Four Forest Restoration Initiative, Rim Country EIS

Botany and Noxious Weeds Report

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for:
4FRI Rim Country EIS

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Purpose and Need for Action

The purpose of the 4FRI Rim Country Project is to restore and maintain the structure, pattern, health, function, and composition and diversity in forests and grasslands across the landscape to conditions within the natural range of variation, thus moving the project area toward the desired conditions in the respective land management plans. One outcome of restored forests and grasslands is increased ecosystem resilience. Resilience is the ability of an ecosystem to survive natural disturbances such as fire, insects, disease, and climate change without changing its inherent function (FSM 1909.12, 05; SER 2004). This project is needed to:

- Increase forest and grassland resilience and sustainability
- Reduce hazards associated with undesirable fire effects
- Improve terrestrial and aquatic species habitat
- Improve the condition and function of streams and springs
- Restore woody riparian vegetation
- Preserve cultural resources
- Support sustainable forest products industries
- Improve the motorized transportation system and provide for a more sustainable road system where poorly located roads are relocated or decommissioned.

Alternatives

Three alternatives were analyzed in detail and four alternatives were considered but eliminated from detailed study. The alternatives analyzed in detail include the no-action alternative (alternative 1), the modified proposed action (alternative 2), which is the preferred alternative, and one additional action alternative (alternative 3). Alternatives 2 and 3 respond to the seven significant issues for the Rim Country Project. Additional details on the alternatives are present in Chapter 2 of the FEIS, including a comparison of the alternatives. Design Features, Best Management Practices, Mitigation and Conservation Measures

The design features, best management practices, mitigation and conservation measures cited in this document can be found in Appendix C of FEIS.

Relevant Law, Regulation, and Policy

- National Forest Management Act (1982)
- Invasive Species, EO 13112 of February 3, 1999
- Environmental Justice, EO 12898 of February 11, 1994
- Multiple-Use Sustained-Yield Act of 1960. This act designates multiple uses with equal standing in the National Forests. These include recreation, range, timber, watershed, wildlife and fish. It introduces the principles of multiple use and sustained yield on the National Forests.
- National Environmental Policy Act, 1969. This act requires all federal agencies to analyze the effects of management actions and prepare Environmental Assessments or Environmental Impact Statements to address these impacts (depending on the complexity of the project).
- Resource Planning Act (RPA), 1974 (as amended). This act directs the National Forest Service to inventory, protect and address the effects to natural resources.

- National Forest Management Act, 1976 (as amended); 36 CFR 219. The NFMA Act originated as an amendment to the Resources Planning Act (1974) to address legal challenges. It provided direction requiring an interdisciplinary and systematic approach to resource management and provided for public input on preparing and revising forest plans.
- Forest Service Manual, FSM 2370 (Special Recreation Designations), Part 2672 (Areas Designated Administratively) (RNAs and Botanical Areas) and Forest Service Manual, FSM 2372, 2372. 01, 2372. 02 and 2372. 05. These manuals provide Forest Service direction for designating, preserving and managing special areas such as Botanical Areas on National Forests. They were considered when addressing Research Natural Areas and Botanical Areas in the analysis area.
- Forest Service Manual, FSM 2620, 2630, 2670, 2672. These manual directives address the management of Southwestern Region sensitive species.
- Executive Order 13112 of 1999, regarding noxious or invasive weed control. This executive order is one of the founding directives of the noxious or invasive weed control on National Forest system lands.
- Forest Service Manuals 2900 and 2150 and Regional Supplement No. 2100-98-1, regarding noxious weed control.
- Forest Service Manuals 2080 and 2150 and Regional Supplement No. 2100-98-1 establish policy and implement programs for noxious weed management.

State and Local Law:
Arizona Administrative Codes R3-4-244, R3-4-245 (Arizona Department of Agriculture 1999) regulate certain invasive species in the state
Noxious Weed Coordination and Plant Protection Act 2000 (Public Law 106-224)

Arizona Administrative Codes (Arizona Department of Agriculture) Article 11, consisting of Sections R3-3-1101 through R3-3-1111 and Appendix A, recodified from 3 A.A.C. 4, Article 6 at 10 A.A.R. 726, effective February 6, 2004 (Supp. 04-1) provides protection for certain native plants in Arizona.

Other Guidance

- Stemming the Invasive Tide: Forest Service Strategy for Noxious and Nonnative Invasive Plant Management. (U.S. Forest Service, 1998).
- Noxious Weeds Strategic Plan Working Guidelines– Coconino, Kaibab, and Prescott National Forests (1998). These working guidelines were developed by the three forests to manage noxious or invasive weeds. Noxious weed invasions were recognized as an emerging issue and growing problem.
- Final Environmental Impact Statement for the Integrated Treatment of Noxious or Invasive Weeds, Coconino, Kaibab and Prescott National Forests within Coconino, Gila, Mojave and Yavapai Counties, Arizona (USDA Forest Service 2005).
- Environmental Assessment For The A-SNFs Integrated Forest-Wide Noxious Or Invasive Weed Management Program USDA Forest Service Apache-Sitgreaves National Forests, Apache, Coconino, Greenlee and Navajo Counties, Arizona ((USDA Forest Service, 2008).
- Environmental Assessment for Integrated Treatment of Noxious or Invasive Plants Tonto National Forest Gila, Maricopa, Pinal, and Yavapai Counties, Arizona (USDA Forest Service 2012) .
- Forest Service Manual 2070 (Amendment 2000-2008-1) Native Plant Policy

Land Management Plan Direction

The Rim Country EIS includes three forests so plan direction for each forest will be considered for this analysis. These are Apache-Sitgreaves National Forests (USDA Forest Service 2016), Coconino National Forest (USDA Forest Service. Coconino National Forest 2018) and Tonto National Forest (USDA Forest Service 1985). Each land management plan provides management direction for the rare plants and non-native invasive plants on each forest as follows.

Apache-Sitgreaves Land Management Plan

Forestwide Desired Conditions

Overall Ecosystem Health

- Ecological components (e.g., soil, vegetation, water) are resilient to disturbances including human activities and natural ecological disturbances (e.g., fire, drought, wind, insects, disease, and pathogens) (Landscape scale 10,000 acres or greater)
- Natural ecological cycles (i.e., hydrologic, energy, nutrient) facilitate shifting of plant communities, structure, and ages across the landscape. Ecotone shifts are influenced at both the landscape and watershed scale by ecological processes. The mosaic of plant communities and the variety within the communities are resilient to disturbances.
- Ecological conditions for habitat quality, distribution, and abundance contribute to self-sustaining populations of native and desirable nonnative plants and animals that are healthy, well distributed, connected, and genetically diverse. Conditions provide for the life history, distribution, and natural population fluctuations of the species within the capability of the landscape.

Desired Conditions for Soil

Mid-Scale Desired Conditions (100 to 1,000 acres)

- Soils are stable within their natural capability. Vegetation and litter limit accelerated erosion (e.g., rills, gullies, root exposure, topsoil loss) and contribute to soil deposition and development.
- Soils provide for diverse native plant species. Vegetative ground cover (herbaceous vegetation and litter) is distributed evenly across the soil surface to promote nutrient cycling, water infiltration, and maintain natural fire regimes
- Biological soil crusts (e.g., mosses, lichens, algae, liverworts) are present and reestablished if potential exists.

Guidelines for Soil

- Severely disturbed sites should be revegetated with native plant species when loss of long-term soil productivity is predicted.

- Locally collected seed should be used where available and cost effective. Seeds should be tested to ensure they are free from noxious weeds and invasive nonnative plants at a State certified seed testing laboratory before acceptance and mixing.

Desired Conditions for All PNVTs (ERUs)

Landscape Scale Desired Conditions (10,000 acres or greater)

Each PNVT contains a mosaic of vegetative conditions, densities, and structures. This mosaic occurs at a variety of scales across landscapes and watersheds. The distribution of physical and biological conditions is appropriate to the natural disturbance regimes affecting the area.

- Native plant communities dominate the landscape.
- Species genetic diversity remains within native vegetation and animal populations, thus enabling species to adapt to changing environmental and climatic conditions.
- Diverse vegetation structure, species composition, densities, and seral states provide quality habitat for native and desirable nonnative plant and animal species throughout their life cycle and at multiple spatial scales. Landscapes provide for the full range of ecosystem diversity at multiple scales, including habitats for those species associated with late seral states and old growth.
- Disjunct populations of Chihuahuan pine (*Pinus leiophylla*), Arizona cypress (*Cupressus arizonica*), and Rocky Mountain maple (*Acer grandidentatum*) are present with the ability to reproduce on capable sites.
- Ecosystem services are available as forests, woodlands, grasslands, and riparian communities successfully adapt to a changing and variable climate.

Mid-Scale Desired Conditions (100 to 1,000 acres)

- Vegetation conditions provide hiding and thermal cover in contiguous blocks for wildlife. Native plant species are present in all age classes and are healthy, reproducing, and persisting.
- Vegetative ground cover (herbaceous vegetation and litter) is optimized to protect and enrich soils and promote water infiltration. There is a diverse mix of cool and warm season grasses and desirable forbs species.

Fine Scale Desired Conditions (less than 10 acres)

- Rare or unique plant communities (e.g., agaves, Chihuahuan pine) are intact and persisting.

Standards for All PNVTs

- Vegetation treatments shall include measures to reduce the potential for introduction of **invasive plants** and animals and damage from nonnative insects and diseases.

Desired Conditions for Riparian Areas

Landscape Scale Desired Conditions (10,000 acres or greater)

- Natural ecological disturbances (e.g., flooding, scouring) promote a diverse plant structure consisting of herbaceous, shrub, and tree species of all ages and size classes necessary for the recruitment of riparian-dependent species
- Riparian-wetland conditions maintain water-related processes (e.g., hydrologic, hydraulic, geomorphic). They also maintain the physical and biological community characteristics, functions, and processes

Mid-Scale Desired Conditions (100 to 1,000 acres)

- Willows (e.g., Bebb's, Geyer, Arizona, and Goodding's) are reproducing with all age classes present, where the potential exists.

- Riparian vegetation consists mostly of native species that support a wide range of vertebrate and invertebrate species and are free of invasive plant and animal species.

Desired Conditions for Forests: Ponderosa Pine

Landscape Scale Desired Conditions (10,000 acres or greater)

- Grasses, forbs, shrubs, needles, leaves, and small trees support the natural fire regime. The larger proportion (60 percent or greater) of soil cover is composed of **grasses and forbs** as opposed to needles and leaves.

Fine Scale Desired Conditions (less than 10 acres)

- Interspaces surrounding tree groups are variably shaped and composed of a grass, forb, and shrub mix. Some may contain individual trees or snags.

Guidelines for Forests: Ponderosa Pine

- Where Gambel oak or other native hardwood trees and shrubs are desirable to retain for diversity, treatments should improve vigor and growth of these species
- Where consistent with project or activity objectives, canopy cover should be retained on the south and southwest sides of small, existing forest openings that are naturally cooler and moister. These small (generally one-tenth to one-quarter acre) shaded openings provide habitat conditions needed by small mammals, plants, and insects (e.g., Merriam's shrew, **Mogollon clover**, four-spotted skipperling butterfly). Where these openings naturally occur across a project area, these conditions should be maintained on an average of 2 or more such openings per 100 acres.

Desired Conditions for Forests: Dry Mixed Conifer

Landscape Scale Desired Conditions (10,000 acres or greater)

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Desired Conditions for Wildlife and Rare Plants

Landscape Scale Desired Conditions (10,000 acres or greater)

- Habitat is well distributed and connected

Fine Scale Desired Conditions (less than 10 acres)

- Collection of animals and plants does not negatively impact species abundance.
- Localized rare plant and animal communities are intact and functioning.

Guidelines for Wildlife and Rare Plants

- Management and activities should not contribute to a trend toward the Federal listing of a species.
- Activities occurring within federally listed species habitat should apply habitat management objectives and species protection measures from recovery plans.
- Modifications, mitigations, or other measures should be incorporated to reduce negative impacts to plants, animals, and their habitats and to help provide for species needs, consistent with project or activity objectives.
- Cool and/or dense vegetation cover should be provided for species needing these habitat components (e.g., Gooding's onion, black bear, White Mountains chipmunk, western yellow-billed cuckoo).
- Rare and unique features (e.g., talus slopes, cliffs, canyon slopes, caves, fens, bogs, sinkholes) should be protected from damage or loss in order to retain their distinctive ecological functions and maintain viability of associated species.
- The needs of localized species (e.g., New Mexico meadow jumping mouse, Bebb's willow, White Mountains paintbrush) should be considered and provided for during project activities to ensure their limited or specialized habitats are not lost or degraded.
- Constructed features should be maintained to support the purpose(s) for which they were built. Constructed features should be removed when no longer needed.

Desired Conditions for Invasive Species

Landscape Scale Desired Condition (10,000 acres or greater)

- Invasive species (both plant and animal) are nonexistent or in low occurrence to avoid negative impacts to ecosystems.

Mid-Scale Desired Conditions (100 to 1,000 acres)

- Undesirable nonnative species are absent or present only to the extent that they do not adversely affect ecosystem composition, structure, or function, including native species populations or the natural fire regime.
- Introduction of additional invasive species rarely occurs and is detected at an early stage.

Objectives for Invasive Species

- Annually, contain, control, or eradicate invasive species (e.g., musk thistle, Dalmatian toadflax) on 500 to 3,500 acres.
- Annually, control or eradicate invasive species (e.g., tamarisk, bullfrogs) on at least 2 stream miles.

Standards for Invasive Species

- Projects and authorized activities shall be designed to reduce the potential for introduction of new species or spread of existing invasive or undesirable aquatic or terrestrial nonnative populations

Guidelines for Invasive Species

- Projects and activities should not transfer water between drainages or between unconnected water bodies within the same drainage to avoid spreading disease and aquatic invasive species.
- Project areas should be monitored to ensure there is no introduction or spread of invasive species.
- Treatment of invasive species should be designed to effectively control or eliminate them; multiple treatments may be needed.
- Pesticide use should minimize impacts on non-target plants and animals.

Standards for Special Uses

- Noxious plants and nonnative invasive species monitoring and control shall be included in contracts, permits, and agreements.
- Special use authorizations for the collection of live species with limited distribution (e.g., some invertebrates, plants) shall include permit provisions to ensure the species persist onsite.

Landscape Scale Disturbance Events

The forest included a section on landscape scale disturbances, recognizing that these areas represent departure from reference conditions and may lead to succession away from the desired conditions. This shift can be complicated by the increased risk of invasion by non-native species and by climate change.

Landscape Scale Desired Conditions (10,000 acres or greater)

- The Apache-Sitgreaves NFs landscapes retain the resiliency to survive landscape scale disturbance events.

Guidelines for Landscape Scale Disturbance Events

- Erosion control mitigation features should be implemented to protect significant resource values and infrastructure such as stream channels, roads, structures, threatened and endangered species, and cultural resources.
- Management should emphasize long term reestablishment of native deciduous trees, shrubs, and herbaceous vegetation to maintain ecosystem diversity.

Management areas

Management areas are areas that have similar management intent and a common management strategy. This direction does not substitute for, or repeat, forestwide direction

There are twelve management areas on the forest. All are represented in the analysis area and include Primitive Area, General Forest, Community-Forest intermix, Energy Corridor, High Use Developed Recreation Area, Natural Landscape, Recommended Research Natural Area, Research Natural Area, Wild Horse Territory, Wildlife Quiet Area and Wilderness.

General Forest

The General Forest Management Area encompasses the majority of the Apache-Sitgreaves NFs. All PNVTs occur in this management area.

There is no additional guidance for this management area for the resources discussed in this report that are not represented by the guidance in the PNVTs.
Community-Forest Intermix. The Community-Forest Intermix Management Area consists of National Forest System (NFS) lands that are within one-half mile of communities-at-risk. The Community-Forest Intermix Management Area makes up a portion of the wildland-urban interface (WUI).

Desired Conditions for Community-Forest Intermix

- The Community-Forest Intermix Management Area is composed of smaller groups of trees that are more widely spaced than other forested areas. These conditions result in fires that burn primarily on the forest floor and rarely spread as crown fire
- As a result of forest management, most wildfires are low to mixed severity surface fires resulting in limited loss of structures or ecosystem function.
- Native grasses, forbs, shrubs, and litter (i.e., fine fuels) are abundant enough to maintain and support natural fire regimes, protect soils, and support water infiltration.
- Grasslands have less than 10 percent woody canopy cover.

High Use Developed Recreation Area

The High Use Developed Recreation Area Management Area includes places with relatively high levels of visitor use that are managed to provide a wide variety of opportunities to a broad spectrum of visitors.

Guidelines for High Use Developed Recreation Area

- Management should focus on operation and maintenance, safety, aesthetics, and control of noxious weeds and nonnative invasive species.

Energy Corridor

The Energy Corridor Management Area includes the three existing high voltage energy corridors located on the Apache-Sitgreaves NFs.

Guidelines for Energy Corridor

Invasive plant species should be aggressively controlled within energy corridors to prevent or minimize spread.

Natural Landscape

These are generally undeveloped areas that are natural appearing and provide primitive and semi primitive recreation opportunities. Management activities are allowed but are primarily focused on ecosystem restoration.

There is no additional guidance for this management area for the resources discussed in this report that are not represented by the guidance in the PNVTs.

Wild Horse Territory

Desired Conditions for Wild Horse Territory

Grazing is in balance with available forage (i.e., grazing and browsing by authorized livestock, wild horses, and wildlife do not exceed established use levels).

Wildlife Quiet Area

Wildlife quiet areas provide relatively undisturbed habitat where big game and other wildlife could reside without disturbance from motorized vehicle use

Guidelines for Wildlife Quiet Areas

Fences surrounding and within WQAs should be inspected and improved to allow wildlife movement within and outside of the areas. Fences should be removed if no longer needed.

Coconino National Forest Land Management Plan (2018)

Forest-wide direction

All Ecosystems

General Description and Background for All Ecosystems

These desired conditions apply to all ecosystems.

Desired Conditions for All Ecosystems

FW-Eco-DC

1. Within their type and capability, ecosystems are functioning properly, provide habitat for native species, and are resilient to natural disturbances (such as flooding, fire, and periodic drought) and climate change. Ecosystem processes and contributions (for example, nutrient cycling, water infiltration, and wildlife habitat) are sustained, as vegetation on the Forest adapts to a changing climate.
2. The composition, structure, function, and arrangement of vegetation conditions reduce the threat of uncharacteristic disturbances.

Management Approaches for All Ecosystems

Coordinate with neighboring jurisdictions, permit holders (including utilities and livestock permittees), and other interested parties when undertaking activities in permitted areas or easements.

Soil

Soils are variable on the forest and range from hot, dry desert soils at the lowest elevations to cold, moist soils found in the alpine tundra at the highest elevations. Soils are inventoried and classified in the terrestrial ecological unit inventory (TEUI) called the Terrestrial Ecosystem Survey of the Coconino NF. The plan refers to Mollisol soil in several locations. Soils classified as Mollisols are those with relatively thick organic surfaces. They are typical of and develop under grassland conditions.

Desired Conditions for Soil

FW-Soil-DC

1 Soils function properly to distribute water and cycle nutrients to a variety of vegetation including lichens, mosses, grasses, **forbs**, shrubs, and trees.

2 Soil productivity and functions are sustained and functioning properly within the capability of the site, so the soil has the ability to resist erosion, infiltrate water and recycle nutrients. Coarse woody debris, including downed logs, provides for long-term soil productivity. Soil productivity and functions contribute to the **resiliency** and **adaptability** of terrestrial and riparian ecosystems to climate change.

