listed threatened, endangered, or sensitive species of plants and animals and other species as they become threatened or endangered. Work toward recovery and declassification species.

Identify and protect areas that contain threatened, endangered, and sensitive species of plants and animals.

Increase opportunities for wildlife and fish oriented recreation opportunities.

## **Riparian (Page 16)**

Improve vegetation condition in riparian areas. This is an emphasis area for the plan. Improvements will be accomplished by reducing or, in some cases, eliminating adverse impacts from grazing, vehicles, and over-use by man.

## ***FOREST-WIDE STANDARDS AND GUIDELINES***

### Off-Road Vehicle Management (Page 34)

Existing, as well as additional ORV closures are implemented when one or more of the following situations or areas exist, and ORV use is likely to occur that would result in significant adverse effects:

Effects of water quality such as increased sediment and turbidity. Also, bacteriological and chemical problems due to heavy concentration of users.

All critical areas as defined in Section 2(b) of the Rare and Endangered Species Act of 1973. (Page 35)

Areas where there is agreement with the Arizona Game & Fish Department to maintain a quality hunting and fishing experience.

Water courses and wetlands permanently or intermittently wet.

### Wildlife Management (Page 46)

Manage threatened and endangered animal, fish, and plant habitat to achieve declassifying in a manner consistent with the goals established by the U.S. Fish and Wildlife Service and the Arizona Game and Fish Department.

Habitat management for Federally listed species will take precedence over unlisted species. Habitat management for endangered species will take precedence over threatened species. Habitat management for sensitive species will take precedence over non-sensitive species.

Implement threatened and endangered species recovery plans.

Carry out the appropriate management activities outlined in the Rocky Mountain Southwest Peregrine Falcon and Apache Trout Recovery Plans.

### Threatened, Endangered, and Sensitive Species. (Page 47)

Monitor management practices within occupied and potential peregrine falcon, Apache Trout, bald eagle, loach minnow, and Little Colorado River spinedace habitat, and evaluate impacts.

Monitor management practices within occupied and potential habitat of plants listed as threatened, endangered, state sensitive animals, or on the Regional Forester's Sensitive Plant List.

Manage sensitive species to sustain viability and prevent the need for listing as threatened or endangered.

#### Watershed Planning (Page 69)

Provide adequate drainage to prevent concentrated flow and sediment laden runoff from entering water courses.

Designate stream courses to receive protection during projects (e.g., timber sales, road work). Those streams shown on 7.5 minute quads as a streamcourse should be considered for designated stream courses.

Roads will be located away from stream bottoms to minimize sediment delivery to the streamcourse whenever possible.

Sediment Production from roads may be minimized by methods such as:

- a. Outsloping of road.
- b. Leadout ditches.
- c. Energy dissipaters on culverts.
- d. Grass seeding
- e. Rock riprap.

Evaluate projects to determine if detailed soil survey (order 2) and hydrologic survey is needed. (Page 70)

Maintain suitable filter/buffer strips between stream courses and disturbed areas and/or road locations to:

- a. Maintain Suitable Stream Temperature
- b. Maintain Water Quality Standards

#### Improvements (Page 71)

Maintain and enhance riparian vegetation along streams to maintain suitable water temperature and other conditions for stream flow.

Effectively close or obliterate roads causing intolerable resource damage (relocate roads as needed).

#### Road Maintenance & Management (Page 85)

Erosion control measures will be included in road plans. Construct roads to keep sediment out of riparian and aquatic habitats. Minimize clearing widths and vegetative clearing. Allow roads within critical wildlife habitat areas that have specific big game winter range objectives are needed to meet priority goals of the forest. Permanent roads constructed/reconstructed in the critical wildlife habitat areas must meet the following criteria:

- 1) There is no feasible alternative to build the road outside the area, and the road is essential to achieve priority goals and objectives of contiguous management areas, or to provide access to land administered by other Government agencies or to contiguous private land.

- 2) Planned management of road use during winter will prevent or minimize disturbance of wintering big game animals.
- 3) Roads are constructed/reconstructed to the minimum standards necessary to provide safety for the road use purpose.
- 4) Roads cross the winter range in the minimum distance feasible to facilitate the necessary use.
- 5) The Forest Biologist should be consulted prior to road location, planning, and alternative evaluation.

(Page 86)

Seasonally or permanently close existing roads, prohibit off-road vehicle use or manage use when conflicts occur with wildlife and soil resource objectives. Generally limit closures to local roads in erosive soil areas, riparian areas, or wildlife areas that require specific management practices.

Roads not needed for industry, public, and/or administrative use which are uneconomical to maintain or which are causing significant resource conflicts will be obliterated. Obliteration of unneeded roads and trails is a means of implementing Resource Access/Travel Management (RATM) decisions. Obliteration will be accomplished by mechanically destroying the facility or by implementing management strategies to discourage, eliminate, or prohibit traffic to allow natural vegetation to return to the site. The road or trail shall be removed from the inventory when obliteration is complete.

Emphasize road management in areas where resource/wildlife protection is dominant Forest policy.

Total road densities should average 3.5 miles/square mile or less. Open road densities should average 2.0 miles/square mile or less.

## **MANAGEMENT AREA 3**

### Riparian (Page 122)

Riparian areas are geographically delineable areas with distinctive resource values and characteristics that are comprised of the aquatic and riparian ecosystems. The aquatic ecosystem includes the stream channel, lake or estuary bed, water, biotic communities and associated habitat features. The riparian ecosystem is the transition between the aquatic and terrestrial ecosystem; identified by soil characteristics or distinctive vegetation communities that require free or unbound water. Riparian areas, with their high productivity and diversity, are a limited and critical ecological resource. In addition to having high timber, range, recreation, and cultural values, riparian areas are vital to the quantity and quality of habitats for fish and some wildlife species, and are basic to the hydrologic function of watersheds. All fish species, many terrestrial wildlife species and many threatened and endangered species depend on this Forest's riparian areas.

### **Management Emphasis:**

Recognize the importance and distinctive values of riparian areas when implementing management activities. Give preferential consideration to riparian area dependent resources (see glossary) in cases of unsolvable conflicts. Manage to maintain or improve riparian areas to

satisfactory riparian condition (see glossary). Other resource uses and activities may occur to the extent that they support or do not adversely affect riparian dependent resources.

Management emphasis will be directed at areas with riparian dependent resources in the following order of priority: 1. Threatened and Endangered Species; 2. cold water fisheries; 3. warm water fisheries; and 4. all other riparian areas. Riparian areas to be emphasized during the life of this plan by priority category are:

**Priority 1 – Threatened and Endangered Species**

<b>Priority 1 – Threatened and Endangered Species Stream/Riparian</b>	<b>Ranger District</b>	<b>Stream/Riparian</b>	<b>Ranger District</b>
Centerfire Creek	Alpine	Maime Creek	Alpine/Springerville
Wildcat Creek	Alpine	Lee Valley Creek	Alpine
Boggy Creek	Alpine	Hanagan Creek	Springerville
Fish Creek	Alpine	Home Creek	Alpine/Springerville
Hay Ground Creek	Springerville	Soldier Creek	Alpine
KP Creek	Alpine	Campbell Blue River	Alpine
Grant Creek	Alpine	Reservation Creek	Alpine
Coleman Creek	Alpine	Bear Wallow Creek	Alpine
Conklin Creek	Alpine	Snake Creek	Alpine
Double Cienega Creek	Alpine	Stinky Creek	Alpine
Corduoy Creek	Alpine	Chitty Creek	Clifton
Mineral Creek	Springerville	Little Colo. E. Fork	Springerville
Dix Creek	Clifton	Blue River	Alpine/Clifton
Eagle Creek	Clifton	San Francisco River	Clifton
Harden Cienga Creek	Clifton	Nutriosio Creek	Springerville
Chevelon Creek		Chevelon	

(Page 123)

**Priority 2 – Cold Water Fisheries**

<b>123 Priority 2 – Cold Water Fisheries Stream/Riparian</b>	<b>Ranger District</b>	<b>Stream/Riparian</b>	<b>Ranger District</b>
Willow Springs Creek	Chevelon	Chevelon Creek	Chevelon
Woods Canyon Creek	Chevelon	Beaver Creek	Alpine
W. Fork – Black River	Springerville	N. Fork – Black River	Springerville
E. Fork – Black River	Alpine/Springerville	W. Fork – Black River	Alpine
Boneyard Creek	Alpine	S. Fork – Black River	Alpine
Willow Creek E. Clear	Chevelon	E. Fork – Black River	Springerville
Little Colo. S&W Forks	Springerville	Coyote Creek	Alpine

**Priority 3 – Warm Water Fisheries**

<b>Priority 3 – Warm Water Fisheries Stream/Riparian</b>	<b>Ranger District</b>	<b>Stream/Riparian</b>	<b>Ranger District</b>
Strayhorse Creek	Clifton	Pigeon Creek	Clifton
Little Blue Creek	Clifton	Horse Canyon Creek	Clifton
Hannah Springs Creek	Clifton	Sardine Creek	Clifton
Raspberry Creek	Clifton	Clear Creek	Clifton
Turkey Creek	Clifton		

Manage for the following indicator species:

Lincoln Sparrows  
Yellow Breasted Chat  
Lucy's Warbler  
Aquatic Macroinvertebrates

Wildlife Management (Page 125)

Cooperate with Arizona Game and Fish Department to: 1. develop implementation plans for Arizona Cold Water Fisheries Strategic Plan; 2. plan lake and stream habitat improvement projects; 3. maintain a current fish habitat inventory; and 4. control fish populations, aquatic plants, and fish stocking to meet state fisheries management goals.

Manage for or maintain a least 60% of potential habitat capability for Apache Trout, Rainbow Trout, Brook Trout, Brown Trout, Loach Minnow, and Little Colorado Spinedace.

For Priority 1 and 2 Riparian Areas:

a) Aquatic resources:

(1) Manage for and maintain at least 80 percent of near natural shade over water surfaces.

(2) Manage for and maintain at least 80 percent of streambank total linear distance in stable condition.

(Page 126)

(3) Prevent siltation not to exceed 20 percent fines (<855mm) in riffle areas.

(4) Maintain 80 percent of the spawning gravel surface free of inorganic sediment.

(5) Manage for stream temperatures not to exceed 68 degrees F, unless not technically feasible.

(6) Manage for and maintain at least a 80 Biotic Condition Index on all perennial streams.

b) Vegetation resource (where the site is capable of supporting woody plants):

(1) Manage for and maintain at least 60 percent of the woody plant composition in three or more riparian species.

(2) Manage for and maintain at least three age classes of riparian woody plants, with at least 10 percent of the woody plant cover in sprouts, seedlings, and saplings.

(3) Manage for and maintain at least 60 percent near natural shrub and tree crown cover.

(4) Determine need and rehabilitate riparian areas through seeding and planting woody species in areas that are in unsatisfactory condition.

For Wetlands:

- a) Improve wetlands in accordance with the Forest Wetlands Management Plan where consistent with private water rights.
- b) Potential emergent vegetation cover in key wetlands as identified in the Wetland Project Implementation Plan will be maintained at optimum density from late spring (May 1) to July 15.
- c) Improve wintering water fowl habitat, including loafing island construction.

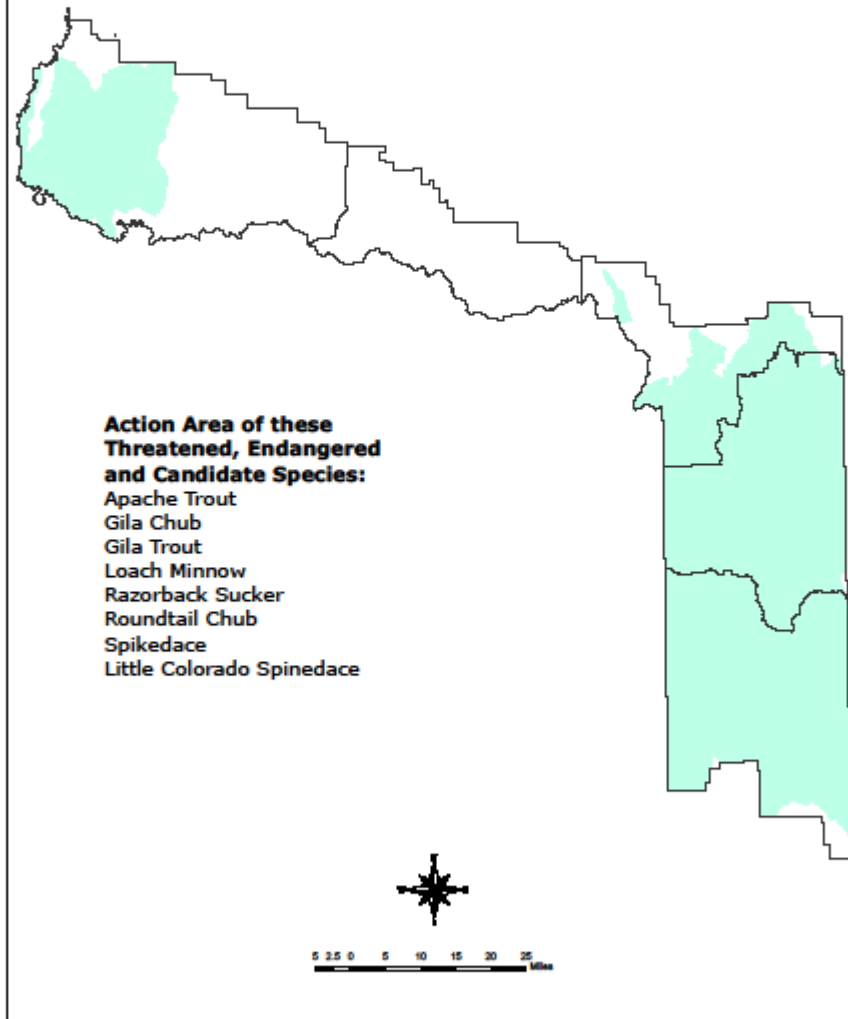
- d) Maintain or improve nesting cover in conjunction with construction of waterfowl islands by seeding herbaceous species unpalatable to large herbivores.
- e) Determine the need, and then maintain and improve wetland habitat by planting waterfowl forage species along with shorelines.
- f) Maintain or improve nesting cover and waterfowl forage on existing waterfowl islands and shorelines and in conjunction with construction of waterfowl islands.
- g) Consult and coordinate wetland improvement projects with affected permittees, individuals and groups.