3 **Vegetative ground cover** is maintained at levels that contribute to suitable hydrologic function, soil stability, and nutrient cycling. Soils are protected by adequate vegetative ground cover on the soil surface to prevent erosion from exceeding natural rates of soil formation (soil tolerance), within their inherent capability. Soils are permeable and capable of infiltrating water to reduce instances of overland flows during precipitation events. The composition of grass and forb species and presence of plant litter and grass, forb, shrub, and tree basal area surface cover reduce occurrences of compaction and erosion.

4 Biological soil crusts stabilize soil and improve nutrient cycling.

Guidelines for Soil

FW-Soil-G

2 Projects should be designed to avoid disturbance that would result in long-term impacts to soil function and productivity. Where disturbance cannot be avoided, project-specific soil and water conservation practices should be developed

3 Project-specific design features should be used when projects occur on slopes with a grade of about 40 percent or greater, on soils with moderate or severe erosion hazard, or on soils that are sensitive to degradation when disturbed, such as calcareous soils, to minimize or avoid soil impacts.

Biophysical Features

Geological Features

General Description and Background for Geological Features

Geological features include caves, karst, cliffs, and talus slopes.

Cliffs are vertical or near vertical rock faces. They range in size from a few feet to hundreds of feet tall and are inherently dynamic, subject to rock fall, ice, and wind and water erosion. Cliff resources include any naturally occurring material or substances such as plant and animal life, paleontological deposits, and minerals.

Desired Conditions for Geological Features

FW-BioPhys-Geo-DC

1 Geological features are generally undisturbed by human activities. The cultural, archaeological, geological, hydrological, paleontological, biological, and aesthetic resources associated with caves, karst, talus slopes, and **cliffs** are maintained.

6 Cliffs provide specialized habitats for a variety of species including nesting and feeding habitats for birds of prey and roosting habitat for bats. They provide escape, bedding, and lambing cover for bighorn sheep. They provide habitat for rare plants such as **rock fleabane** and Senator Mine alumroot.

Guidelines for Geological Features

FW-BioPhys-Geo-G

1 Projects should be designed and uses should be managed to maintain the integrity and function of caves, karst, cliffs, and talus slopes. Where alteration of these resources cannot be avoided, they should be mitigated to mimic pre-disturbance conditions and function.

Watersheds and Water

Watersheds within the **C.C. Cragin Watersheds**, Inner Basin Watershed, and Lake Mary Watersheds Management Areas contribute water to public water systems.

Desired Conditions for Watersheds and Water

FW-Water-DC

3 Vegetation and soil conditions in watersheds support important ecosystem services such as clean water, base flow, riparian communities, and long-term soil productivity. These conditions also help moderate climate variability and change. Soil and vegetation function to facilitate precipitation infiltration and groundwater recharge.

Guidelines for Watersheds and Water

FW-Water-G

1 Watersheds should have enough vegetative ground cover to recover rapidly from natural and human disturbances and to maintain long-term soil productivity.

Management Approaches for Watersheds and Water

Consider prioritizing and accelerating watershed treatments such as vegetation thinning, prescribed burning, and channel stabilization in C.C. Cragin Watersheds MA, Lake Mary Watersheds MA, and Inner Basin Watershed MA to help reduce the threat of crown fires, flood volumes, sedimentation impacts, and risk of future wildfires.

Riparian Areas

Desired Conditions for All Riparian Areas

FW-Rip-All-DC

1 Within their type and capability, riparian ecosystems and corridors promote the natural role of water, sediment, woody debris, and root masses, and maintain water tables. This includes perennial and intermittent riparian stream courses. The associated water table supports riparian vegetation.

Guidelines for All Riparian Areas

FW-Rip-All-G

1 Management activities such as vegetation treatments or other restoration actions should be designed to maintain or move toward desired conditions for other uses and resources.

2 Riparian areas should be managed to promote natural movement of water and sediment, to maintain ecological functions, and to maintain habitat and corridors for species.

Desired Conditions for Riparian Forest Types

FW-Rip-RipType-DC

1 Riparian forests are in proper functioning condition. Periodic flooding and scouring are the primary natural disturbances and promote a diverse plant structure consisting of herbaceous, shrub, and tree species of all ages and size classes necessary for the recruitment and succession of riparian-dependent species. Age and size classes include seedling, sapling, mature, and over mature vegetation. Fire is infrequent.

2 Riparian forests provide the composition and structure to filter sediments, ash, and contaminants; build and stabilize banks; reduce the effects of flooding; store and release water; and recharge aquifers. Riparian forests provide habitat and help maintain temperatures necessary for maintaining populations of native aquatic and riparian-dependent species and for their dispersal. At the landscape scale, overall plant composition is similar to site potential (greater than 66 percent). Plant composition can vary considerably at the fine- and mid-scales, depending on site potential (as determined by TEUI or other appropriate ecological classification system) and climate, elevation, geomorphology, topography, soils, and smaller scale disturbances.

Wetlands

Desired Conditions for Wetlands

FW-Rip-Wtlnds-DC

1 Wetlands provide functional soil and water resources on most acres, consistent with their flood regime and flood potential, and provide diverse habitats for native species. Wetlands are in or trending toward proper functioning condition.

2 Consistent with the natural hydrologic cycle, wetland vegetation has a variety of age classes ranging from young to old and a composition of native species that reflects the individual wetland types. Plant composition can vary considerably at the fine- and mid-scales depending on site potential (as determined by TEUI or other appropriate ecological classification system) and geomorphology, elevation, climate, topography, soils, and smaller scale disturbances. Wetlands include vegetation that indicates maintenance of riparian soil moisture characteristics.

Desired Conditions for Springs

FW-Rip-Spr-DC

1 Springs have functional soil, water, and vegetative resources consistent with natural water flow patterns, recharge rates, and geochemistry appropriate for the site.

2 Spring vegetation has young, mid, and late seral stages and a composition of native aquatic and riparian species consistent with spring type, slope, aspect, natural disturbances, and natural solar energy budget (amount of radiation during different times of the year).

3 Spring riparian zones are capable of filtering sediment, capturing and/or transporting bedload, improving or maintaining water quality, providing groundwater recharge and supporting perched water-bearing zones within their natural potential, consistent with the spring type.

All Terrestrial ERUs

FW-TerrERU-All-DC

1 Each ERU contains a mosaic of vegetation conditions, densities, and structures. This mosaic occurs at a variety of scales across landscapes and watersheds and reflects the natural disturbance regimes affecting the area.

2 Within their type and capability, terrestrial ERUs are functioning properly and are resilient to the frequency, extent, intensity, and severity of disturbances, such as fire in fire-adapted systems, and adapt to climate variability. Natural and human disturbances provide desired overall plant density, species composition (mix of species), structure, coarse woody debris, and nutrient cycling. Desired disturbance regimes, including fire, are restored where practical.

3 Vegetation and stream ecosystems are connected based on natural patterns that are consistent with landforms and topography and provide for upland and aquatic species movements and genetic exchange.

4 Vegetation conditions allow for inclusions and variability within the landscape as well as for transition zones or ecotones between riparian areas, forests, woodlands, shrublands, and grasslands. Transition zones shift in time and space due to factors affecting site conditions (such as fire or climate). Stringers persist where they naturally occur. For example, pine stringers are noncontiguous narrow communities of pine (often large old trees) that extend into lower elevation vegetation.

5 Vegetation provides ecologically sustainable amounts of products, such as wood fiber or forage.

Guidelines for All Terrestrial ERUs

FW-TerrERU-All-G

1 Management activities such as vegetation treatments or other restoration actions should be designed to maintain or move toward desired conditions, to minimize impacts to other uses and resources, and to maintain biodiversity created by inclusions, landscape variability, and transition zones.

3 If needed to support restoration activities, seeding with native species appropriate for the ecological unit (or similar in elevation, soil type, and ecosystem) should be used to restore the desired native species composition of the area. Use of desirable, non-native plant materials may be allowed where native plant materials are unavailable, cost-prohibitive, insufficient to address site-specific problems, and the non-native plant materials do not impede re-establishment of native species.

Grassland ERUs

General Description and Background for Grassland ERUs

The Coconino NF has three different grassland ERUs: Semi-desert Grassland, Great Basin Grassland (also known as Colorado Plateau/Great Basin Grassland), and Montane/Subalpine Grassland. One of the defining characteristics of grasslands is the amount of canopy cover, generally less than 10 percent. Many of these grasslands within the Forest boundary are at least partially in private ownership.

There are two grassland ERUs within analysis boundary. These are montane/subalpine and Great Basin grasslands.

Montane/Subalpine Grasslands

The higher elevation Montane/Subalpine Grassland ERU covers approximately 23,656 acres within lands managed by the Coconino NF. Typical locations of the montane portion include Kendrick Park, Antelope Park, and Bargaman Park whereas the subalpine portion is located on the San Francisco Peaks, on deeper soils with warmer, drier aspects than adjacent mixed conifer or spruce-fir vegetation. This ERU is more productive than Great Basin, and Semi-desert Grassland ERUs.

Great Basin Grasslands

Great Basin Grassland ERU are more arid than Montane/Subalpine Grassland ERU. They consist mostly of grasses with smaller amounts of forbs and shrubs. Trees can be present in trace amounts depending on the soil; however, tree canopy is increasing in some areas. Species include, but are not limited to, western wheatgrass, black grama, blue grama, galleta grass, hairy grama, spike muhly, and needle and thread grass. Trees may include sparse one-seed juniper, alligator juniper, red berry juniper, Utah juniper, and Colorado pinyon pine. Natural disturbances are weather, low-intensity/high-severity fire (from adjacent ERUs), and natural soil movement (such as natural shrink-swell and seasonal surface cracking).

Desired Conditions for Grassland ERUs

FW-TerrERU-Grass-DC

Landscape Scale (1,000 to 10,000+ acres)

1 Grasslands occur on soils classified as Mollisol or those with relatively thick organic surfaces. Canopy cover of trees and shrubs on grasslands is less than 10 percent. Grassland vegetation is dominated by native grasses, forbs and annuals of varying seral stages where they naturally occur. Early seral stages will typically contain more forbs, and as stages get older, they are dominated by more grasses and fewer forbs. Native plant species are present in natural patterns of abundance and density, and regenerate successfully in most years depending on seasonal climatic conditions. At the landscape scale, overall plant composition is similar to site potential (greater than 66 percent). Plant composition can vary considerably at the fine- and mid-scales depending on site potential (as determined by TEUI or other appropriate ecological classification system) and climate, topography, soils, and smaller scale disturbances. Succulents are present on more arid sites.

3 Grasslands are connected based on the distribution of soils classified as Mollisol or those with relatively thick organic surfaces and are not fragmented.

Mid-Scale (10 to 999 acres)

6 In Montane Grasslands, soil surface structure is granular or well aggregated, which promotes water infiltration at natural rates and reduces runoff. Natural surface drainages and subsurface flow patterns maintain water flow into connected waterbodies or streams.

Guidelines for Grassland ERUs

FW-TerrERU-Grass-G

2 Grassland composition, structure, and productivity and soil function should be protected and enhanced using methods such as fencing, aerating soil (decompacting soils), improved grazing strategies, or strategic location of constructed waters or of roads.

Pinyon Juniper ERUs

General Description and Background for Pinyon Juniper ERUs

There are three pinyon juniper ERUs on the Coconino NF: Pinyon Juniper with Grass (includes Juniper with Grass), Pinyon Juniper Evergreen Shrub, and Pinyon Juniper Woodland (also called Pinyon Juniper (persistent). All three occur in the analysis boundary. Where?

Desired Conditions for Pinyon Juniper ERUs

FW-TerrERU-PJ-DC

3 In Pinyon Juniper with Grass, fires typically occur every 1 to 35 years with low severity and patches of mixed severity (Fire Regime I) favoring regrowth and germination of native grasses and forbs.

4 In Pinyon Juniper with Grass, scattered shrubs and a dense herbaceous understory including native grasses, forbs, and annuals, are present to support frequent surface fires. Shrubs average less than 30 percent canopy cover. At the landscape scale, overall plant composition is similar to site potential (greater than 66 percent) but can vary considerably at the fine- and mid- scales owing to a diversity of seral conditions. The seral state proportions contained in appendix E apply at the landscape scale, where low overall departure from reference proportions is a positive indicator of ecosystem condition.

9 In Pinyon Juniper Evergreen Shrub, the understory is dominated by low to moderate density of shrubs, depending on seral stage. The shrub component consists of one or a mix of evergreen shrub, oak, manzanita, mountain mahogany, sumac, skunk bush, Fremont barberry, and other shrub species, which are well distributed. A variety of low- to high-growing native perennial and annual grasses and forbs are present in the interspaces. Shrubs average greater than 30 percent canopy cover. At the landscape scale, overall plant composition is similar to site potential (greater than 66 percent) but can vary considerably at fine- and mid-scales owing to a diversity of seral conditions. The seral state proportions contained in appendix E apply at the landscape scale, where low overall departure from reference proportions is a positive indicator of ecosystem condition.

Guidelines for Pinyon Juniper ERUs

FW-TerrERU-PJ-G

1 In all pinyon juniper ERUs, soils classified as Mollisols should be managed toward grassland desired conditions.

2 In areas where there is little understory and treatments are proposed, slash treatments (such as lop and scatter and mastication) should be used that improve herbaceous vegetation growth, watershed condition, and soil productivity. The intent is to encourage response in herbaceous vegetation and allow smaller debris to decompose in place on the ground.

Aspen and Maple

General Description and Background for Aspen and Maple

Aspen is an early seral shade-intolerant species that occurs as groups or clones. Its distribution can vary in space and time and is influenced by soil type, soil moisture, low temperatures, and disturbances (primarily wildfires, but occasionally flooding) that stimulate root sprouting and colonization. Aspen sites may or may not have a significant conifer component depending on successional status. Aspen primarily occurs in the Mixed Conifer with Infrequent Fire and Spruce-Fir ERUs but may also be found in cool moist locations in the Mixed Conifer with Frequent Fire and Ponderosa Pine ERUs.

Maple is a shade-tolerant later seral species generally found in wetter and cooler sites, canyons, and draws. It is currently more abundant in the bottom than in the top of snow-melt drainages on the Mogollon Rim. Bigtooth maple is a deciduous tree or shrub and its form is dependent on the moisture regime. It is generally fire-tolerant, sprouting from root crowns after low to moderate severity burns. The white fir/bigtooth maple community represents a unique vegetation type found in Arizona at only a few locations along the Mogollon Rim. It is important wildlife habitat especially for birds and black bears.

Desired Conditions for Aspen and Maple

FW-TerrERU-AspMpl-DC

1 Where they naturally occur, all age classes of aspen and maple are present in groups or patches and are regenerating and vigorous, providing habitat for a variety of species. Natural and human disturbances are sufficient to maintain desired overall tree density, structure, species composition, coarse woody debris, and nutrient cycling. The size and number of patches depend on the scale and type of disturbance as well as microsite conditions such as elevation, soil type, aspect, and site productivity. A diverse understory consisting of native graminoids, forbs, and/or shrubs is present and has a variety of seral stages and age classes.

Guidelines for Aspen and Maple

FW-TerrERU-AspMpl-G

1 Where needed, aspen and maple should be protected from excessive herbivory using methods such as fencing that protect regeneration and recruitment. Fences should be removed when no longer needed to allow wildlife and human access.

Management Approaches for Aspen and Maple

Regularly inspect and maintain fences used to protect aspen and maple to ensure recovery

Ponderosa Pine

Mid-Scale (10 to 999 acres)

FW-TerrERU-PP-DC

10 Diversity of understory species (such as grasses, forbs, and shrubs) is within the capability of the site and provides for water infiltration and soil stability. The understory has a variety of heights of cool and warm season vegetation and produces seed heads and all age classes of vegetation food and cover for wildlife and forage for livestock. A mosaic of dense cover, high amounts of litter, and bare ground provide habitat for a variety of species.

All Mixed Conifer ERUs

Desired Conditions for Mixed Conifer ERUs

FW-TerrERU-MC-All-DC

2 Native herbaceous and shrub species occur in natural patterns of abundance and density with varying seral stages ranging from young to old and are regenerating successfully. The amount of shrub cover depends on the TEUI unit. At the landscape scale, overall plant composition is similar to site potential (greater than 66 percent) but can vary considerably at fine- and mid- scales owing to a diversity of seral conditions. The seral state proportions contained in appendix E apply at the landscape scale, where low overall departure from reference proportions is a positive indicator of ecosystem condition.

Mixed Conifer with Frequent Fire

Landscape Scale (1,000 to 10,000+ acres)

FW-TerrERU-MC-MCFF-DC

4 The composition, structure, and function of vegetation conditions are resilient to the frequency, extent, intensity, and severity of disturbances and to climate variability. The landscape is a

functioning ecosystem that contains all its components, processes, and conditions that result from natural levels of disturbances (such as insects, diseases, fire, dwarf mistletoe, drought, and wind) including: snags, downed logs, and old trees which allows for the establishment and sustainability of the desired forest structure over time. Graminoids, forbs, shrubs, needle cast (fine fuels), and small trees maintain the natural fire regime. Vegetative ground cover provides protection from accelerated soil erosion, promotes water infiltration, and contributes to soil nutrient cycling, plant and animal diversity, and to ecosystem function.

8 Ground cover consists primarily of perennial grasses and forbs capable of carrying surface fire, with basal vegetation values ranging between about 5 and 20 percent, depending on the TEUI (soil) unit. Fires burn primarily on the forest floor and do not spread between tree groups as crown fire, but may result in torching of single trees or tree groups.

Fine Scale (less than 10 acres)

FW-TerrERU-MC-MCFF-DC

10 Trees typically occur in irregularly shaped groups and are variably spaced with some tight clumps. Crowns of trees within the mid-aged to old groups are interlocking or nearly interlocking. Old-growth groups are trees having similar characteristics and conditions. Such groups may include fairly similar tree ages and sizes or combinations of ages and sizes, limited amounts of dead and downed material, and dead trees and spike tops, but they are readily distinguished from adjacent groups having different characteristics. In local areas, trees are randomly distributed. Interspaces surrounding tree groups and patches are variably shaped and composed of a mix of graminoids, forbs, and shrubs. Some natural openings contain individual trees or snags.

Mixed Conifer with Infrequent Fire ERU

Mixed Conifer with Infrequent Fire is also known as Wet Mixed Conifer. It covers approximately 37,143 acres within lands managed by the Coconino NF and is generally on moister sites than Mixed Conifer with Frequent Fire such as higher elevations on the San Francisco Peaks or **along the Mogollon Rim**. It may also occur in canyons and north-facing slopes such as on Hutch Mountain and Mormon Mountain. Tree species composition varies depending on seral stage, elevation, and moisture availability. This ERU can be composed of dominant and codominant species such as: Douglas-fir, New Mexico locust, southwestern white pine and limber pine, and late seral species such as maple, and white fir. Ponderosa pine may be present in minor proportions. The absence of significant proportions of Engelmann spruce and/or corkbark fir distinguishes Mixed Conifer with Infrequent Fire from the Spruce-Fir ERU.

Fine Scale (less than 10 acres)

10 Small openings are present as a result of disturbances. Some openings may support grasses, forbs, and shrubs and provide habitat for species such as Colorado blue columbine, Rusby milkvetch, Oregon willow herb, and timberland blue-eye grass.

Forest Products

General Description for Forest Products

Forest products generally include botanical products, such as boughs, cones, fruits, seeds and plants and are provided using special use permits. Small amounts of these product are generally provided without permit for personal use.

Desired Conditions for Forest Products

FW-FProd-DC

1 The Coconino NF provides a sustainable supply of forest products consistent with other resource desired conditions and applicable laws and regulations. This supply contributes to the stability and social, **economic**, and **cultural** aspects of the communities in central and northern Arizona.