Soil and Water (Page 128)

Enhance watershed condition by obliterating roads causing resource damage, which are unneeded for Forest management. (See Plan, page 86)

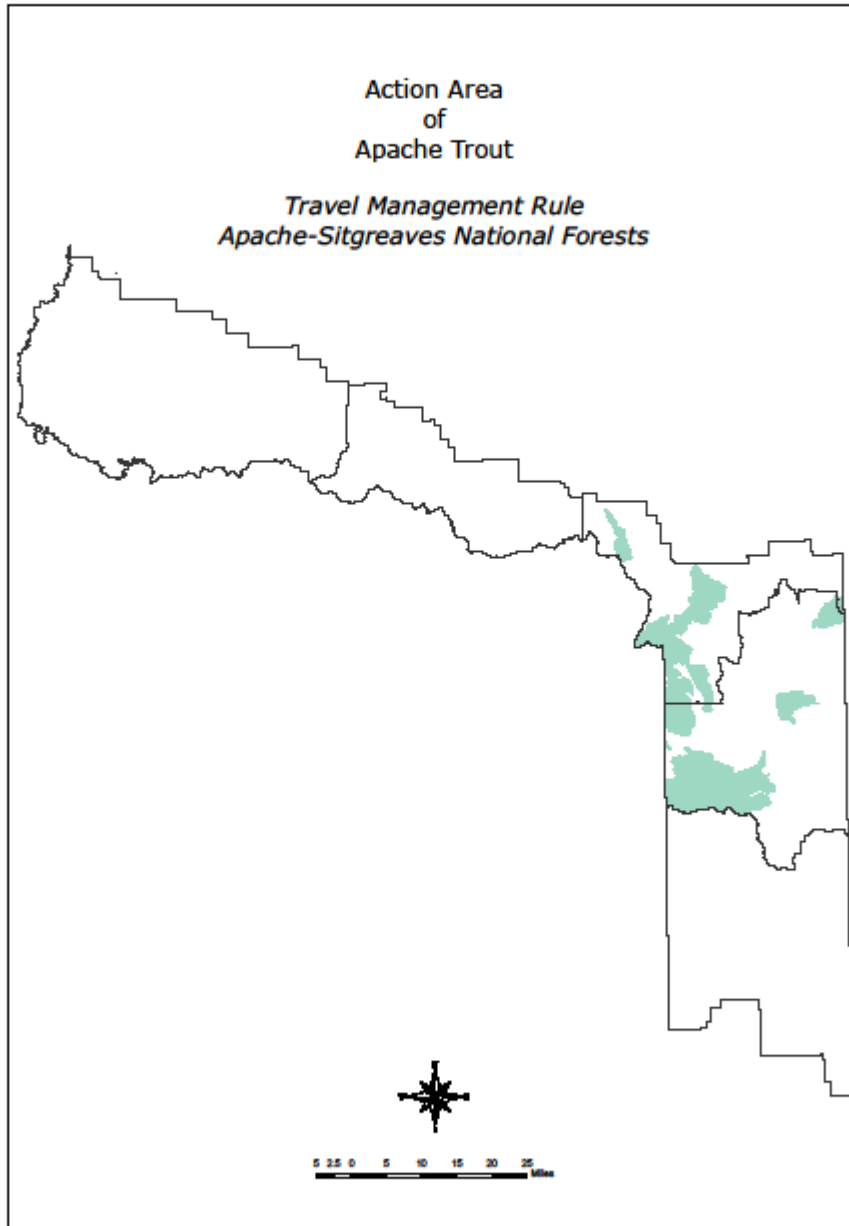
## APPENDIX B

Action Area of Threatened, Endangered and Candidate Species  
*Travel Management Rule*  
*Apache-Sitgreaves National Forests*



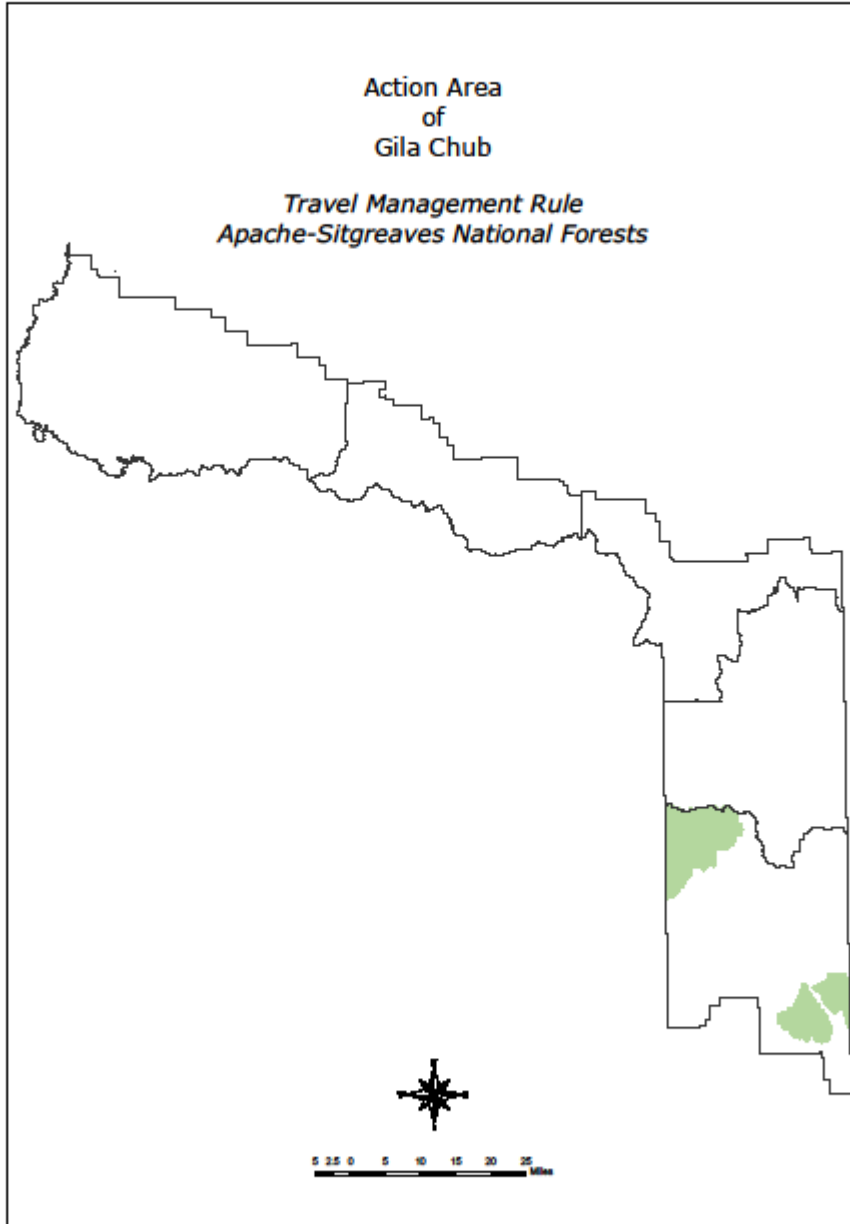
Action Area  
of  
Apache Trout

*Travel Management Rule  
Apache-Sitgreaves National Forests*



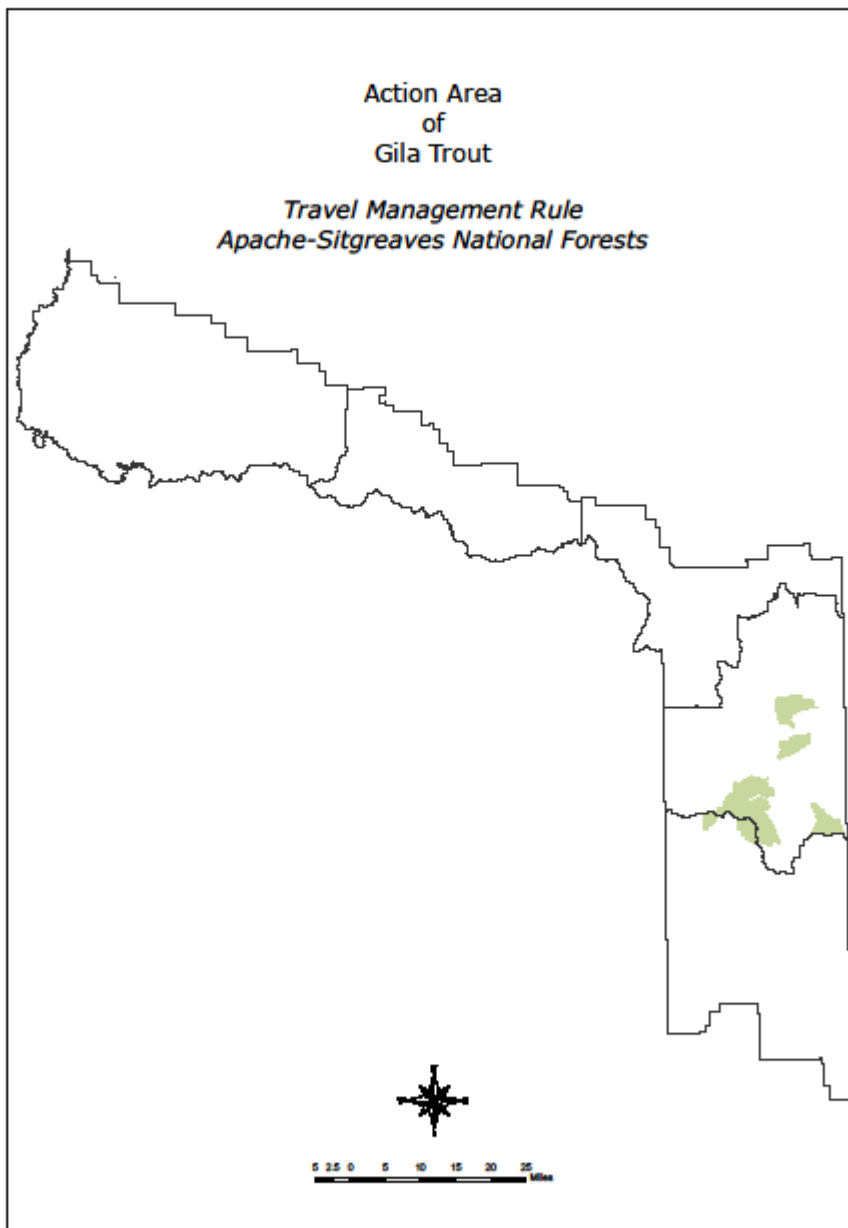
Action Area  
of  
Gila Chub

*Travel Management Rule  