3 Traditional and ceremonial tribal uses for forest products, such as the collection of medicinal plants, wild plant foods, basketry materials, kiva beams, and firewood, are available under conditions and procedures that minimize restrictions and are consistent with laws, regulations, and agreements with **tribes.**

Wildlife, Fish, and Plants

General Description and Background for Wildlife, Fish, and Plants

Species are primarily dependent on the condition of their habitats. The plan addresses species needs by providing guidance to maintain and/or enhance habitat elements that are important for species found on the forest, in addition to addressing threats specific to habitat and providing guidance for species-specific threats. Guidance to manage species is found in this section on Wildlife, Fish, and Plants, as well as in the sections of this plan that relate to their habitats and specific resources like recreation.

Desired Conditions for Wildlife, Fish, and Plants

FW-WFP-DC

1 Properly functioning ecosystems and ecologically responsible forest activities support sustainable populations of native plant and animal species distributed throughout their potential natural range. Properly functioning ecosystems reflect the diversity, quantity, quality, and site potential of natural habitats on the Forest. Habitat is available at the appropriate spatial, temporal, compositional, and structural levels for a wide variety of species.

3 Terrestrial ERUs and riparian areas provide the necessary physical and biological habitat components for carrying out growth, reproduction, survival, dispersal, and other key life cycle needs of associated native species.

5 The composition, structure and function of ERUs and associated physical elements (such as canyons, cliffs, caves, karst, talus slopes, rock piles, specific soil types, springs, wet areas, and other special features) provide functioning habitat and refugia to support populations of federally listed, Southwestern Region sensitive species, narrowly endemic species, and species with restricted distributions.

Guidelines for Wildlife, Fish, and Plants

FW-WFP-G

10 Projects and management activities should be designed and implemented to maintain refugia and primary life cycle needs of Southwestern Region sensitive species and to protect and provide for narrowly endemic species and species with restricted distributions where they are likely to occur.

Desired Conditions for Established and Proposed Research Natural Areas and Designated Botanical and Geological Areas

The 339-acre Mogollon Rim Botanical Area preserves a representative portion of a white fir/bigtooth maple community. This community represents a unique vegetation community in Arizona and is found only at a few locations along the Mogollon Rim.

The Mogollon Rim Botanical Area is part of a larger area along the Mogollon Rim known as the “snow-melt draws”. This area is generally characterized by steep slopes or canyon bottoms and provides habitat

for a diverse community of organisms including a wide variety of songbirds. The botanical area was impacted by the Packrat Fire (2002) which has resulted in the loss of the white fir overstory in some areas.

SA-RNABotGeo-DC
5 The unique characteristics of botanical and geological areas are protected and maintained. The inherent physical and biological processes of botanical areas and geological areas are sustained, and not negatively impacted from human activities or permitted uses. Natural processes continue to shape and define the unique features, characteristics, and formations of these areas.
6 Botanical areas and geological areas provide opportunities for study, monitoring, and interpretation.

Guidelines for Established and Proposed Research Natural Areas and Designated Botanical and Geological Areas

SA-RNABotGeo-G

1. To support the area's purpose, human activities, permitted uses, and types and levels of access should be managed to protect the uniqueness and/or ecological condition of these special areas, and the values for which they were designated, established, or proposed.
2. In established and proposed research natural areas, fire management activities should be designed and implemented to mimic natural fire processes and should be compatible with ongoing research.
3. Fire should be managed using minimal impact suppression tactics or other appropriate suppression tactics to protect the resources for which research natural areas, botanical areas, and geological areas were designated, established, or proposed.
4. Allotment management plans should have provisions to protect the uniqueness and/or ecological condition of these designated, established, or proposed special areas that occur within an active grazing allotment.

Invasive Species

General Description and Background for Invasive Species

Executive Order 13112 defines an invasive species as any species that is non-native (or alien) to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health. Invasive species generally possess one or more of the following characteristics: aggressive and difficult to manage; poisonous; toxic; parasitic; a carrier or host of serious insect or pathogen; and being non-native, new, or not common to the United States or parts thereof. Invasive species pose an increasing threat to the integrity of ecosystems by decreasing native plant and animal diversity, increasing soil erosion and sedimentation, and interfering with natural fires regimes. Reducing the threat of aquatic and terrestrial invasive species will allow the Coconino NF to better manage resilient landscapes and species populations that have a greater capacity to survive natural disturbances and uncertain future environmental conditions such as those driven by climate change and increasing human uses.

Invasive species include aquatic and terrestrial vertebrates, invertebrates, plants, and pathogens. Priority infestations or populations have the greatest threats to native species populations, watershed condition, ecosystem health, and biological diversity.

Desired Conditions for Invasive Species

FW-Invas-DC

1 Invasive species are absent or exist at levels where they do not disrupt ecological composition, structure, and function; do not disrupt the natural fire regime; or do not affect the sustainability of native and desirable non-native species.

2 Infestations of invasive species are detected at an early stage.

Guidelines for Invasive Species

FW-Invas-G

1 Measures should be incorporated into authorized activities, project planning, and implementation to prevent, control, contain, and eradicate priority infestations or populations of invasive species to ensure the integrity of native species populations and their habitats is maintained.

2 Integrated pest management approaches and other treatments to control invasive species should be used to improve watershed condition and maintain ecosystem function while minimizing project impacts on native species. [1]

3 Weed-free plant material should be selected for all seeding and mulching projects to restore natural species composition and ecosystem function to the disturbed area. Plant or seed materials should be used that are appropriate to the site, capable of becoming established, and are not invasive.

Management Approaches for Invasive Species

Maintain a current inventory of invasive species on forest lands. For plant inventories, prioritize areas of unique and rare habitats first, areas of high use and disturbance second (such as material pits, trailheads, campgrounds, corrals, roads, boat ramps, and bridges), and areas where invasive species are just getting established.

Prioritize areas such as wilderness, research natural areas, botanical areas, wild and scenic areas, and riparian areas for control of invasive species to maintain and restore the integrity of native species and ecosystems. Promote early detection of new populations of invasive species and rapid management response as an effective approach to minimize spread.

Coordinate with stakeholders and the public to reduce, minimize, or eliminate the potential introduction, establishment, spread, and impact of non-native invasive species and to monitor the effectiveness of project design features.

Encourage the prevention of accidental introduction and spread of invasive species carried by contaminated vehicles, equipment, personnel, or materials (including plants, wood, plant/wood products, water, soil, rock, sand, gravel, mulch, seeds, grain, hay, straw, animal feeds, or other materials).

Guidelines for All Recreation

FW-Rec-All-G

6 Forest visitors with recreational stock should carry hay, cubed, pelleted, or rolled feed that is certified **weed**-free to prevent the spread of invasive plants.

Desired Conditions for Developed Recreation

FW-Rec-Dev-DC

9 In and around developed sites, **invasive weeds** and invasive aquatic organisms are not established or transported.

Desired Conditions for C.C. Cragin Watersheds Management Area

MA-CCCrg-DC

1. There is low risk of substantial damage from uncharacteristic fire and recreation to water supply, infrastructure, water quality, visual quality, and cultural integrity (such as tribes and local communities).

Guidelines for C.C. Cragin Watersheds Management Area

MA-CCCrg-G

1 The C.C. Cragin Watersheds MA should be managed to reduce the threat of uncharacteristic wildfires, flooding, and sedimentation, and to maintain water quality and quantity.

2 Roads and trails within the C.C. Cragin Watersheds MA should be maintained to prevent erosion and sedimentation and to protect existing infrastructure.

Tonto National Forest Land Management Plan (1985)

Common to all areas

Standards and Guidelines

Replacement page 40-1

- Identify, survey, map, and analyze habitat for all Federally-listed species. Identify management conflicts and enhancement opportunities. Correct any management conflicts or problems.
- Identify, survey, map, and analyze habitat for all state species as listed in Threatened Native Wildlife in Arizona. Correct any management conflicts or problems.
- Continue to clear all projects for threatened, endangered, proposed, and candidate plant and animal species. Clearances will be done by a Wildlife Biologist and reviewed by the Forest Biologist.
- New additions of listed, proposed, or candidate species by the US Fish and Wildlife Service will be protected.
- Where appropriate and feasible, culture and stock candidate plants such as Chiricahua Dock (*Rumex orthoneurus*) into suitable habitats to eliminate the need for formal listing by the US Fish and Wildlife Service
- Maintain a minimum of 30% effective ground cover for watershed protection and forage production, especially in primary wildlife forage producing areas. Where less than 30% exists, it will be the management goal to obtain a minimum of 30% effective ground cover.
- Habitat requirements for endangered species will have precedence over threatened species. Habitat requirements for threatened, endangered, and **sensitive species** will take precedence over requirements for other species and habitat requirements for **sensitive species** will take precedence over non-sensitive species.

Wildland Fire will receive an appropriate management response and be managed consistent with Wilderness resource objectives. Naturally occurring fires may be used to play as nearly as possible their natural ecological role and to reduce unnatural fuel hazards as identified in the Forest Service Manual and approved Wilderness Implementation Plan.

All reported wildland fires will receive a strategic fire size-up. Wildland fires meeting locally developed operating guidelines listed below may be managed for resource benefit.

1. Fire cause is from a natural ignition.
2. Fire does not threaten life, property, public and firefighter safety.
3. Fire does not threaten fire sensitive cultural resources.
4. ADEQ, Air Quality Division procedures and guidelines for consultation and management of smoke will be implemented.
5. Wildland Fire managed for resource benefit must meet Tonto, Regional, and National fire situation parameters.
6. No site-specific resource objective is threatened.

For each wildland fire located in an FMU approved for wildland fire use and naturally ignited, a decision criteria checklist will be prepared to determine whether or not it should be declared a Wildland Fire use candidate. If approved, a Wildland Fire Implementation Plan (WFIP) will be prepared that identifies specific resource concerns.

Designated Wildland Fires managed for resource benefit will be monitored according to established guidelines.

Wildland Fire suppression actions using accepted fire management tactics will be taken if any of the above parameters are not met. Suppression of fires, or portions thereof, will be undertaken where they adversely affect forest resources, endanger public safety and/or have potential to damage private lands.

Management Area 4D Payson Ranger District – Mogollon Rim Area

Description: This management area includes the ponderosa pine forested area below the Mogollon Rim. The area includes 13 developed and public service sites totaling 169 acres. Most of the area is ponderosa pine forest with the exception of 610 acres of riparian. 81 percent of the ponderosa pine forest occurs on slopes less than 40 percent.

Management Emphasis: Manage for a variety of renewable resource outputs with primary emphasis on intensive, sustained yield timber management, timber resource protection, creation of wildlife habitat diversity, increased populations of emphasis harvest species, and recreation opportunity. Timber harvesting methods and timing will include improvement of wildlife habitat quality and watershed condition, and will consider impacts on intensive range and recreation management. Mining activities are authorized in conformance with existing laws and regulations. Visual quality protection will be emphasized in the area (Analysis Area 5542) of the Highline Trail, a National Recreation Trail. Wildland Fires will be managed consistent with resource objectives. Wildland Fires will be managed with an appropriate suppression response. Fire management objectives for this area include providing a mosaic of age classes within the total type which will provide for a mix of successional stages, and to allow fire to resume its natural ecological role within ecosystems. Wildland Fires or portions thereof, will be suppressed when they adversely affect forest resources, endanger public safety, or have a potential to damage significant capital investments.

Standards and Guidelines

- Aspen stands should be periodically harvested to achieve wildlife benefits. A 20-year rotation retaining some old growth has been proposed. The oak component of the conifer types and the

Encinal oak type will be maintained. Oak may be cut to improve spacing and sprouting. Thickets can be cut to thin but retain at least 40% of the stand. When thinning stands, retain large trees contributing the bulk of the mast crop. Manage oak to enhance band-tailed pigeon and whitetail deer habitat, especially within 1/2 mile of water.

- Retain alligator-juniper as a component where it occurs in commercial forest land. Replacement page 130.
- Habitat requirements for threatened, endangered and sensitive species will take precedence over requirements for other species Replacement page 131
- Exclude cable logging on the face of the Mogollon Rim replacement page 132.
- Manage noncommercial species within the pine type to maintain their representation in the vegetative diversity.
- Manage the oak component to maximize an optimum mix of mast and browse to accomplish wildlife objectives. Replacement page 133
- Ensure the silvicultural prescriptions and logging practices provide adequate protection of the Chihuahua pine stand and other biological benchmarks. Page 134.
- If necessary, maintain animal control fencing on reforestation plots until the regenerated stands are fully established. Page 134.
- Use prescribed fire to treat vegetation for water yield, forage, and wildlife habitat improvement. Replacement Page 136-1.

Management Area 4F Payson Ranger District – General Management Area

Description: This management area is comprised of several vegetation types, including ponderosa pine. 89 percent of the ponderosa pine forest occurs on slopes less than 40 percent, but the ponderosa pine vegetation type represents only about 3.5 percent of the management area.

Management Emphasis: Wildland Fires will be managed consistent with resource objectives. Wildland Fire not meeting management objectives will receive an appropriate suppression response. Fire management objectives for this area include providing a mosaic of age classes within the total type which will provide for a mix of successional stages, and to allow fire to resume its natural ecological role within ecosystems. Wildland Fires or portions thereof will be suppressed when they adversely affect forest resources, endanger public safety, or have a potential to damage significant capital investments.

Sonoran Desert and Riparian vegetative types will be protected from fire except where separate burn plans have identified an ecological need.

Standards and Guidelines

- Continue periodic inspection and maintenance of existing wildlife exclosures and restoration projects. Develop report as needed to describe results of studies. Improve the level of protection and maintenance at these sites to ensure their continued informational value for wildlife management. Replacement Page - 140

- Integrate habitat needs through prescribed fire within fire suppression objectives. Replacement Page - 140

- Use prescribed fire as necessary to enhance natural regeneration. Replacement Page - 142

- All except Riparian Areas - Use prescribed fire to treat vegetation for water yield, forage, and wildlife habitat improvement. Replacement Page 143-1

Management Area 5A Pleasant Valley Ranger District – Sierra Ancha Wilderness

Management Emphasis: Manage for wilderness values, wildlife habitats and natural ecological processes while allowing livestock grazing and recreation opportunities that are compatible with maintaining these values and processes. Replacement Page 144. Wilderness areas are not scheduled for treatment in this analysis.

Management Area 5D Pleasant Valley Ranger District – Mogollon Rim-Sierra Ancha Area

Management Emphasis: Manage for a variety of renewable resource outputs with primary emphasis on intensive, sustained yield timber management, timber resource protection, creation of wildlife habitat diversity, increased populations of emphasis harvest species, and recreation opportunity. Timber harvesting methods and timing will include improvement of wildlife habitat quality and watershed condition, and will consider impacts on intensive range and recreation management. Replacement page 151.

The dominant vegetation type in this management area is ponderosa pine (99%). 72 percent of the ponderosa pine in the management area occurs on slopes that are 40 percent or less. However, a large portion of the ponderosa pine forest is unsuitable for timber operations (USDA Forest Service 1985).

Standards and Guidelines

- Aspen stands should be periodically harvested to achieve wildlife benefits. A 20-year rotation retaining some old growth has been proposed. Page 154.
- The oak component of the conifer types and the Encinal oak type will be maintained. Oak may be cut to improve spacing and sprouting. Thickets can be cut to thin but retain at least 40% of the stand. When thinning stands retain large trees contributing the bulk of the mast crop. Manage oak to enhance band-tailed pigeon and whitetail deer habitat, especially within 1/2 mile of water. Page 154.
- Retain alligator-juniper as a component where it occurs in commercial forest land. Page 154.
- Continue monitoring wildlife exclosures and restoration projects. Develop reports as needed to describe results of studies. Improve the level of protection and maintenance at these sites to ensure their continued informational value for wildlife management. Page 154.
- Habitat requirements for threatened, endangered, and sensitive species will take precedence over requirements for other species. Replacement Page 155.
- Exclude cable logging along the face of the Mogollon Rim. Replacement Page 156.
- Manage noncommercial species within the pine type to maintain their representation in the vegetative diversity. Replacement Page - 157
- Manage the oak component to maximize an optimum mix of mast and browse to accomplish wildlife objectives. Replacement Page - 157
- If necessary, maintain animal control fencing on reforestation plots until the regenerated stands are fully established. Replacement Page - 157
- Use prescribed fire for seedbed preparation to enhance natural regeneration and control of competing species such as juniper. Replacement Page – 157

Management Area 5E Pleasant Valley Ranger District – Sierra Ancha Experimental Forest

Management Emphasis: The Experimental Forest was established and is managed for purposes of research on vegetative treatments for increasing water yield. The Experimental Forest is operated by the Rocky Mountain Research Station, Flagstaff, Arizona, often cooperatively with Arizona State University and the University of Arizona. Replacement Page 161. The Sierra Ancha Experimental Forest will not be treated under this analysis. It contains occurrences of the Southwestern Region sensitive plant, Arizona bugbane.

Management Area 5G Pleasant Valley Ranger District – General Management Area

Management Emphasis: Manage for a variety of renewable natural resources with primary emphasis on wildlife habitat improvement, livestock forage production, and dispersed recreation. Watersheds will be managed so as to improve them to a satisfactory or better condition. Improve and manage the included riparian areas (as defined by FSM 2526) to benefit riparian dependent resources. Replacement Page – 164

This management area contains riparian, chaparral/pinyon-juniper and ponderosa pine vegetation types. The ponderosa pine vegetation type forms about 28 percent of the management area. 77 percent of the ponderosa pine forest is on slopes of less than 40 percent.

Standards and Guidelines

- Continue periodic inspection and maintenance of existing wildlife exclosures and restoration projects. Develop report as needed to describe results of studies. Page 166.
- Integrate habitat needs through prescribed fire within fire suppression objectives. Page 166.
- Manage the chaparral type on a 30-year prescribed fire rotation on those sites managed intensively for forage production and water yield. Page 166.
- All except Riparian Areas. Use prescribed fire to treat vegetation for water yield, forage, and wildlife habitat improvement. Replacement Page 168-1.

Management Area 6J Tonto Basin Ranger District – General Management Area

Management Emphasis: Manage for a variety of renewable natural resources with primary emphasis on wildlife habitat improvement, livestock forage production, and dispersed recreation. Watersheds will be managed so as to improve them to a satisfactory or better condition. Improve and manage the included riparian areas (as defined by FSM 2526) to benefit riparian dependent resources. Replacement Page 193.

Ponderosa pine forms only a small portion (about 2%) of this Management Area and is unsuitable for timber operations.

Sonoran Desert and Riparian vegetative types will be protected from fire except where separate burn plans have identified an ecological need. Replacement page 193.

Standards and Guidelines

- Continue periodic inspections and maintenance of existing wildlife enclosures and restoration projects. Develop report as needed to describe results of studies. Improve the level of protection and maintenance at these sites to ensure their continued informational value for wildlife management. Page 195.

- Integrate habitat needs through prescribed fires within fire suppression objectives. Page 195.
- Manage the chaparral type on a 30-year prescribed fire rotation on those sites managed intensively for increased forage production and water yield. Page 195.
- All except Riparian-Use prescribed fire to treat vegetation for water yield, forage, and wildlife habitat improvement. Replacement Page 198

Noxious or Invasive Weed NEPA Guidance

Each of the three forests in the project area has completed NEPA analyses to address noxious or invasive weed management within their forest boundary. In addition to guidance provided by individual Forest Plans, Forest Service Manual and Handbook, Executive Order, and state laws, guidance for noxious or invasive weed management will be dependent on the appropriate NEPA document. Each of these documents contains analyses for the weed species of concern, analyses of effects, control methods. Best management practices and mitigations by forest. Each is incorporated into the respective forest plan buy amendment (Tonto NF) or through incorporation into the recently revised Forest Plans.