Apache-Sitgreaves National Forests*



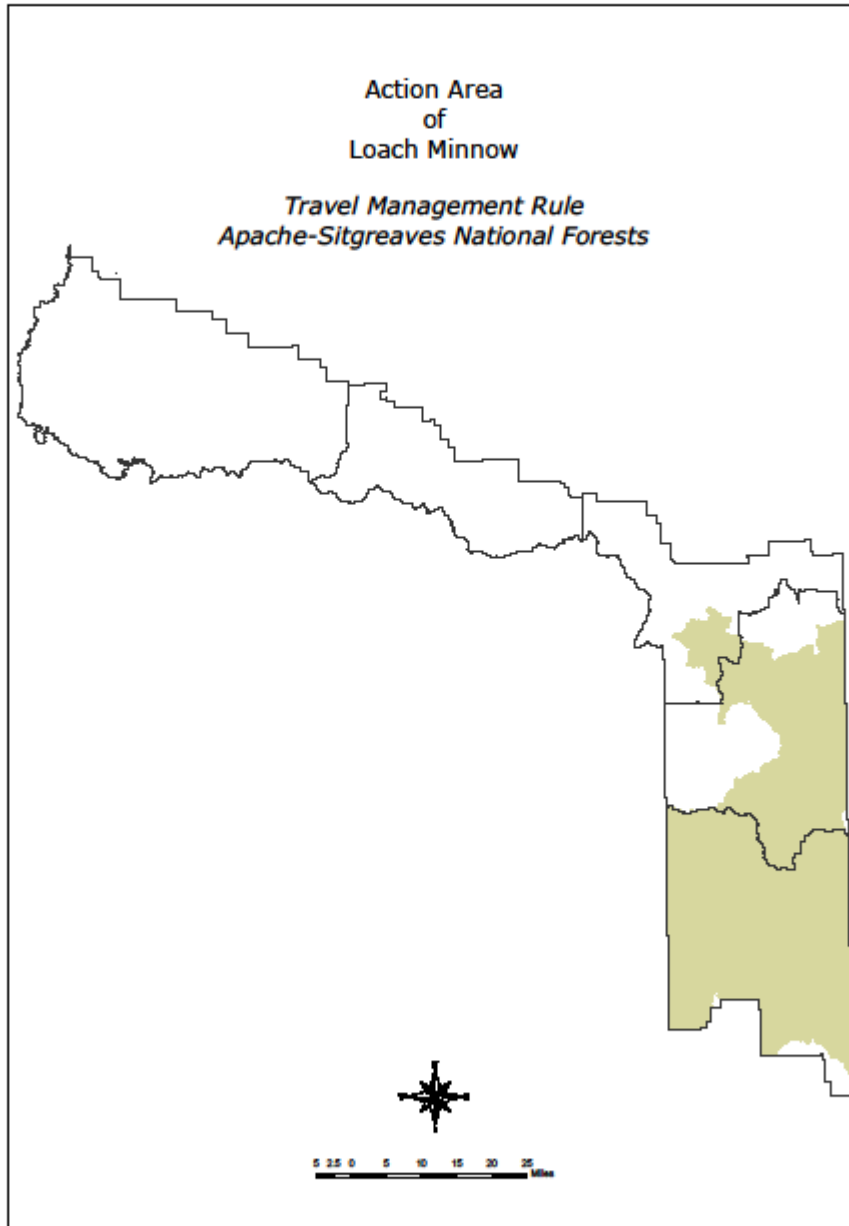
Action Area  
of  
Gila Trout

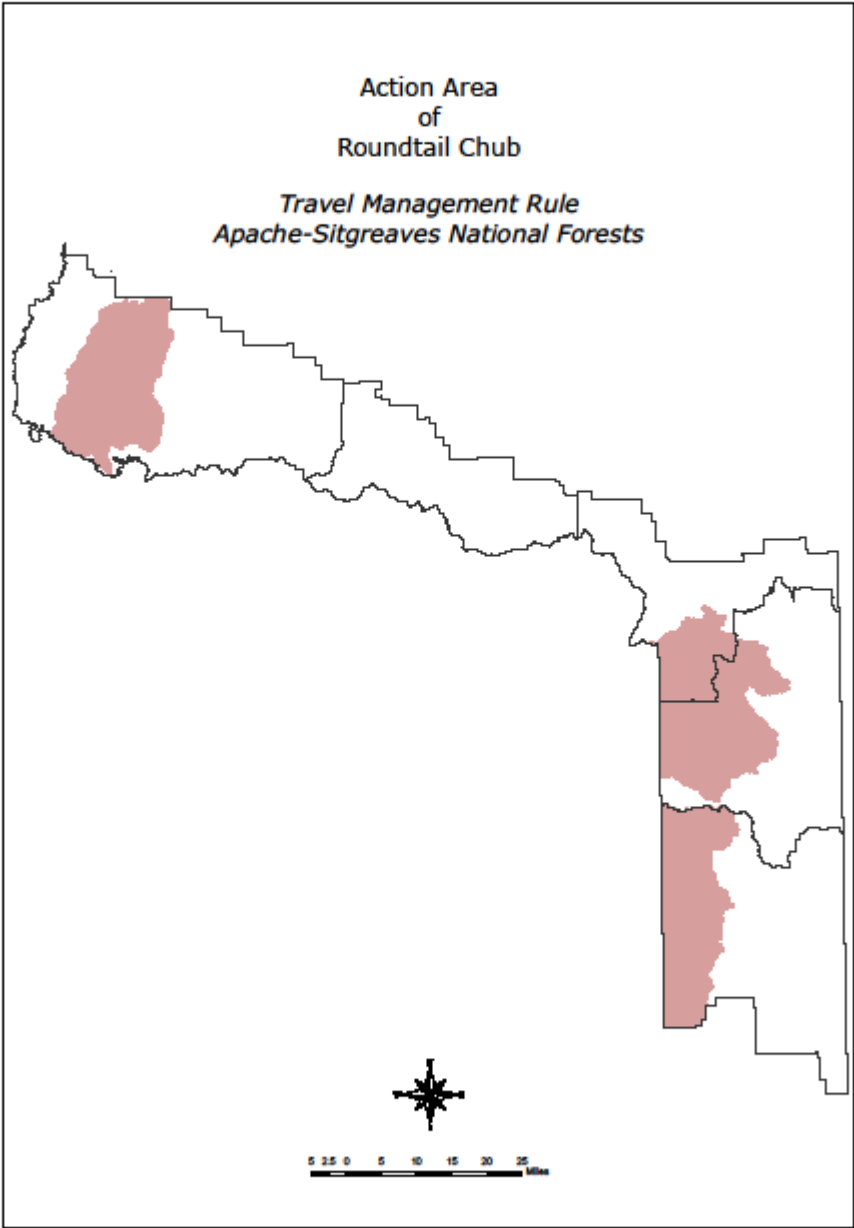
*Travel Management Rule  
Apache-Sitgreaves National Forests*



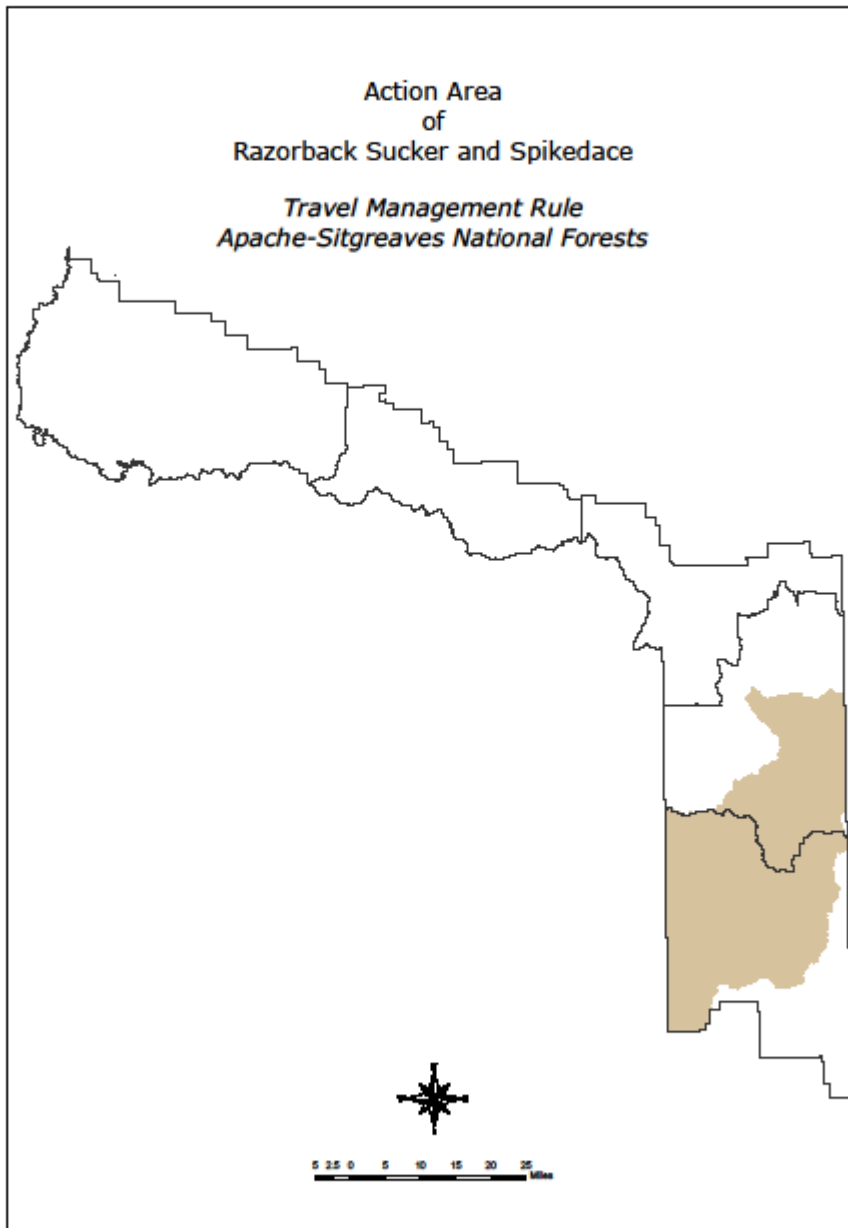
Action Area  
of  
Loach Minnow

*Travel Management Rule  
Apache-Sitgreaves National Forests*



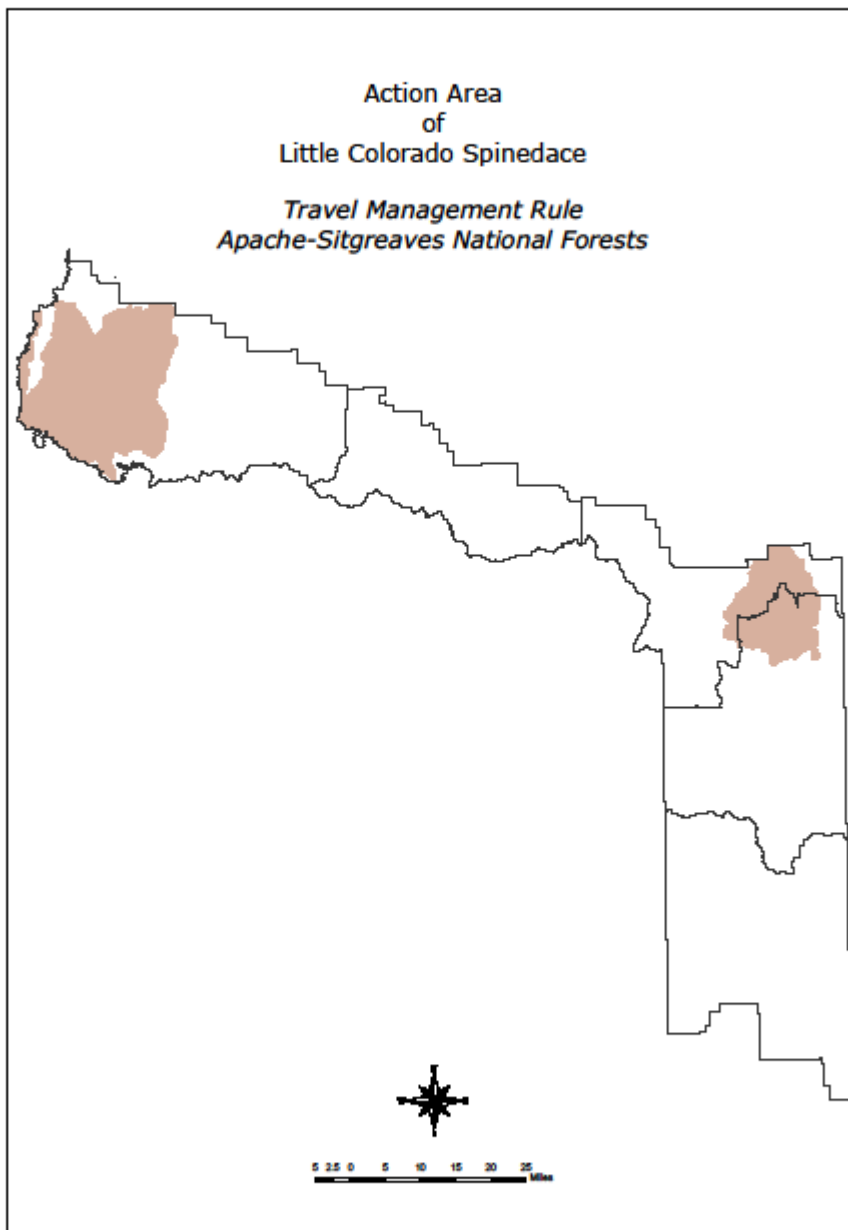


Action Area  
of  
Razorback Sucker and Spikedace  
*Travel Management Rule*  
*Apache-Sitgreaves National Forests*