Weed management for the Coconino National Forest is addressed in the Final Environmental Impact Statement for *Integrated Treatment of Noxious or Invasive Weeds, Coconino, Kaibab, and Prescott National Forests* (USDA Forest Service 2005)

Weed management for the Apache-Sitgreaves National Forest is addressed in the *Environmental Assessment for the A-SNFs Integrated Forest-Wide Noxious or Invasive Weed Management Program* (USDA Forest Service 2008)

Weed management for the Tonto National Forest is addressed in the *Environmental Assessment for Integrated Treatment of Noxious or Invasive Plants* (2012)

Rare Plants

Affected Environment and Environmental Consequences

This section details the affected environment and environmental consequences for the threatened, endangered and Southwestern Region sensitive plants and noxious or invasive weeds within the project area. It establishes the baseline against which the decision maker and the public can compare the effects of all action alternatives.

This section also describes the direct, indirect, and cumulative effects of implementing each alternative on threatened, endangered and Southwestern Region Sensitive plants and noxious or invasive weeds in the analysis area. It presents the scientific and analytical basis for the comparison of the alternatives presented in Alternatives section. NEPA requires consideration of "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 CFR 1502. 16). As declared by the Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA Section 101).

Affected Environment

Southwestern Region Regional Forester's Sensitive Plants

Desired future conditions for Southwestern Region Sensitive plants with habitat or locations within the planning area include:

- **Maintain or increase** the populations within the planning area. Additionally, suitable habitat for sensitive plant species should be **maintained or enhanced**.
- **Follow Forest Plans and Manual Direction** as applicable to Southwestern Region sensitive plant species.

The indicators used to evaluate environmental consequences are:

- A qualitative evaluation of whether populations are maintained or increased per FSM 2670. 5(19)
- A qualitative evaluation of whether potential habitat is maintained or enhanced
- An evaluation of whether impacts to sensitive plants and their habitats are effectively minimized
- An evaluation on habitat and species resiliency to natural disturbances including fire and climate change.

Table 1. Southwestern Region Regional Sensitive species occurring within the Project Area.

Common name	Scientific Name	Forest	ERU/Habitat	Data source	Notes
Villous groundcover milkvetch	*Astragalus humistratus var. crispulus*	Apache Sitgreaves	Narrow-leaf cottonwood/shrub.	HDMS Data (Arizona Game and Fish Department 2006), SEINet	These occurrences are in the Rodeo-Chediski Fire (2002) and are in severely disturbed sites.
Arizona Bugbane	*Actaea* (*Cimicifuga*) *arizonica*	Coconino, Tonto	Ponderosa pine, Mixed Conifer with Aspen	HDMS, (Arizona Game and Fish Department 2012), SEINet and Forest Service files.	Arizona bugbane occurs mostly in deep canyons.
Dane Thistle	*Cirsium parryi ssp. mogollonicum*	Coconino	Springs – limited to a few known locations in Dane Springs Canyon and nearby drainages/	Goodwin (2005)	Field notes prepared by Goodwin (2005) provide the most accurate location and condition description for this species.
Hairy Clematis (Arizona leatherflower)	*Clematis hirsutissima var. hirsutissima*	Coconino	Ponderosa pine	FS files	Generally on limestone soils.
Mogollon Fleabane	*Erigeron anchana*	Tonto	Ponderosa pine/willow, ponderosa pine/evergreen oak, mixed conifer frequent fire.	SEINet, HDMS (Arizona Game and Fish Department 2003)	Rock crevices or ledges on boulders and vertical rock faces, usually in canyons, usually on granite (HDMS 2003)
Rock Fleabane	*Erigeron saxatilis*	Coconino	Ponderosa pine, Mixed Conifer Frequent Fire, narrow-leaf cottonwood/shrub, willow/alder, Mixed Conifer with Aspen	SEINet, HDMS, (Arizona Game and Fish Department 2003) NRM/TESP	Cliffs or vertical rock faces, usually on Coconino sandstone
Arizona Sneezeweed	*Helenium arizonicum*	Coconino, Apache Sitgreaves	Ponderosa pine Forest (wet meadows) Apache Sitgreaves NF.	SEINet, FS files and local knowledge, NRM/TESP	

Common name	Scientific Name	Forest	ERU/Habitat	Data source	Notes
			Ponderosa Pine Forest, Montane-subalpine grasslands. Coconino NF		
Eastwood (Senator Mine) Alumroot	*Heuchera eastwoodiae*	All	Ponderosa Pine Evergreen Oak, (TNF) Mixed Conifer Frequent Fire (TNF) Mixed Conifer with Aspen (TNF, A-S) Cottonwood Shrub (TNF), Ponderosa Pine/Willow (TNF, A-S) and Ponderosa Pine (A-S)	SEINet and HDMS (Arizona Game and Fish Department 2005)	
Flagstaff beardtongue	*Penstemon nudiflorus*	Coconino	Ponderosa pine/Gambel oak	HDMS NRM/TESP	
Blumer's Dock	*Rumex orthoneurus*	All	Fremont cottonwood/shrub, herbaceous, Mixed conifer frequent fire, mixed conifer with aspen, narrow leaf cottonwood/shrub, ponderosa pine/evergreen oak, ponderosa pine/willow and ponderosa pine forest.	SEINet and HDMS	
Bebb's Willow	*Salix bebbiana*	Coconino, Apache Sitgreaves	Montane willow riparian forest for hart prairie	SEINet	

Assumptions

The environmental effects disclosed in this document are based on the following assumptions:

- All relevant laws, regulations, manual guidance and Forest Service policy relating to management of the resources discussed within are followed during analysis and implementation.
- Management will follow the guidance of the Forest Plans.
- Silviculture and prescribed burning treatments will be implemented as written and addressed in the Silviculture and Fire Specialist's Reports and not substantially modified without review of the effects of such actions.
- Management actions for activities related to roads and transportation as well as spring and channel restoration will be implemented as addressed in their respective reports and not substantially modified without review of the effects of such actions.
- Prescribed fires will be of lower severity and intensity in any given area compared to large-scale wildfires in the same area so the amount of disturbance from prescribed burning is less than compared to wildfires.
- Fire effects to individual species vary depending on several factors including life cycle, time of burning and several biotic and abiotic factors (Pyke, Brooks and D'Antonio 2010). As a result, the responses of the plant species discussed in this report may vary in any given area or time. The effects of fire on these species will be mitigated through the burning prescription.
- Areas to be treated will be surveyed for Southwestern Region sensitive plants before and after treatments are implemented. These factors should be considered when identifying survey needs
    - Target special features and microhabitat needed by the species of interest. This is generally only a small portion of the area and is estimated to be 5% or less of any given area.
    - Survey and mitigation will be based on the likelihood of any of the species addressed in this document occurring within the treatment area. Not all areas contain suitable habitat for a given species.
    - The amount of disturbance predicted to occur during treatment. For example, surveys may not be needed in areas scheduled for prescribed burning if the treatments are scheduled to be of low intensity.
- Areas to be treated will be surveyed for noxious or invasive weeds before and after treatments are implemented. These factors should be considered when identifying survey needs
    - Likelihood of any of the species addressed in this document occurring within the treatment area
    - Amount of disturbance. For example, surveys may not be needed in areas scheduled for prescribed burning if the treatments are scheduled to be of low intensity.
- The mitigations and Best Management Practices addressed in this document are included in analysis and project implementation.
- The acreage of potential disturbance in this project is much larger than generally analyzed in similar projects, necessitating more noxious or invasive weed treatments to control invasive species. This will lead to increases in personnel and budget to accomplish this need.

Indicators/Topics of Analysis

The indicators used to evaluate environmental consequences are:

1. A qualitative evaluation of whether populations are maintained or increased per FSM 2670.5(19)
2. A qualitative evaluation of whether potential habitat is maintained or enhanced
3. An evaluation of whether effects on sensitive plants and their habitats are effectively minimized

4. An evaluation on habitat and species resiliency to natural disturbances including fire and climate change.

Federally Listed Threatened or Endangered Plants

The Rim Country project area **does not include** any locations or potential habitat for Threatened or Endangered plant species so no threatened or endangered plant species will be analyzed for this project

Environmental Consequences

Alternative 1 No Action

Southwestern Region Regional Forester's Sensitive Plants

Direct and Indirect Effects common to all species

Alternative 1 is the no action alternative. This alternative would not address the purpose and need for the Rim Country Project and would provide any progress toward the improved conditions addressed in each of the three forest's Land Resource Management Plans (LMRPs).

Specifically portions of the purpose and need that would improve habitat for these species would not be addressed.

- There would be no increase in forest resiliency and sustainability
- The risk of uncharacteristic fire effects would not be reduced.
- Habitat for wildlife and aquatic species would not be improved
- Conditions and function of streams and springs would not improve
- There would be no opportunity to restore woody riparian species, including Bebb's willow.

There would be no tree cutting and no prescribed burning, so no reduction in , tree density. Tree canopy would not be reduced. Conditions associated with dense ponderosa pine stands result in physiologically stressful environments for understory plants. Stressors include increased shading, deep litter horizons, low soil moisture, low nutrient availability and contribute to a decline in species richness within the plant community (Laughlin, Moore and Fule 2011) These factors affect all understory species including Southwestern Region sensitive plants. There would continue to be a reduction or loss of understory vegetation and therefore, a loss of understory services

With no treatment, fire hazard would continue to increase therefore increasing the risk of severe wildfire in many parts of the project area (see Vegetation and Fire Reports for more information). Factors that contribute to fire hazard ratings that would be reduced through management actions such as canopy cover, trees per acre and dead and down fuel loading would not be reduced. The risk of wildfire transitioning to crown fires would increase in many areas of the project area resulting in the increased risk of severe wildfire and degradation of potential habitat. Severe wildfires often result in short and long-term effects, which include removal of tree canopy, loss of the understory plant community and alteration of soil structure and nutrients ((Pyke, Brooks and D'Antonio 2010), (Springer and Egan 2012). These changes could adversely affect the habitat and populations of Southwestern Region sensitive plants by damaging soil, killing existing plants and by reducing or destroying the seed bank. Fire size may also increase, leading to largescale crown fires, which in turn may cause a permanent loss in understory diversity (Covington 2000), (Springer, et al. 2018). Primary fire effects such as deaths of individual plants or groups may recover in a matter of a few years. However, secondary effects such as permanent changes in

biotic and abiotic factors can result in permanent changes in the post fire plant community (Pyke, Brooks and D'Antonio 2010) (Springer and Egan 2012)

There would be no opportunities to improve the condition and function of streams and springs so opportunities to improve habitat for such species as Arizona sneezeweed, Bebb's willow and Blumer's dock would not occur and areas that might have historically provided habitat for these species and would remain degraded and unsuitable for these and other plant species that require mesic conditions for their survival.

With no action, there would be no restoration of structure and function in the treatment areas, resulting in continued departure from the desired conditions for all resources in this project, including Southwestern Region sensitive plant species.

If Alternative 1 is selected management actions such as fuels reduction projects, prescribed fire, spring and channel restoration would be limited to those analyzed and implemented by the individual projects analyzed in other NEPA on each forest..

Effects Common to Alternatives 2 and 3

Villous groundcover milkvetch (Astragalus humistratus var. crispulus)

Villous groundcover milkvetch is a Southwestern Region sensitive species for Apache Sitgreaves.

Villous groundcover milkvetch is a perennial species with prostrate, forking stems. Its distribution is limited to southeastern Apache County in Arizona and in neighboring Catron County in New Mexico where it grows on sandy soils of volcanic origin in dry pine forests (Spellenberg 2007). The occurrences on the forest are in narrow-leaf cottonwood/shrub ERUs.

Existing Condition

The locations below were recorded by Glenn Rink and G. Clifton on July 23, 2014 for Bear Spring and July 24, 2014 for Black Canyon Lake. (SEINet - Arizona Chapter 2017). Figures 1 through 4 show the collection sites. Both sites within the Rodeo-Chediski Fire (2002). This landscape scale event was a major driving force in defining the existing conditions on these sites which is now outside the historic range variation (HRV).

Table 2. Locations and proposed treatments for villous groundcover milkvetch. Data are from SEINet.

Collector/Observer	Date	Location	Comments
G. Rink and G. Clifton	7/23/2014	Along the Mogollon Rim at Bear Spring, 34.31849 -110.45950	Within the Rodeo- Chediski Burn. Near edge of ponderosa pine forest. The estimated distance from the channel is less than 0.1 mile.
G. Rink and G. Clifton	7/24/2014	Spillway of Black Canyon Lake, southwest of Heber, 34.33100 -110.69794	Mogollon Rim, spillway of Black Canyon Lake, southwest of Heber Within the Rodeo- Chediski Burn. The estimated distance from the channel is less than 0.1 mile.

Figure 1. Location of villous groundcover milkvetch near Bear Spring

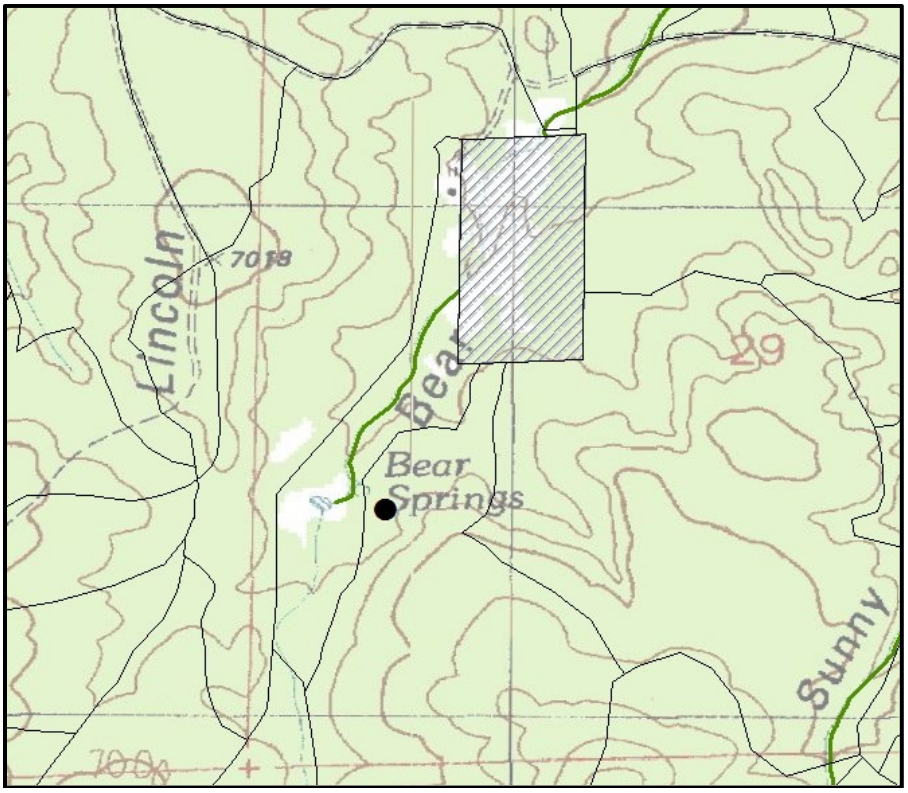


Figure 2. Google Earth image of Bear Springs area.

Figure 3. Location of villous groundcover milkvetch near Black Canyon Lake

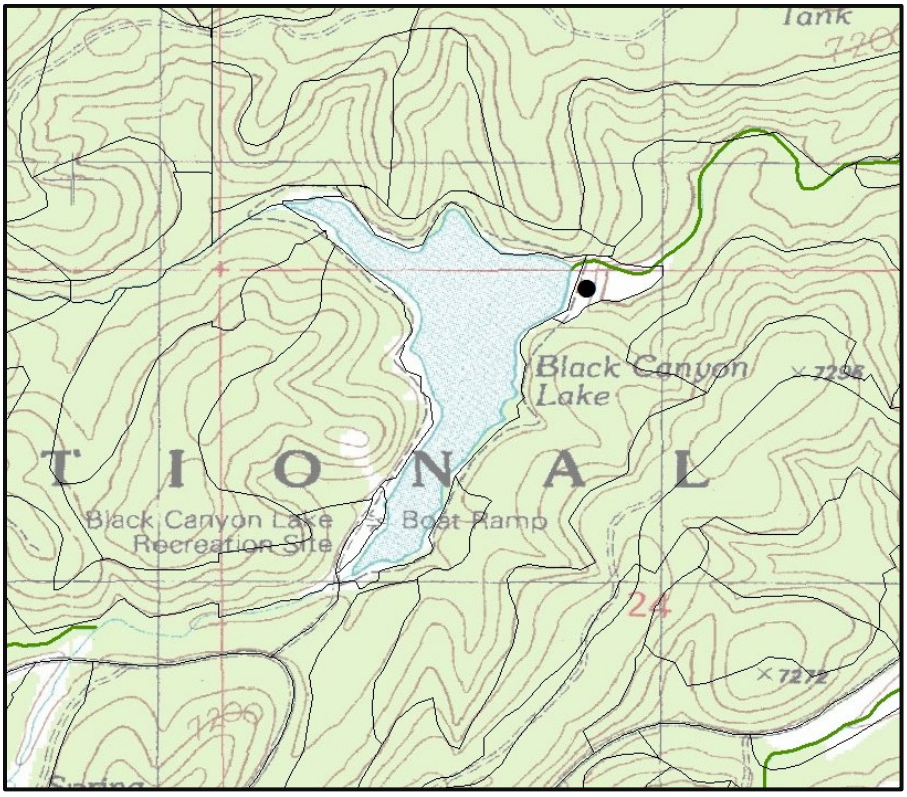


Figure 4. Google Earth image of Black Canyon Lake and occurrence of villous groundcover milkvetch.

Environmental Consequences

Effects Common Alternatives 2 and 3

Direct and Indirect Effects

The known occurrences of villous ground cover milkvetch are in areas proposed for stream channel restoration on the Apache-Sitgreaves NF. The project activities would help move the treated areas toward the desired conditions as described in the Apache-Sitgreaves LRMP including mitigating the landscape scale disturbance that occurred as a result of the Rodeo-Chediski Fire in 2002.

The plant locations were documented in 2014 so are present despite the disturbance from the fire. No scientific data or publications were found that document the effects of fire on the plant. Villous groundcover milkvetch has been observed growing in roadbeds so is assumed to tolerate disturbance (Spellenberg 2007) so will likely tolerate the burning treatments proposed for these areas. Mitigations such as BT003 that addresses disturbance will help reduce the risk of prescribed fire treatments.

Management activities related to stream restoration could result in the damage or loss of individual plants or groups of plants at the two known locations. This can be mitigated by following the guidelines for wildlife and rare plants in the forest plans, stating that modifications, mitigations, or other measures should be incorporated to reduce negative impacts to plants, animals, and their habitats and to help provide for species needs, consistent with project or activity objectives.

The management activities needed to restore the stream channels will be guided by the Aquatic Toolbox which will also mitigate the loss of plants. It is anticipated that the tools for improving the form and function of stream channels and floodplains (see Appendix D of FEIS) and the tools for improving spring outflows will be used at these sites. Mitigations such as AQ020, BT005, and BT007 will reduce the risk of management actions to the Southwestern Region sensitive plants at these sites.

Cumulative Effects

The timeframe for this analysis is from 2002 when the Rodeo-Chediski Fire burned through the area to 20 years in the future. The area of consideration for this analysis includes project boundary

The degraded channels in the area may be attributed at least in part to the effects of the Rodeo-Chediski Fire (2002) in the areas around the occurrences of villous groundcover milkvetch as well as in the watersheds above and attributed to the need for action to restore these channels.

The effects of recreation on the plants at Black Canyon Lake when added to the effects of implementing the activities proposed in the Rim Country Project may contribute to the impacts to the villous groundcover milkvetch in the area.

Other documented occurrences of villous groundcover milkvetch are within the Heber Wild Horse Territory. Desired conditions for this area include grazing that is in balance with the available forage. It is not known if horses or other grazers in the area utilize villous groundcover milkvetch as forage so cumulative effects are also unknown.