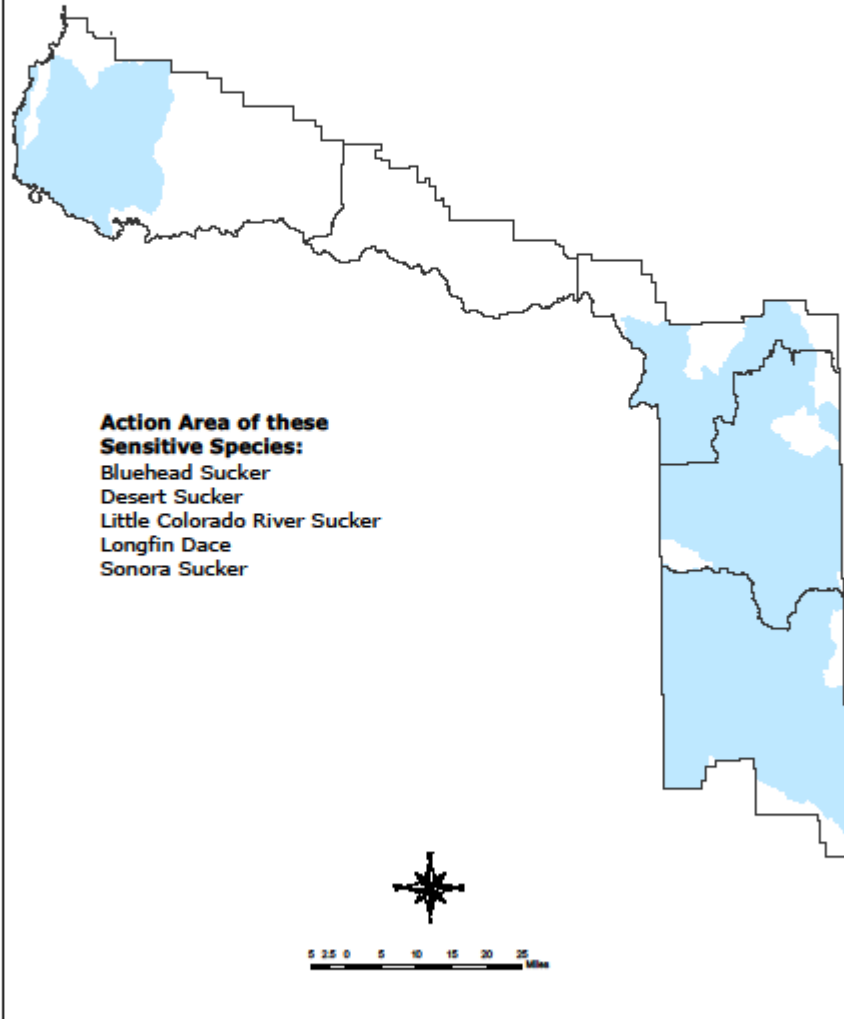


Action Area  
of  
Little Colorado Spinedace

*Travel Management Rule  
Apache-Sitgreaves National Forests*

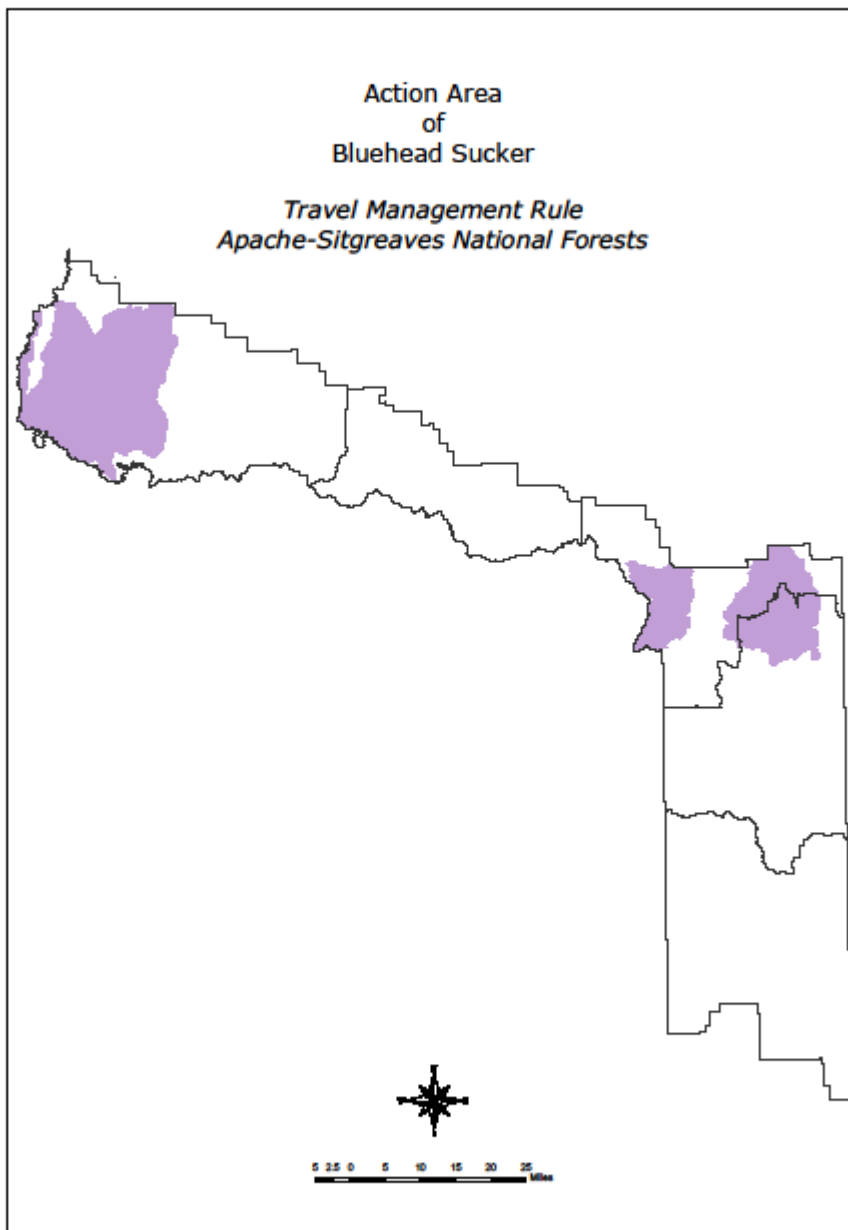


Action Area of Sensitive Species  
*Travel Management Rule*  
*Apache-Sitgreaves National Forests*