Determination of Effect

Implementation of Alternative 2 or 3 of the Rim Country EIS may impact individuals of villous groundcover milkvetch (*Astragalus humistratus* var. *crispulus)* but is not likely to result in a trend toward federal listing or loss of viability.

Dane (Mogollon) thistle (Cirsium parryi subsp. mogollicum)

Dane thistle is a sensitive species for Coconino National Forest. It is endemic to a few canyons on the Mogollon Rim Ranger District.

Dane thistle was first "discovered" in 1987 and its description was published in 1990 (Schaack and Goodwin 1990). Dane thistle is distinguished from the more common Parry thistle by its white corollas and nearly entire leaves (Arizona Game and Fish Department 2005)

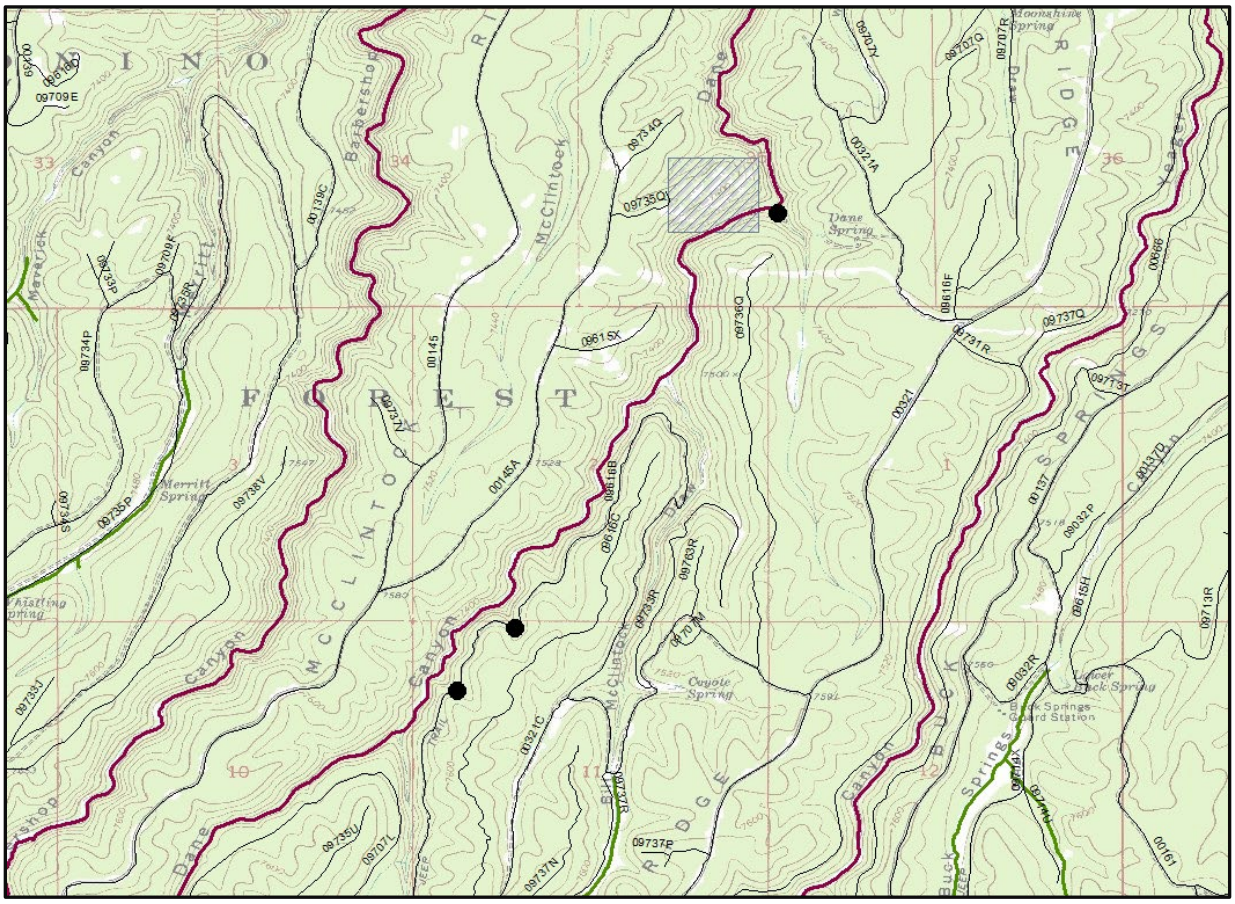
Existing Condition

This rare thistle is known from only four locations on the Mogollon Rim Ranger District, Coconino National Forest where it is associated with springs or canyons including Dane, Dane Spring, and Yeager Canyons (Goodwin 2005). The data provided by Goodwin show the locations for the plants in Dane Canyon and Dane Spring Canyon but no accurate description for the occurrence in Yeager Canyon was found. These areas are proposed for aquatic habitat restoration.

The occurrence in the upper right corner of Figure 5 is in a drainage below Dane Spring and is in MSO recovery habitat. The other two occurrences are within the Coyote Springs MSO PAC and will receive PAC treatment. Treatment at the first location may be guided by the mechanical toolbox but treatment in MSO PACS will be negotiated separately with USFWS.

All the occurrences are near stream channels which will receive aquatic habitat restoration. Treatments for aquatic habitat restoration will be guided by the Aquatic Toolbox. Mitigations and design features such as AQ020, BT005, and BT007 will also be applied.

Figure 5. Dane thistle in analysis area.



Effects Common to Alternatives 2 and 3

Direct and Indirect Effects

The known range of Dane thistle is a small portion of the overall project area. At least one occurrence of Dane thistle was protected with a small wire structure in the past, but this area has not been revisited in several years, so the fates of the plants and structure are unknown. Two occurrences of Dane thistle are within the Coyote Springs Mexican Spotted Owl (MSO) PAC The third occurrence in outside the Coyote Springs PAC in recovery habitat. The most significant risk to Dane thistle from this treatment is direct losses of individuals from management actions and these can be mitigated by using design features and mitigations such as BT005, BT006, and BT007.

Short-term effects of prescribed fire include loss of individual plants. The potential long-term effects include the loss of shade, increased risk of noxious or invasive weeds and an increased risk of erosion. This will be mitigated by burning at intensities in all entries low enough to limit mortality to trees and other vegetation to the extent possible.

The management activities would help move the treated areas toward the desired conditions. The effects of disturbance from vegetation treatments and prescribed fire include loss of individual plants.

Aquatic restoration includes site disturbing activities that would affect the occurrences of Dane thistle, especially the northernmost occurrence which is less than 1/10th mile from a proposed restoration site. Ground disturbing activities such as moving soil would increase the risk of disturbance to individual

plants and their habitat. These effects can be mitigated through design features to mitigate loss of sensitive plants by avoiding them as much as possible.

There are no rock pits or in-woods processing areas near this occurrence of Dane thistle so no effects will occur

The locations of Dane thistle are not near any roads so there are no effects from management actions along roads.

Cumulative Effects

The area of this cumulative effects analysis includes the known range of Dane thistle. The timeframe begins when Dane thistle was first described in 1990 to twenty years in the future.

There have been a variety of management activities in the uplands surrounding the known Dane thistle occurrences, but few activities have occurred in the steep canyon areas. Grazing by cattle has occurred in the past but the allotment containing Dane thistle is not currently being used. Grazing by wildlife still occurs. A limited amount of recreational activities such as hiking may occur in the areas but there are no established trails in the canyon areas.

There is a large dispersed camping area in the uplands above one occurrence. A fence restricts vehicle travel and camping near the canyon edge. Hikers from the camping area may occasionally venture into the area. At the same site, there is an historical cabin and spring diversion upslope. Through another project there are plans to rehabilitate the spring, allowing it to be free flowing but management actions from this action are not anticipated to have any effect on Dane thistle.

In addition to the management actions in this analysis, grazing by wildlife and recreation will continue in this area.

Non-native invasive species such as bull thistle (Cirsium vulgare) are threats to rare species such as Dane thistle for resources such as water and light. Mitigation to prevent infestations in these areas is especially important.

Cumulatively, the loss of individual plants may occur when added to the loss of plants as a result of grazing, creation and other prescribed fire or mechanical treatments implemented within the cumulative effects boundary.

Determination of Effect

Implementation of Alternative 2 or 3 of the Rim Country EIS may impact individuals of Dane thistle (*Cirsium parryi* ssp. *mogollonicum*) but is not likely to result in a trend toward federal listing or loss of viability.

Mogollon fleabane (Erigeron anchana)

Mogollon fleabane is a Southwestern Region sensitive species for Tonto National Forest

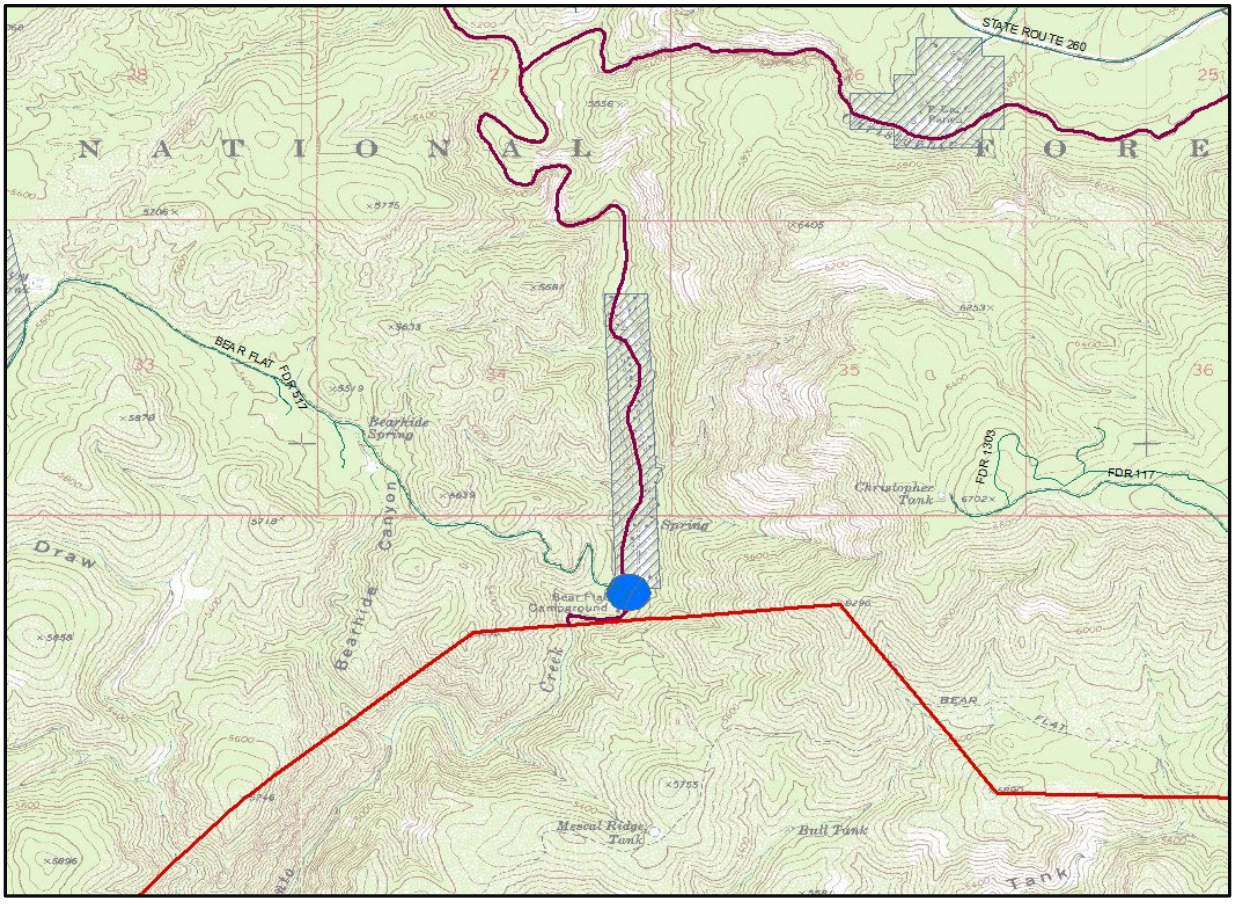
Mogollon fleabane is one of four species identified by Nesom in 1990 (Nesom 1990) in a revision of *Erigeron pringlei*. Prior to then, all were considered one species. All four species occur in various areas of northern Arizona where they are endemic. Occurrences tend to be on rock cliffs (Arizona Game and Fish Department 2003) where it occurs in cliff crevices, ledges, soil pockets among boulders (Nesom 2006).

Existing Condition

There is one confirmed location of Mogollon fleabane in the analysis area. It is near Bear Flat Campground on the Tonto NF. The area where the plants are located is scheduled for mechanical and prescribed fire treatment and is near a stream channel proposed for aquatic restoration

This occurrence of Mogollon fleabane is in the Mogollon Rim Area (4D) Management Area (MA) of the Tonto NF LMRP (USDA Forest Service 1985). The management emphasis is for a variety of renewable resource outputs with primary emphasis on intensive, sustained yield timber management, timber resource protection, creation of wildlife habitat diversity, increased populations of emphasis harvest species, and recreation opportunity. Fire management objectives for this area include providing a mosaic of age classes within the total type which will provide for a mix of successional stages, and to allow fire to resume its natural ecological role within ecosystems. A standard and guideline for the area states that habitat requirements for TES species will take precedence over other species.

Figure 6. Location of Mogollon fleabane in analysis area.



Effects Common to Alternatives 2 and 3

Direct and Indirect Effects

Treatments in the area of known occurrences of Mogollon fleabane include mechanical and prescribed fire treatment . The area is also near a stream channel proposed for aquatic restoration.

The vegetation and prescribed fire treatments would support the management emphasis for Mogollon fleabane, and the vegetation treatments would reduce the risk of uncharacteristic disturbances and would improve watershed condition. Prescribed fire would reduce the risk of uncharacteristic fire in the area surrounding this occurrence Mogollon fleabane and move toward allowing fire to resume its natural ecological role.

Aquatic restoration may include site disturbing activities that would affect this occurrence of Mogollon fleabane. Ground disturbing activities such as moving soil would increase the risk of disturbance to individual plants and their habitat. These effects can be mitigated through design features to mitigate loss of sensitive plants by avoiding them as much as possible. See mitigation BT007.

The known occurrence of Mogollon fleabane is near the Bear Flat Campground near roadway so the species may be affected if construction, maintenance, or reconstruction of the road occur, especially if the rocky areas favored by the species is affected. This can be mitigated by locating and avoiding the plants before activities occur. See mitigation BT007.

There are no rock pits or in-woods processing areas near this occurrence of Mogollon fleabane so no effects will occur.

Cumulative Effects

The timeframe of this discussion of cumulative effects on Mogollon fleabane is from 1990 to 20 years in the future. The area of this analysis is the project boundary. Many of the documented collections of Mogollon fleabane are in wilderness or remote areas and would not be affected by management actions such as those proposed in this analysis.

Related to the known occurrence in the project area near the Bear Flat Campground, past and future impacts from recreational activities have occurred and would continue to occur near the site. Recreational activities such as rock climbing could also affect plants by crushing individuals and altering habitat.

Factors contributing to the degradation of Tonto Creek may have impacted Mogollon fleabane, Cumulatively aquatic habitat restoration activities would help to conserve or improve the habitat of Mogollon fleabane in this area.

The past actions such as construction and maintenance of roads in the area would have contributed to the effects on habitat in this area, especially if rock formations were altered during construction and maintenance.

In addition to the management actions in this analysis, the foreseeable actions in area include recreation and occupancy of nearby land. Grazing by cattle and wildlife may occur in the area. Wildfire may also occur in the area. These may affect the habitat or plants occurring at this location but are not likely to affect the entire species.

Determination of Effect

Implementation of Alternative 2 or 3 of the Rim Country EIS may impact individuals of Mogollon fleabane (*Erigeron anchana*) but is not likely to result in a trend toward federal listing or loss of viability.

Rock (cliff) fleabane (Erigeron saxatilis)

Rock fleabane is a Southwestern Region sensitive species for Coconino National Forest.

Rock fleabane is a small daisy-like plant that tends to grow in erosion pockets on vertical cliff faces, most commonly Coconino sandstone. Generally, risks from management actions are confined to activities that would affect the cliff habitat on which it depends. Rock fleabane is an endemic species that occurs only

in northern and central Arizona where it inhabits sheer canyon walls, moist north-facing slopes, steep solid rock and bedrock outcrops from 5,000 to 8,350 ft (Arizona Game and Fish Department 2003). It is closely related to Mogollon fleabane and is one of the four species identified by Nesom in his 1990 revision of *Erigeron pringlei*.

Existing Condition

Figure 7 shows the locations of rock fleabane in the project area.

Figure 7. Locations of Rock fleabane in analysis area.

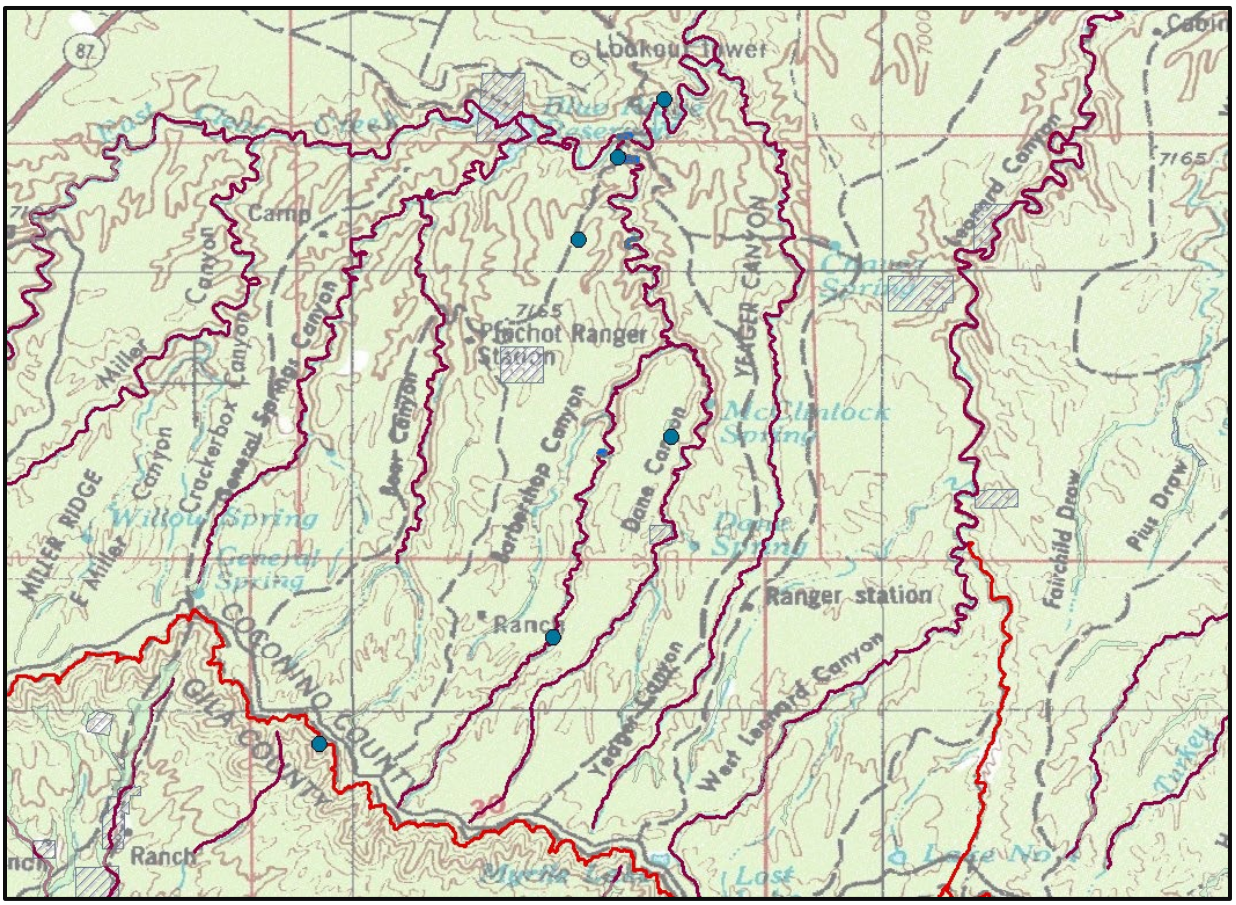


Table 5 below contains the locations containing rock fleabane.

Table 3. Locations of rock fleabane in project. Plant locations are from SEINet.

Collector/Observer	Date		Notes
Ronald L. Hartman, James F. Fowler 83951	09/13/2006	Rim Road, ca 1 mi NW of Forest Road 139., 34.4257 -111.225, 2332m	Within Dude Fire (1990) and Rim Fire (2009) Severe infestation of weeping lovegrass in Dude Fire (TNF)
G. Rink 7127	05/25/2008	Barbershop Canyon, about 2 km downstream of Trail 91, 34.447591 -111.176789, 2160m	Aquatic habitat restoration

Max Licher 2122	07/06/2008	Barbershop Canyon ca 0.5mi upstream of the confluence with East Clear Creek, riparian stream bottom, 34.488917 -111.1525, 2003m	Near stream channel scheduled for treatment (McClintock Draw)
P. Boucher 654	06/25/1987	Barbershop Canyon, runs N in E Clear Creek, 34.5293 -111.1715, 2072m	Near road 95R
Wendy C. Hodgson 11705 and 11720	06/25/1999	Tributary running north-south into East Clear Creek, just below junction of FSR 95 and FRS 96, parallel to (and below) FSR 96., 34.546183 -111.163583, 2226m	Near roads 95 and 96
D.M. Benham 1058	09/12/1987	East side of E Clear Creek at FS Roads 95 and 96 junction, ca. 23 air mi NE of Payson, Blue Ridge Reservoir Quad 7.5 series, 34.5581 -111.1539, 1993m	Aquatic habitat restoration

Effects Common to Alternatives 2 and 3

Direct and Indirect Effects

Two areas containing rock fleabane are slated for mechanical treatment. The treatments will be developed using the mechanical treatment toolbox. . The effects of mechanical treatment include loss of individual plants or groups of plants. These effects can be mitigated by using the design features BT001, BT005, BT006, and BT007

Prescribed fire will occur throughout the project area, but rock fleabane tends to occur in rocky areas that are sheltered from most fire activities so effects to the species from burning are anticipated to be minimal. Management activities such as fire line construction are not likely to occur in these areas. Short-term effects of prescribed fire include deaths of individual plants. Mitigation BT003 applies to prescribed fire where Southwestern Region sensitive plants occur. The potential long-term effects include increased risk of noxious or invasive weeds and an increased risk of erosion.

There are two occurrences of rock fleabane in aquatic restoration areas. Management actions to accomplish this work will be guided by the Aquatic Toolbox (Appendix D of FEIS) The risk to rock fleabane from these actions include loss or damage of plants or loss of habitat. These can be mitigated through using the design features. Ground disturbing activities such as moving soil would increase the risk of disturbance to individual plants and their habitat. These effects can be mitigated through design features and mitigations.

An indirect effect of management actions within the potential habitat of rock fleabane includes an increased risk of invasion from noxious or invasive weeds. Incorporation of the Design Features, best management practices, mitigation and conservation measures in Appendices C and D would mitigate the effects of increased disturbance from management activities and help to control the spread and introduction of weeds within the habitat of roc fleabane.

Two occurrences of rock fleabane appear to be near roadways so may be affected if construction, maintenance or reconstruction of the road occurs, especially if the rocky areas favored by the species is affected. This can be mitigated by locating and avoiding the plants before activities occur.

Factors contributing to the degradation of aquatic habitats that led to the decision to include the areas in this analysis may have also affected the habitat of Mogollon fleabane. Aquatic habitat restoration, depending on the actions taken could preserve or improve the habitat of rock fleabane in this area, depending on the actions taken by restoring the general area and reducing effects such as erosion in the long term.

There are no rock pits or in-woods processing areas near this occurrence of rock fleabane so no effects will occur.

Cumulative Effects

The timeframe of this discussion is from 1990 to 20 years in the future. The area of this analysis is the project boundary.

Factors contributing to the degradation of areas scheduled for aquatic restoration that led to the decision to include it in this analysis may have also affected the habitat of rock fleabane. Aquatic habitat restoration, depending on the actions taken could preserve or improve the habitat of rock fleabane in this area, depending on the actions taken.

The past actions such as construction and maintenance of roads in the area could have contributed to the effects on habitat in this area, especially if rock formations were altered during construction and maintenance.

In addition to the management actions in this analysis, grazing by cattle and wildlife may occur in the area. Vegetation treatments, prescribed fire and aquatic restoration analyzed in this analysis will occur. Wildfire may also occur in the area. These may affect the habitat or plants occurring at this location but are not likely to affect the entire species.

Determination of Effect

It is my determination that

Management actions proposed in the Rim Country EIS may impact individuals of rock fleabane (*Erigeron saxatilis*) but are not likely to result in a trend toward federal listing or loss of viability.

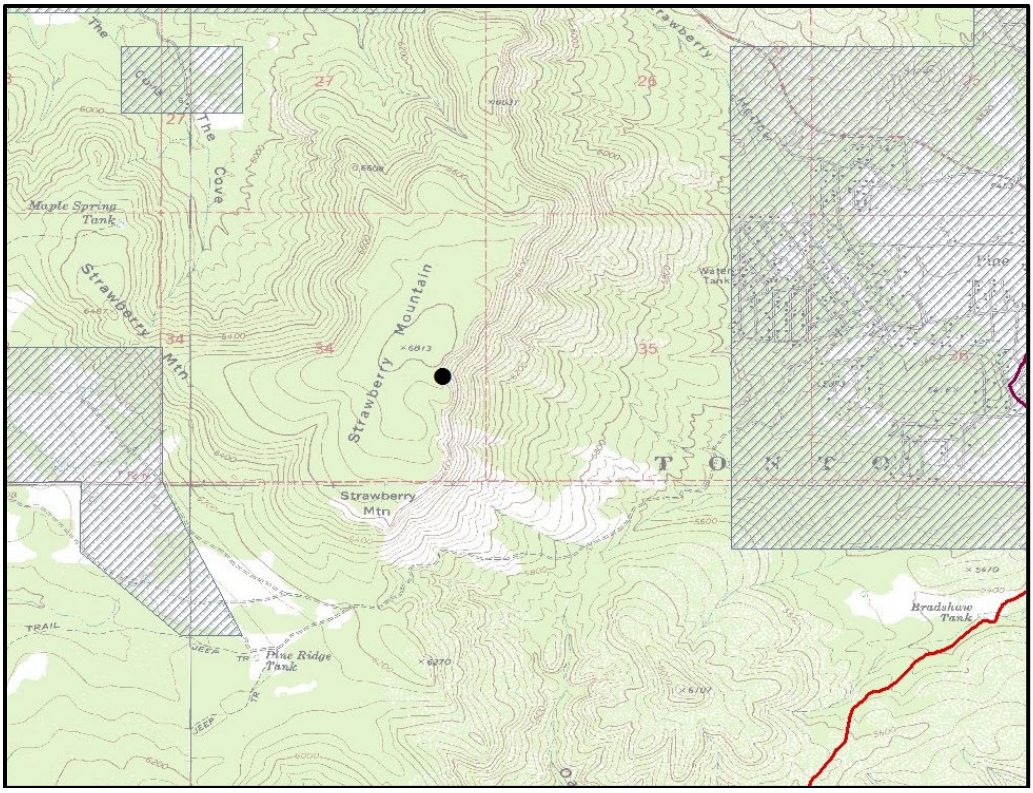
Eastwood (Senator Mine) Alumroot (Heuchera eastwoodiae)

Eastwood Alumroot is a Southwestern Region sensitive species for all three forests
Eastwood alumroot is endemic to central Arizona where it grows on moist shaded slopes in ponderosa pine forests and canyons. The typical substrate is crevices in basalt soil or basalt soil (Arizona Game and Fish Department 2005). Many of the previous occurrences of this species have been reclassified and are no longer included is this taxon (Folk and Alexander 2015). This has reduced the number of known occurrences of Eastwood alumroot on the forests and possibly within the project area.

Existing Condition

There are several occurrences of Eastwood alumroot within the analysis area documented in SEINet. Hendricks collected the species in 1930 from “Strawberry Hill”. The location falls with ponderosa pine/evergreen oak habitat.

Figure 8. Map showing Hendricks collection location of Eastwood alumroot.



Eastwood alumroot was collected three times in 1966 in the Christopher Creek drainage (SEINet - Arizona Chapter 2017). Lehto collected the species on April 30, 1966 at Christopher Creek Campground and on October 1, 1966 on a mountainside near Christopher Creek (34.3152 -111.016). David Keil collected it near the mountainside location on April 30, 1966. These locations are on private land. However, the species may occur on nearby Forest Service lands.

In addition to these areas, there are documented occurrences of Eastwood alumroot in the Hunter Creek, Christopher Creek drainages and in Chevelon Canyon (Arizona Game and Fish 2017). The location information is generalized so exact locations cannot be determined.

For the purposes of this analysis, only the collection by Hendricks will be discussed since it is the only collection that can be verified as occurring on forest lands. The area will receive mechanical treatment. This location is on the Tonto NF, but Eastwood alumroot may also be present on the other forests as well.

Effects Common to Alternatives 2 and 3

Direct and Indirect Effects

The occurrence of Eastwood alumroot is in an area that will be treated using intermediate thinning. The treatment will be developed using the mechanical treatment toolbox. The effects of mechanical treatment include loss of individual plants or groups of plants. These effects can be mitigated by using the design features in Appendix C of FEIS, specifically BT001, BT005, BT007.

Prescribed fire will occur in the project area. Short-term effects of prescribed fire include deaths of individual plants. The potential long-term effects include increased risk of noxious or invasive weeds and an increased risk of erosion. Mitigation BT003 will reduce the risk from prescribed fire.

Hunter and Christopher Creeks are slated for riparian restoration. Management actions to accomplish this work will be guided by the Aquatic Toolbox. The risk to Eastwood alumroot from these actions include loss or damage of plants or loss of habitat. These can be mitigated through using the design features. Ground disturbing activities such as moving soil would increase the risk of disturbance to individual plants and their habitat. These effects can be mitigated through design features and mitigations specifically BT007 to mitigate loss of sensitive plants by avoiding them as much as possible.

An indirect effect of management actions within the potential habitat of Eastwood alumroot includes an increased risk of invasion from noxious or invasive weeds. Incorporation of the design Features, best management practices, mitigation and conservation measures in appendices C and D would mitigate the effects of increased disturbance from management activities and help to control the spread and introduction of weeds within the habitat of Eastwood alumroot.

There are no rock pits or in-woods processing areas near this occurrence of Eastwood alumroot so no effects will occur.

Eastwood alumroot may occur near roadways so may be affected if construction, maintenance or reconstruction of the road occurs and can be mitigated by locating and avoiding the plants before activities occur (BT001, TR011, TR015).

Cumulative Effects

The area of consideration for this discussion is the project area boundary. The timeframe includes 20 years past and future. Although this species occurs on all three forests within the project area, no data were found to document the effects of management on the species. Several of the areas where Eastwood alumroot occurs are in remote areas and/or in wilderness areas such as the Sierra Ancha, Red Rock Secret Mountain, and Mazatzal Mountains where no management would occur. Some of these areas have been affected by previous wildfires. Past activities that have resulted in the need to restore Hunter and Christopher Creeks may have also affected Eastwood alumroot habitat. Past impacts to basalt soils and crevices, especially in canyons and drainage areas may have affected individuals, groups, or habitat for Eastwood alumroot. Dispersed recreation, especially activities such as canyoneering and rock climbing occur in potential habitat for Eastwood alumroot.

Determination of Effect

Implementation of Alternative 2 or 3 of the Rim Country EIS may impact individuals of Eastwood (Senator Mine) alumroot (*Heuchera eastwoodiae*) but is not likely to result in a trend toward federal listing or loss of viability.

Blumer's Dock (Rumex orthoneurus)

Blumer’s dock is a Southwestern Region sensitive species for all three forests.

Blumer’s dock is a large, long-lived herbaceous perennial plant endemic to New Mexico and Arizona. Its range is from east-central to southeastern Arizona (depending on taxonomic interpretation). Habitat for Blumer’s dock includes mid- to high-elevation wetlands with moist, organic soil adjacent to perennial springs or streams in canyons or meadows (Arizona Game and Fish Department 2002). The species was proposed for federal listing in 1998 (US Fish and Wildlife Service 1998) but the petition was rescinded in 1999 (U.S. Fish and Wildlife Service 1999).

Existing Condition

There are numerous occurrences of Blumer's dock on the Apache-Sitgreaves NF. The Wildlife Specialist Report for Plan Revision on Apache-Sitgreaves NF identified the habitat for Blumer's dock as All Riparian PVNTs. Healthy riparian condition and clean water are identified as the habitat elements (fine filter components) addressed in analyses for plan revision (USDA Forest Service, Apache-Sitgreaves National Forest. 2015).

Historically, there were both naturally occurring and introduced populations of Blumer's dock on Tonto NF (USDA Forest Service 1985). The introductions occurred in the 1980's. The introduced plants were cultivated from seeds collected from naturally occurring populations on the forest. The four naturally occurring populations include Reynolds Creek, Workman Creek, Rose Creek and Cold Springs Canyon. There are seventeen additional introduced populations including Canyon Creek, Haigler Creek, Pueblo Canyon, Bray Creek, Chase Creek, See Canyon, Nappa Spring, Dude Creek, East Verde River, Horton Springs, Pine Creek, Tonto Creek, Tonto Spring, Washington Park, Webber Creek, Ellison Creek, Christopher Creek, See Canyon and Horton Spring (USDA Forest Service 1993).

The Tonto NF prepared a Conservation Strategy for Blumer's dock in 1993. Directions in the Conservation Strategy included a series of mitigations including maintaining or improving suitable riparian condition and actions to reduce the effects of roads. These are

- Locate new roads away from populations
- Minimize road maintenance and reconstruction of existing roads adjacent to populations
- Seek opportunities to obliterate and/or close roads adjacent to or impacting the population.

The documented locations within the project area on the Coconino NF are in the East Clear Creek and Barbershop Canyon areas.

Table 4. Locations of Blumer's dock on Apache-Sitgreaves and Tonto NFs (source Apache Sitgreaves files).

Forest	Date	Location	Comments
Apache-Sitgreaves	7/2/1997	Double Cabin	1000-3000 plants, very vigorous, within a 6-acre exclosure along creek. 6/26/98: Upstream of exclosure, within 100 meters of exclosure,
Apache-Sitgreaves	6/26/1998	Gentry Canyon	Very few individuals observed; two clumps prostrate 11 plants upstream 80-100 meters from FR40; one clump prostrate plants d
Apache-Sitgreaves	6/26/1998	Upper Fairchild Draw	Rhizomes documented. Probably 1000 plants in wet meadow, but all prostrate and very small. No evidence of old or new flower stalks.
Apache-Sitgreaves	7/28/1998	Pius Draw	Common in cienega.
Apache-Sitgreaves	7/29/1998	Willow Creek, Wiggins Crossing	Infrequent from 1 km above mouth of Hart Canyon to 1 km below Wiggins Crossing.
Apache-Sitgreaves	7/29/1998	Long Tom Canyon	Common from FR 172 crossing down to near center of Sec 27 in deeply incised stream in ponderosa pine forest.
Apache-Sitgreaves	10/14/2007	Willow Creek, Mule Crossing	Plant found just north of Mule Crossing. Plants found in Willow Creek from Mule Crossing to approximately 1.5 miles north of Wiggins Crossing. Rhizomes verified at this location.
Apache-Sitgreaves	10/14/2007	Willow Creek at Gentry Creek Junction	Plant found at junction of Willow Creek and Gentry Creek. Plants found in Willow Creek from Mule Crossing to approximately 1.5 miles north of Wiggins Crossing.
Apache-Sitgreaves	10/14/2007	Willow Creek	Plant found approximately 0.5 miles north of Wiggins Crossing. Plants found in Willow Creek from Mule Crossing to approximately 1.5 miles north of Wiggins Crossing.

Forest	Date	Location	Comments
Tonto	1984	Napa Spring	Introduced population; 1984: 10 plants introduced. 1985: 5 plants observed. 1986: No plants observed. 1991: No plants observed.
Tonto	1985	Tonto Spring	Introduced population. Tonto Spring (site T12): 1985: 20 plants introduced. 1986: 12 plants observed. 1989. 10 plants observed, area being grazed. 1990: No plants observed, area scoured by flooding following the Dude Fire. 1990-11: plants found res
Tonto	1985	Tonto Creek	Introduced population. Tonto Creek Site (site T13): 1985-08: Four plants introduced T11, R12 Sec 4. 1987-07: 80 plants introduced. 1988-07: 132 plants introduced. 1989-10: No plants observed. 1990: No plants observed, area scoured following Dude Fire
Tonto	1986	Christopher Creek	Introduced population. 1989-09: 180 plants introduced. Much caterpillar use noted. 1990: 18 plants observed, area grazed. 1991-08: 9 plants observed.
Tonto	May-85	Horton Springs	Introduced population. 1985-05: 40 plants introduced. 1986-07: 12 plants observed. 1987: Area fenced. 1989: Fire in fenced area. 1990-08: 95 plants observed. Area being grazed. Most small with no flowers. 1991-08: 164 plants observed, appear healthy.
Tonto	Aug-85	See Spring	Introduced population: 1985-08: 75 plants introduced. 1986-10: 23 plants, reproduction. Evident. 1987-08: 50 plants introduced. 1989: 180 plants introduced below spring 1990: 130 plants observed.

Forest	Date	Location	Comments
Tonto	1987	Lower Canyon Creek	Introduced population: 1987: Approximately 100 (?) plants introduced downstream from FR 33. 1988-09; 1988-1989: More plants introduced. 1990-08:
Tonto	Aug-85	Canyon Creek Spring and Canyon Creek	Introduced population. USFWS site T2A at Canyon Creek Spring. 1985: Introduced 30 plants. 1986: Reproduction evident. 1987-09: 31 plants, 100 more introduced. 1989-09: Over 216 plants, reproductive. Evident. Last observation 1998. USFWS site T2B.

Table 7 below includes specimens or observations from various herbaria and documented in SEINet (on-line database).

Table 5. Collections of Blumer's dock within the analysis boundary as documented in SEINet

Collector/Observer	Date	Location
G. J Harrison; T. H. Kearney & H. J. Fulton	06/23/1929	Rose Creek, Sierra Ancha, 33.8295 -110.9796
Gregory J. Imdorf	07/09/1993	Along Reynolds Creek, east of Reynolds Falls at trailhead for Trail 150., 33.8482 -110.921, 1890m
Wendy C. Hodgson	06/25/1999	Tributary running N-S into East Clear Creek, just below junction of FSR 95 and FSR 96, parallel (and below) FSR 96
Barbara Phillips	09/20/1998	Barbershop Canyon, 34.55028 -111.16194

Arizona Game and Fish Heritage Database documented occurrences of Blumer's dock in the following areas Barbershop Canyon, Fairchild Draw, Gentry Canyon, Pius Draw, Willow Draw, Bray Creek, Canyon Creek, Christopher Creek, Dude Creek, Buck Springs Canyon, Pieper Hatchery Spring., Ellison Creek, Horton Spring, Haigler Creek, Pine Canyon, Reynolds Creek, Rose Creek, Tonto Creek, Webber Creek and Workman Creek (Arizona Game and Fish 2017).