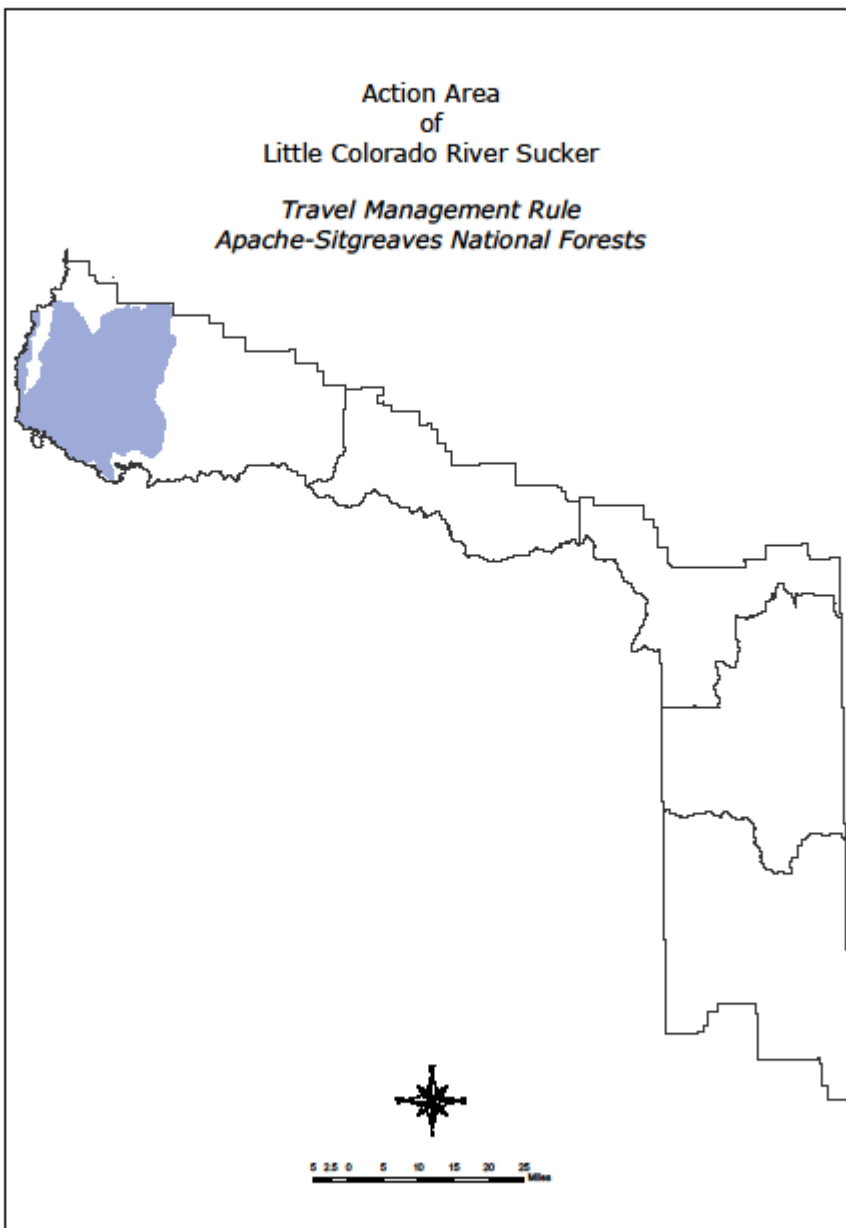
Action Area  
of  
Bluehead Sucker

*Travel Management Rule  
Apache-Sitgreaves National Forests*



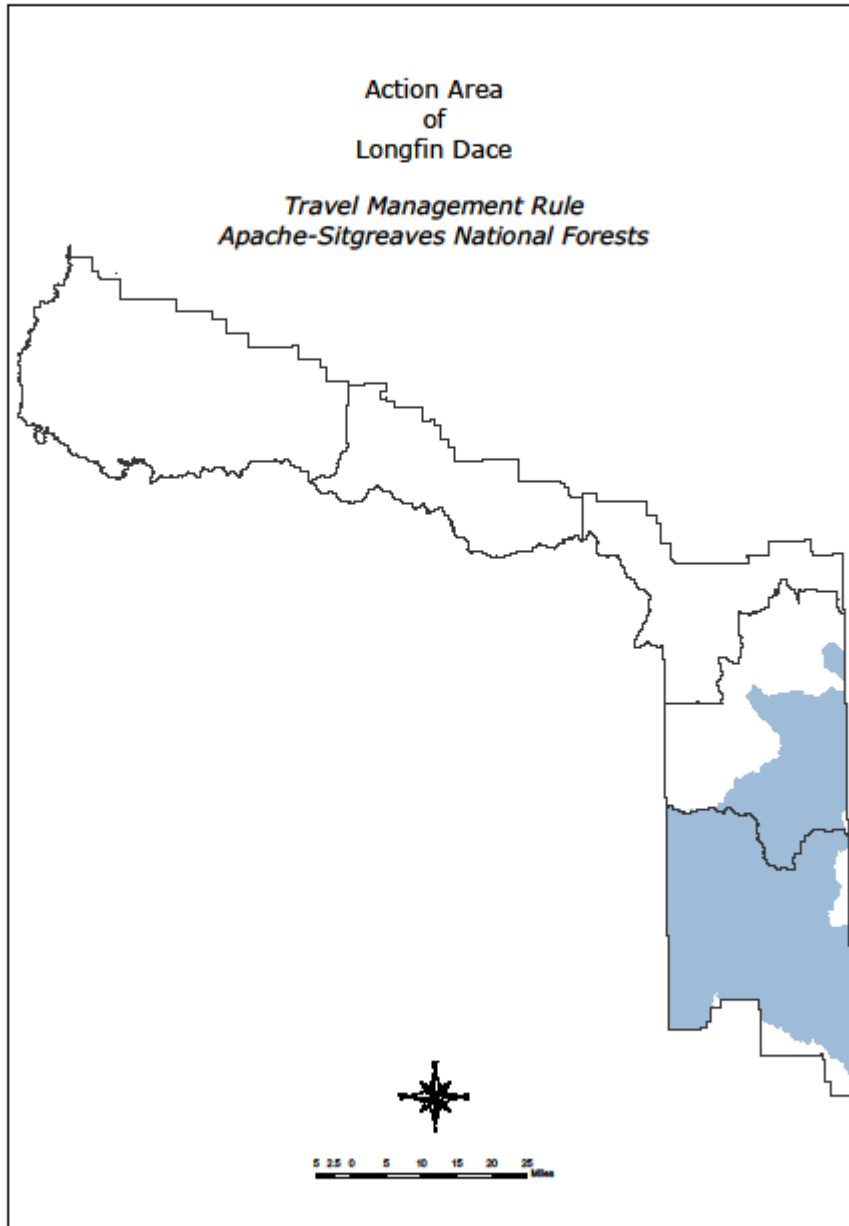
Action Area  
of  
Little Colorado River Sucker

*Travel Management Rule  
Apache-Sitgreaves National Forests*



Action Area  
of  
Longfin Dace

*Travel Management Rule  
Apache-Sitgreaves National Forests*



Action Area  
of  
Desert Sucker and Sonora Sucker  
*Travel Management Rule*  
*Apache-Sitgreaves National Forests*