Table 6. Aquatic restoration areas and/or stream channel restoration containing Blumer's dock. Plant locations are from AZGFD HDMS data.

Stream	Location of plants	Date last observed
Barbershop Canyon	Barbershop Canyon	September 1998
Canyon Creek	Canyon Creek	1998
Chase Creek	Chase Creek	1998
Christopher Creek	Christopher Creek	August 1991
Christopher Creek	Christopher Creek/ Nappa Spring	1985
Dude Creek	Dude Creek	1997
East Verde River	East Verde River/Pieper Hatchery Spring	1998
Ellison Creek	Ellison Creek	September 1989
Gentry Canyon	Gentry Canyon	July 26, 1998
Haigler Creek	Naegelin Rim/ Haigler Creek	1998
Pine Creek	Pine Canyon	1998
Reynolds Creek	Reynolds Creek	August 1998
Christopher Creek	See Canyon	1998
Upper Tonto Creek	Tonto Creek	1998
Webber Creek	Webber Creek	1997
Willow Creek	Willow Creek	July 29, 1998
Workman Creek	Workman Creek.	September 8, 2011

The streams in table 9 are being analyzed for channel restoration, which is a subset of the aquatic restoration treatments.

Table 7. Stream channel restoration areas containing Blumer's dock

Date observed	Stream
June 6, 1998	Gentry Canyon
June 6, 1998	Fairchild Draw
August 1987	Bray Creek
1998	East Verde River
1989-09	Ellison Creek
1998	Valentine Canyon
1998	Mule Creek
1998	Canyon Creek
August 1998	Reynolds Creek
September 8, 2011	Workman Creek
1998-08	Rose Creek
1997	Weber Creek
August 18, 1999	Buck Springs Canyon

Effects Common to Alternatives 2 and 3

Direct and Indirect Effects

Most of the occurrences of Blumer's dock occur in areas scheduled for riparian restoration, with some in areas where wet meadow restoration is planned. Management actions in riparian and wet meadow areas will be guided by the Aquatics and Watershed Flexible Toolbox Appendix D of FEIS. These treatments will be prioritized based on the criteria in toolbox. Mechanical and fire treatments may occur in the uplands adjacent to these areas and will be guided by the Mechanical Treatments Flexible Toolbox

The risk to Blumer's dock from management actions to restore aquatic habitats and stream channels include loss or damage of plants or loss of habitat. These can be mitigated through using the design features AQ020, , BT005, BT007, and FE005. Ground disturbing activities such as moving soil would increase the risk of disturbance to individual plants and their habitat. These effects can be mitigated through design features and mitigations specifically BT007 to mitigate loss sensitive plants by avoiding them as much as possible. Design feature AQ020 also applies, stating that all federally listed or sensitive species will be identified during pre-planning on a site-specific basis and mitigations for those species will be determined.

An indirect effect of management actions within the potential habitat of Blumer's dock includes an increased risk of invasion from noxious or invasive weeds. Incorporation of the Design Features, best management practices, mitigation and conservation measures in Appendices C and D would mitigate the effects of increased disturbance from management activities and help to control the spread and introduction of weeds within the habitat of Blumer's dock.

Prescribed fire will occur in the project area. Short-term effects of prescribed fire include deaths of individual plants, but these can be mitigated by using design features BT003, FE005.

There are no rock pits or in-woods processing areas near the occurrences of Blumer's dock so no effects will occur.

Blumer's dock may occur near roadways so may be affected if construction, maintenance or reconstruction of the road occurs and can be mitigated by locating and avoiding the plants before activities occur. The action alternatives would better address the purpose and need for aquatic and riparian habitats for the Apache Sitgreaves and Coconino NFs and would address the desired conditions and

guidelines in the LMRPs. On the Tonto NF, the design features, mitigations and Aquatic Condition-based Management Approach (Appendix D of FEIS) would provide better protection for riparian areas and stream courses as compared to the protections in Tonto NF LMRP (1985). Management actions would be guided by a comprehensive set of mitigations.

Cumulative Effects

The area of consideration for this discussion includes the portion of the project area containing Blumer's dock plants and habitat, especially the drainages in the area. The timeframe is from 1993 to 20 years in the future. The 1993 timeframe was chosen to allow inclusion of introductions of Blumer's dock on the Apache Sitgreaves and Tonto NFs as documented in the Conservation Strategy. These introductions were implemented to supplement the numbers of plants and populations of this rare species. The fates of many of these introductions are unknown but are not thought to have persisted. This would affect the distribution of Blumer's dock in the project area and could affect the mitigations and management actions for restoring these areas. A series of exclosures on Apache Sitgreaves NF protects some of these sites.

Several large fires have occurred in the project area. The largest of these is the Rodeo-Chediski (2002). It and other large fires have affected the terrestrial and aquatic habitats in the area containing Blumer's dock by destroying or altering vegetation communities, creating landscape scale disturbance, contributing to the risk of invasion of noxious or invasive weeds and contribution to erosion. The extent of effects on Blumer's dock is not known.

Grazing by livestock and wildlife has occurred and will continue to occur in the area. Blumer's dock is palatable to animals and small populations may be completely eaten in a single year. Activities such as dispersed recreation and firewood gathering have occurred and will continue to occur in the area.

Determination of Effect

Implementation of Alternative 2 or 3 of the Rim Country EIS may impact individuals of Blumer's dock (*Rumex orthoneurus*) but is not likely to result in a trend toward federal listing or loss of viability.

Bebb's Willow (Salix bebbiana)

Bebb's willow is a Southwestern Region sensitive species for Coconino and Apache Sitgreaves National Forests.

Bebb's willow (*Salix bebbiana*) is a large native shrub or a small bushy tree fifteen to twenty-five feet tall that ranges from Alaska south to British Columbia to east Newfoundland and in northeast United States and upper mid-western United States. Bebb's willow plants can regenerate from root and basal stem sprouting. Stem and root fragments root naturally if buried in moist soil. Plants are dioecious: male and female flowers are borne on separate plants. Large quantities of seed may be produced but remain viable for only a few days. Bebb's willow is drought and shade intolerant. Changes in water regime such as channel changes reduce successful germination from seed (Tesky 1992).

Existing Condition

Table 8. Bebb's willow locations on Apache-Sitgreaves NF

Date	Number of plants	Location	Comments
9/11/2000	29	Gentry Meadow	11 Sept 2000: 29 live, 86 skeletons. 09 May 2003: 7 live, 9 skeletons. Site fenced Sept 2004: 100 *S. bebbiana* seedlings planted. 18 Aug 2005: 35 seedlings observed. Existing exclosure, In meadow
9/11/2000	30	Baca Meadow	11 Sept 2000: 30 live, 48 skeletons. 09 May 2003: 3 live, 9 skeletons. Site fenced Oct 2004 Existing exclosure, In meadow
2002	Unknown	South Willow Creek	Several large willows caged with heavy 4' hog wire. Not in exclosure layer
2006	1	Willow Creek N. of Rancho Alegre	One large willow on bank north of Private Land No information to show willow is fenced
5/9/2000	4	Gentry Spring	Site caged. Protected by "cage"
5/9/2000	6	Open Draw	Site fenced in 1996 and seedlings planted. Existing exclosure
10/17/2005	1	Side drainage of Hart	Willow not doing well. Hammered by elk. No information in files indicating protective fencing is present.
5/9/2000	7	Double Cabin	Site fenced and seedlings planted. Existing exclosure
5/9/2000	32	Fairchild Draw	Site fenced in 2001 and seedlings planted. Existing exclosure

Table 9. Bebb's willow from SEINet.

Name	Date	Location	Forest	Comments
G. Rink	7/6/2015	McCormick Spring	Apache Sitgreaves	
C.Granfelt	7/3/2008	McCormick Spring. Bebb's tree tag #11. T9N R24E S27 SWNW.	Apache Sitgreaves	
G.W. Argus	5/28/1985	Kehl Springs	Coconino	Vegetation treatment addressed in the Cragin Project
G. Rink	7/17/2016	Pat Knoll Spring	Apache Sitgreaves	
Vera Markgraf	8/9/2012	Middle Kehl Spring	Coconino	Vegetation treatment addressed in the Cragin Project
G.W. Argus	5/24/1985	Merritt Draw	Coconino	

Name	Date	Location	Forest	Comments
Barb Phillips	6/29/2008	Moonshine Spring	Coconino	
Jessa Fisher	6/29/2008	Moonshine Spring	Coconino	
Vera Markgraf	7/26/2013	Moonshine Spring	Coconino	
L.E Stevens	9/19/2009	Moonshine Springs	Coconino	

There is no information for Bebb's willow in the TESP/IS or Arizona Game and Fish Heritage Database.

Effects Common to Alternatives 2 and 3

Direct and Indirect Effects

Some of the areas containing Bebb's willow will receive vegetation treatments. The treatments will be developed using the mechanical treatment toolbox. The effects of mechanical treatment include loss of individual plants or groups of plants. These effects can be mitigated by using the design features in Appendix C of FEIS.

Management actions in aquatic and riparian areas will be guided by the Aquatic Toolbox (Appendix D of FEIS) These treatments will be prioritized based on the criteria in toolbox. Mechanical and fire treatments may occur in the uplands adjacent to these areas and will be guided by the Mechanical Toolbox (Appendix D of FEIS).

The risk to Bebb's willow from management actions to restore aquatic habitats and stream channels include loss or damage of plants or loss of habitat. These can be mitigated through using the design features. Ground disturbing activities such as moving soil would increase the risk of disturbance to individual plants and their habitat. These effects can be mitigated through design features and mitigations to mitigate loss sensitive plants by avoiding them as much as possible. These mitigations from Appendix C of FEIS apply; AQ020, BT002, BT004, BT005, BT006, and BT007

Prescribed fire will occur in the project area. Short-term effects of prescribed fire include deaths of individual plants, but these can be mitigated by using design features. The effects of prescribed fire can be mitigated by using mitigation FE005

An indirect effect of management actions within the potential habitat of Bebb's willow includes an increased risk of invasion from noxious or invasive weeds. Incorporation of the Design Features, best management practices, and mitigation and conservation measures in Appendix C of FEIS would mitigate the effects of increased disturbance from management activities and help to control the spread and introduction of weeds within the habitat of Bebb's willow. Mitigations include NW001, NW002, NW003, NW004, NW006, and NW008

There are no rock pits or in-woods processing areas near the occurrences of Bebb's willow so no effects will occur.

Bebb's willow may occur near roadways so may be affected if construction, maintenance or reconstruction of the road occurs and can be mitigated by locating and avoiding the plants before activities occur. The action alternatives would better address the purpose and need for aquatic and riparian habitats for the Apache Sitgreaves and Coconino NFs and would address the desired conditions and guidelines in the LMRPs. The Aquatic Toolbox (Appendix D of FEIS) contains decision matrices and tools to address a series of conditions that affect the ecosystem health in aquatic systems. Examples

include addressing the effects of erosion, noxious weeds, and soil disturbance or compaction that degrade all habitats including those occupied by Bebb's willow.

Cumulative Effects

The area of consideration for this discussion includes the portion of the project area containing Bebb's willow and its habitat, especially the drainages in the area. The timeframe is 20 years past and in the future.

There are a series of exclosures on the Apache Sitgreaves NF and Coconino NFs. Some of contain or were designed to protect Bebb's willows. The status of these are unknown.

Several large fires have occurred in the project area. The tops of Bebb's willow may be removed by fire but the species is able to regenerate through basal sprouting. However, regeneration is often targeted and eaten by domestic and wild grazers, leading to depletion of underground reserves ultimately leading to the death of individual plants.

Grazing by livestock and wildlife has occurred and will continue to occur in the area. Bebb's willow is palatable to animals and small populations may be completely eaten in a single year.

Activities such as dispersed recreation and firewood gathering have occurred and will continue to occur in the area.

Determination of Effect

It is my determination that

Management actions proposed in the Rim Country EIS may impact individuals of Bebb's willow (*Salix bebbiana*) but are not likely to result in a trend toward federal listing or loss of viability.

Arizona Bugbane (Cimicifuga arizonica)

Arizona bugbane is endemic to northern Arizona, occurring on Coconino, Kaibab and Tonto National Forests where it occurs in mesic habitats, typically along the bottoms and lower slopes of steep, narrow canyons. The overstory often includes a combination of coniferous and deciduous tree species. Important overstory species include Douglas fir (*Psuedotsuga menziesii*), white fir (*Abies concolor*), big tooth maple (*Acer saccharum* ssp. *grandidentatum*), Arizona alder (*Alnus oblongifolia*) and red osier dogwood (*Cornus stolonifera*).

Arizona bugbane is a Southwestern Region sensitive species for Kaibab, Coconino and Tonto National Forests. Almost all of the known occurrences are in wilderness areas including those known from West Clear Creek drainage (Arizona Game and Fish Department 2012).

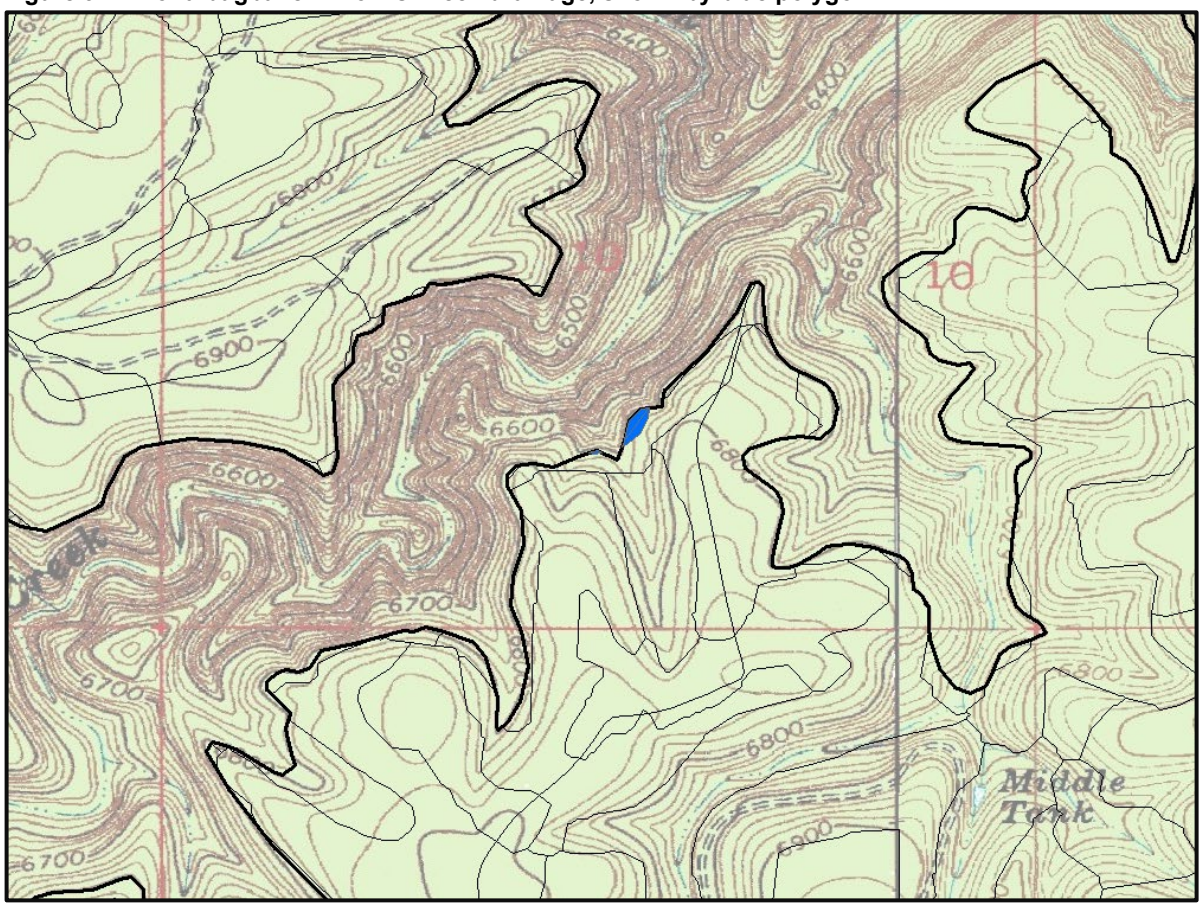
Existing Condition

In this analysis occurrences of Arizona bugbane are limited to the Coconino National Forest. The location in figure 9 below is in Tom's Creek drainage, which is a tributary of West Clear Creek. The data are from Arizona Game and Fish Heritage Database (2017). This location is also documented in Forest Service files (USDA Forest Service 1998) and in the NRM TESP/IS database. The area is in the Tom's Creek Mexican Spotted Owl PAC and the treatment is listed as a potential PAC treatment. Because occupied PACs can already be considered successful nesting habitat, mechanical activity within PACs should be designed to protect the habitat characteristics that make each PAC effective at providing habitat.

Table 10. Locations of Arizona bugbane in treatment units.

Collector/Observer	Date	Location	Comments
USDA Forest Service - J. Keller and R. Popowski	08/11/1998	Tom's Creek	Within Tom's Creek MSO PAC. Treatments for individual PACs will be negotiated with FWS and not treated using treatment matrix in Mechanical Toolbox.

Figure 9. Arizona bugbane in Tom's Creek drainage, shown by blue polygon



Arizona bugbane occurs on the Tonto National Forest but there are no data that support its occurrence in the treatment areas for Rim Country. Arizona bugbane was previously managed using a Conservation Assessment (USDA Forest Service 1993a) and Agreement (USDA Forest Service and USDI US Fish and Wildife Service 1998). Most occurrences of Arizona bugbane are within the Sierra Anchas Experimental Forest. Others are in the Sierra Ancha Wilderness. The most recent survey of the area was by Glenn Rink, who recorded occurrences in three areas including Workman Creek, Pueblo Canyon and Cold Springs Canyon. He surveyed other canyons in the general area and reported finding no additional occurrences. The Juniper Fire (2016) burned in the experimental forest and in the wilderness. The effects to Arizona bugbane and its habitat from these fires is unknown.

Alternative 2

Direct and Indirect Effects

The proposed management actions would help move the treated areas toward the desired conditions as described in the LRMP. The most significant effect to Arizona bugbane from management actions is direct losses of individuals from management actions but these would be mitigated by incorporating design features, best management practices, mitigation and conservation measures (See Appendix C of FEIS)

This occurrence of Arizona bugbane is within the Tom's Creek Mexican Spotted Owl (MSO) PAC. Treatments for individual PACs will be negotiated with FWS and not treated using treatment matrix in Mechanical Toolbox (Appendix D of FEIS).

Trees removed from areas in this treatment are generally smaller in diameter than those removed in other treatments. Canopy cover after treatment is generally higher as compared to those prescribed using the mechanical toolbox for areas outside MSO habitat. Shade for Arizona bugbane plants in this area may be affected but it would not be extensive. This could result in the loss of a few individuals but would not affect the entire population at this site.

Short-term effects of prescribed fire include loss of individual plants. The potential long-term effects include the loss of shade, increased risk of noxious or invasive weeds and an increased risk of erosion. This will be mitigated by burning at intensities in all entries low enough to limit mortality to trees.

No hauling is proposed in the immediate area of Arizona bugbane populations. Indirect effects from road use would be limited to dust from road maintenance but these will be minimal and inconsequential.

An indirect effect of management actions within the potential habitat of Arizona bugbane includes an increased risk of invasion from noxious or invasive weeds. Incorporation of the design features in Appendix C of FEIS would mitigate the effects of increased disturbance from management activities and help to control the spread and introduction of weeds within the habitat of Arizona bugbane.

No locations of Arizona bugbane occur within sites for spring or channel restoration, so there are no effects to the species.

There are no rock pits or in-woods processing areas near this occurrence of Arizona bugbane so no effects will occur.

Cumulative Effects

The following past actions have affected the abundance of Arizona bugbane and have established baseline current condition for Arizona bugbane; grazing, recreation, wildfire, and natural disturbances such as flooding, drought, tornados and mortality in overstory trees. Grazing impacts were addressed in the Conservation Assessment and Strategy for the Coconino and Kaibab National Forests and included fencing and monitoring in certain populations which led to a reduction in these conflicts (USDA Forest Service 1995).

In addition to the management actions in this analysis, the foreseeable activities in area include recreation such as hiking, rock climbing and canyoneering. Grazing by cattle and wildlife will continue. Wildfires may also occur in the area. Singly, none of these activities would eliminate Arizona bugbane at the site. Cumulatively, the effects from activities from this project when added to effects from other projects will also not eliminate bugbane at this site.

Determination of Effect

Implementation of Alternative 2 of the Rim Country EIS may impact individuals of Arizona bugbane (*Cimicifuga arizonica*) but is not likely to result in a trend toward federal listing or loss of viability.

Alternative 3

No mechanical treatment will occur in this area, so the effects of mechanical treatment described in alternative 2 above do not apply. The effects of all other management actions are similar.

Hairy Clematis (Arizona leatherflower) (Clematis hirsutissima var. hirsutissima) (syn. var. Arizonica)

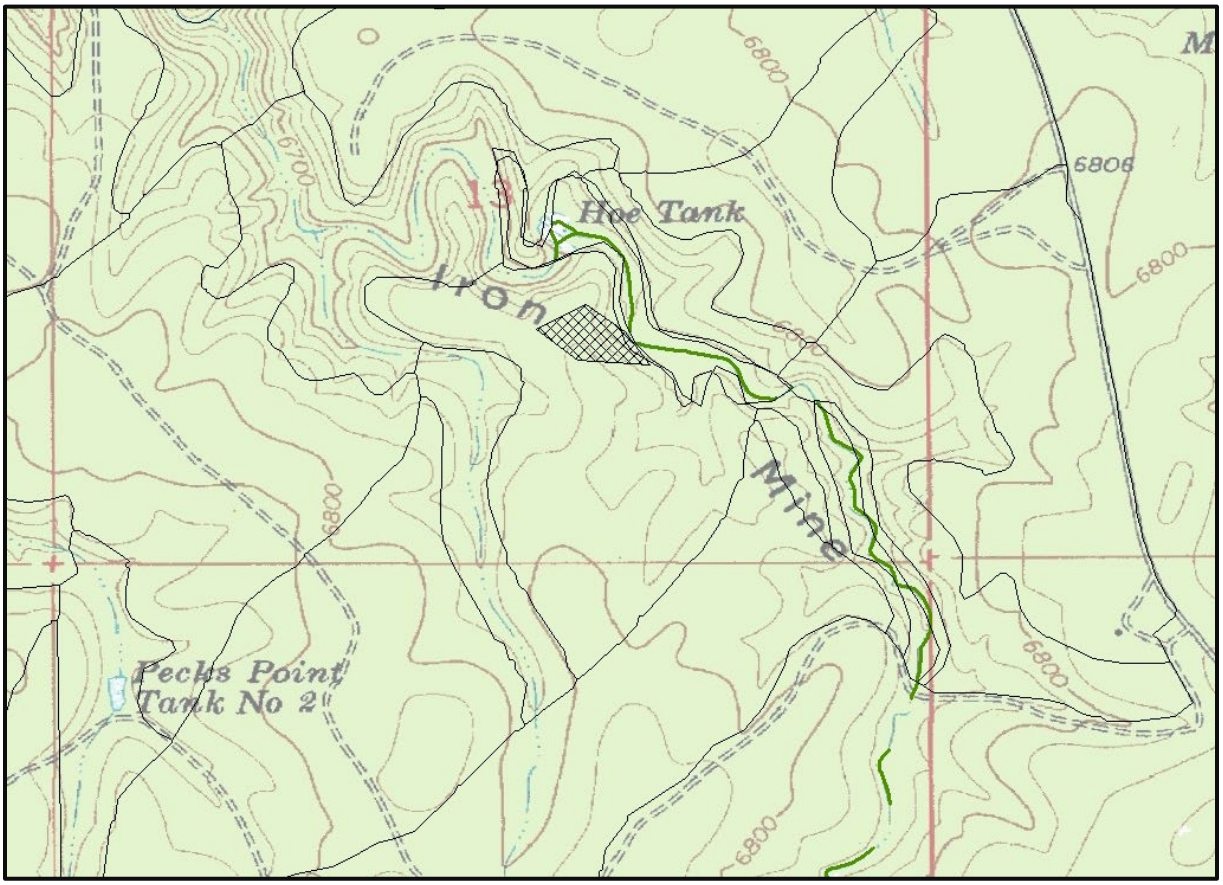
Hairy clematis is a Southwestern Region sensitive species for Coconino National Forest.

A balance of shade and sun is important habitat components of hairy clematis. Intermediate amounts (approximately 50%) of light and shade provided the most beneficial conditions. Higher levels of light increased photosynthesis in adult plants, but resulted in lower reproductive success, and increased risk of desiccation. Low levels of light resulted in decreased photosynthesis, fewer stems per plant and lower seed production (Maschinski, et al. 1997). Juvenile plants benefit from the presence leaf litter. The litter provides a source of humidity around seedlings. However, heavy accumulation of litter can be detrimental to seedling survival and vegetative reproduction in adults.

Existing Condition

There is one location of hairy clematis in the area near Hoe Tank. Proposed treatments in the area are mechanical treatment and stream channel restoration.

Figure 10. Hairy clematis near Hoe Tank.



Effects Common to Alternatives 2 and 3

Direct and Indirect Effects

The area containing hairy clematis is slated for mechanical treatment.. The treatment will be developed using the mechanical treatment toolbox (Appendix D of FEIS). The effects of mechanical treatment include loss of individual plants or groups of plants. These effects can be mitigated by using the design features in Appendix C of FEIS

Short-term effects of prescribed fire include deaths of individual plants. The potential long-term effects include the loss of shade, increased risk of noxious or invasive weeds and an increased risk of erosion. This will be mitigated by burning at intensities in all entries low enough to limit mortality to trees

Activities associated with roads and transportation in this project would be limited those needed to accomplish the management actions that will occur in the area. The effects of road construction, maintenance, reconstruction, and decommissioning can be mitigated by using the design features in Appendix C of FEIS.

An indirect effect of management actions within the potential habitat of hairy clematis includes an increased risk of invasion from noxious or invasive weeds Incorporation of the Design Features, best management practices, mitigation and conservation measures in Appendix C of FEIS would mitigate the effects of increased disturbance from management activities, and help to control the spread and introduction of weeds within the habitat of hairy clematis.

This occurrence of hairy clematis is near the proposed Iron Mine Draw Stream Channel Restoration Actions needed to restore the channel will be guided by the Aquatic Toolbox. The risk to hairy clematis from these actions include loss or damage of plants or loss of habitat. These can be mitigated through using the design features (Appendix C of FEIS)

There are no rock pits or in-woods processing areas near this occurrence of hairy clematis so no effects will occur.

Cumulative Effects

The area of this analysis is the project boundary. The time frame is from 2005 to 10 years in the future which is considered the length of the decision to be made by this analysis.

One occurrence was detected in 2005 during a survey for the Bald Mesa Fuels Reduction Project. Since then there has been at least one entry of prescribed fire in this area. The effects were mitigated by locating and constructing hand line around the plants. Other activities include grazing and dispersed recreation in the uplands.

In addition to the management actions in this analysis, the foreseeable actions within the habitat of hairy clematis include recreation such as hiking and dispersed camping. Wildfires may burn in the area. Grazing by cattle and wildlife will continue. Singly none of these actions will extirpate the hairy clematis at the site

Determination of Effect

It is my determination that

Management actions proposed in the Rim Country EIS may impact individuals of hairy clematis (*Clematis hirsutissima* var. *hirsutissima*) (syn. var. *Arizonica*) but is not likely to result in a trend toward federal listing or loss of viability.

Arizona sneezeweed (Helenium arizonicum)

Arizona sneezeweed is a Southwestern Region sensitive species for Coconino and Apache Sitgreaves National Forests Arizona sneezeweed is a perennial herb that grows up to 4 feet tall with several stems. Flower heads consist of yellow to orange 3-lobed ray flowers and purplish-brown globular disk flowers and bloom July through September. Hundreds of individuals may exist in a single population. This endemic species ranges from the Mormon Lake area southeastward to the White Mountains area where it grows in drainages, near springs, ponds, and other wet areas (Arizona Game and Fish Department 2005) within ponderosa pine and mixed conifer habitats.

Existing Condition

Table 11. Locations of Arizona Sneezeweed from Apache Sitgreaves files

Collector/Observer	Date	Location	Notes
Jon Ricketson and Luther Raechal	9/3/1988	Horseshoe Lake	
Herbarium of Desert Botanical Garden. Notes: Forest Service.	8/16/1975	Fivemile Lake	Road #300, 10.6 mile. W of Rt 260. Abundant along wet gully and in moist low wet areas.
No information	10/4/2006	Aspen Lake	100+ plants; nearing the end (dying). In Elk exclosure.

Table 12. Arizona sneezeweed occurrences as documented in TESP/IS (Coconino National Forest)

Collector/Observer	Date	Notes
AZCC, Plant Crew	6/24/2014	In grassland restoration unit
AZCC, Plant Crew	6/24/2014	In grassland restoration unit
AZCC, Plant Crew	9/26/2015	In grassland restoration unit
K. Sullivan	8/2/2004	551/0001
Wildlife Crew	8/25/2011	551/0022
Wildlife Crew	8/25/2011	551/0034
Wildlife Crew	8/25/2011	551/0035
Wildlife Crew	9/2/2014	559/0015
Wildlife Crew	9/2/2014	559/0016
Wildlife Crew	7/13/2011	562/0015
Wildlife Crew	8/27/2014	571/0010
Wildlife Crew	8/25/2011	571/0024
Wildlife Crew	7/13/2011	572/0001
Wildlife Crew	7/15/2011	572/0001
Wildlife Crew	7/13/2011	573/0001
Wildlife Crew	7/13/2011	573/0001
Wildlife Crew	9/9/2014	610/0018
Wildlife Crew	9/9/2014	611/0001
Wildlife Crew	9/9/2014	611/0007

Table 13. Locations of Arizona sneezeweed in treatment areas using data from SEINet

Collector/collector's number	Date	Location
J.M. Rominger 3576	9/3/1986	Woods Canyon at Rocky Park Exit
W. S. Phillips; T. K. Phillips, T. H. Kearney 3459	8/14/1950	4.5 mi E of Alder Lake
J. Ricketson 4451	9/3/1988	R12E T12N Sec. 34 & 35. Horseshoe Lake, 2.6 miles east of the Coconino-Sitgreaves National Forest boundary, along U.S.F.S. Road 300 (Rim Road
M. Licher 4636	8/14/2014	Navajo County, Along Hwy. 260, west of Forest Lakes, Mogollon Rim country
Ronald L. Hartman 84707	9/21/2006	Near Forest Lakes Estates, on Forest Road 237 at dual 500 KV transmission lines
P. Boucher 764	7/9/1987	Barbershop Canyon
R. A. Darrow 3275	9/10/1975	Myrtle Lake, on Mogollon Rim Rd
W. S. Phillips 3588	8/24/1953	Myrtle Lake, Mogollon Rim
J. Ricketson 1686	7/24/1984	Myrtle Lake
J. Ricketson 1698	7/24/1984	Lost Lake, 19.2 miles E of the junction of AZ-87, along FS Road 300
Rose E. Collom 630	9/1/1936	Buck Springs Ranger Station

Collector/collector's number	Date	Location
S. P. McLaughlin; J. E. Bowers 3812	8/23/1986	Junction of Highway 260 and Rim Road
Elinor Lehto 2003	7/14/1963	Payson-Heber Hwy; 5 miles east of Woods Canyon Lake turnoff
Paul A. Newman 1971-09-14	9/14/1971	Rt. 260 between road to Woods Canyon Lake and Heber
J. Springer 5579	8/23/2007	FR135 turnoff from Lake Mary Road, in wet meadow
J.N. Mann 174	8/15/1967	Beaver Creek Watershed 1 mi SW Lake Mary Rd, 4 mi NW Happy Jack
W. Hodgson H-828	7/8/1980	In meadow adjacent to lower Canyon Creek, ca. 2 mi. from campground

There are no data for Arizona sneezeweed in the Arizona Game and Fish Heritage Database.

Effects Common to Alternatives 2 and 3

Direct and Indirect Effects

Arizona sneezeweed occurs on all three forests included in this analysis and within several treatments. Vegetation treatments except those in MSO habitat will be developed using the Mechanical Toolbox (Appendix D of FEIS). Treatments within MSO habitat will be developed in cooperation with U.S. Fish and Wildlife Service. These effects can be mitigated by using the design features in Appendix C of FEIS.

Short-term effects of prescribed fire include deaths of individual plants. The potential long-term effects include the loss or damage of plants, increased risk of noxious or invasive weeds and an increased risk of erosion. These effects can be mitigated through the use of design features and mitigations.

An indirect effect of management actions within the potential habitat of Arizona sneezeweed includes an increased risk of invasion from noxious or invasive weeds. Incorporation of the Design Features, best management practices, mitigation and conservation measures in Appendix C of FEIS would mitigate the effects of increased disturbance from management activities and help to control the spread and introduction of weeds within the habitat of Arizona sneezeweed.

Arizona sneezeweed is known to occur in the following aquatic restoration units; Woods Canyon Creek, Chevelon Lake and Canyon Creek but may be in additional sites as well. Aquatic restoration may include site disturbing activities that would affect this occurrence of Arizona sneezeweed. Ground disturbing activities such as moving soil would increase the risk of disturbance to individual plants and their habitat. These effects can be mitigated through design features and mitigations found in Appendix C of FEIS.

Arizona sneezeweed near roadways may be affected if construction, maintenance, or reconstruction of the road occurs, especially if the rocky areas favored by the species is affected. This can be mitigated by locating and avoiding the plants and through other mitigations in Appendix C of FEIS.

There are no rock pits or in-woods processing areas near this occurrence of Arizona sneezeweed so no effects will occur.

Arizona sneezeweed may occur near roadways so may be affected if construction, maintenance or reconstruction of the road occurs and can be mitigated by locating and avoiding the plants before activities occur and by using the mitigations found in Appendix C of FEIS.

Cumulative Effects

The timeframe of this discussion is from 1999 when Arizona sneezeweed was added to the sensitive species list to 20 years in the future. The area of this analysis is the project boundary.

On the Coconino NF, Arizona sneezeweed has been addressed in Upper Beaver Creek Watershed Fuel Reduction (2010), Clint's Well Forest Restoration (2013) and the Cragin Watershed Protection Project (2018), in which effects were mitigated through design features and mitigations similar to those proposed in this project. The finding of effect for all these projects was "may effect". To date, none of these projects has been fully implemented. Therefore, the effects of the projects on Arizona sneezeweed including those that would be beneficial to the species have not been fully realized.

Arizona sneezeweed tends to grow in drainages and open areas. These areas are also favored by dispersed recreationists who may crush plants and alter habitat during activities. Activities such as grazing and fuelwood gathering have occurred and will continue in these areas.

Factors contributing to the degradation of aquatic habitats that led to the decision to include the areas in this analysis may have also affected the habitat of Arizona sneezeweed. Aquatic habitat restoration, depending on the actions taken could preserve or improve the habitat of Arizona sneezeweed in this area, depending on the actions taken by restoring the general area and reducing effects such as erosion in the long term.

Determination of Effect

It is my determination that

Management actions proposed in the Rim Country EIS may impact individuals of Arizona sneezeweed (*Helenium arizonicum*) but are not likely to result in a trend toward federal listing or loss of viability.

Flagstaff beardtongue (*Penstemon nudiflorus*)

Flagstaff beardtongue is a Southwestern Region sensitive species for Coconino NF. Flagstaff beardtongue grows in dry pine forests, pine/oak, pine/oak/ juniper and pinyon juniper forests. It occurs on dry slopes, in openings and along edges of openings and in forested areas. Documented locations for Flagstaff beardtongue include Anderson Mesa, near Lake Mary, Luke Mountain, Mormon Lake, Stoneman Lake, along the Schnebly Hill Road, along Oak Creek. In recent years, numerous locations have been found in proposed fuels reduction projects such as Upper Beaver Creek Watershed Fuels Reduction Project (2010).

Flagstaff beardtongue is endemic to northern and central Arizona where grows in dry pine forests (Arizona Game and Fish Department 2003). It tends to occur at elevations from 5100 to 7000 ft. in stony basaltic soil (Crosswhite 1967).

Existing Condition

Tables 15 and 16 show the occurrences of Flagstaff beardtongue as recorded in TESP/IS and Arizona Game and Fish Heritage Database (2017).

Table 14. Locations of Flagstaff Beardtongue in vegetation treatments.

Examiner/ Observer	Date	Site/location
MRRD WL Crew	8/1/2013	573/6
MRRD WL Crew	8/1/2013	573/7
MRRD WL Crew	8/8/2005	606/22
MRRD WL Crew	8/1/2013	609/9

Examiner/ Observer	Date	Site/location
MRRD WL Crew	8/1/2013	609/15
K Sullivan	8/31/2004	609/41
MRRD WL Crew	8/1/2013	610/25
MRRD WL Crew	8/1/2013	611/6
K Sullivan	8/2/2005	618/24
K Sullivan	8/2/2005	618/25
K Sullivan	9/5/2004	619/1
K Sullivan	9/5/2004	619/2
MRRD WL Crew	8/1/2013	619/3
MRRD WL Crew	8/1/2013	619/24
MRRD WL Crew	8/1/2013	619/26
MRRD WL Crew	8/3/2005	621/1
MRRD WL Crew	8/3/2005	621/7
MRRD WL Crew	8/3/2005	925/6
MRRD WL Crew	8/2/2005	925/14
MRRD WL Crew	8/2/2005	925/15
MRRD WL Crew	8/2/2005	925/16
MRRD WL Crew	8/2/2005	925/17
MRRD WL Crew	8/2/2005	925/18
MRRD WL Crew	8/2/2005	925/21
MRRD WL Crew	8/2/2005	925/27
MRRD WL Crew	8/2/2005	925/28
MRRD WL Crew	8/2/2005	925/29
MRRD WL Crew	8/2/2005	925/30
MRRD WL Crew	8/2/2005	944/5
MRRD WL Crew	8/2/2005	944/6
MRRD WL Crew	8/2/2005	944/7
MRRD WL Crew	8/15/2005	954/2
MRRD WL Crew	8/9/2004	
MRRD WL Crew	8/11/2004	
MRRD WL Crew	8/11/2004	
MRRD WL Crew	8/13/2004	
MRRD WL Crew	7/31/2014	

Table 15. Locations for Flagstaff beardtongue from Arizona Game and Fish Heritage Database

Date	Location
6/25/1988	Mogollon Rim: N of Strawberry
6/25/1988	Mogollon Rim: N of Strawberry
6/25/1988	Mogollon Rim: N of Strawberry
8/15/1973	Jacks Canyon: Moqui Draw
7/5/1974	W of Stoneman Lake

Effects Common to Alternatives 2 and 3

Direct and Indirect Effects

Most of the areas containing Flagstaff beardtongue receiving vegetation treatments areas are scheduled for mechanical treatment . The treatments will be developed using the mechanical treatment toolbox (Appendix D of FEIS). The treatment will encompass considerations for the habitat of northern goshawk. The effects of mechanical treatment include loss of individual plants or groups of plants. These effects can be mitigated by using the design features in Appendix C of FEIS.

Prescribed fire will occur across the project area. Short-term effects of prescribed fire include deaths of individual plants. The potential long-term effects include the loss of shade, increased risk of noxious or invasive weeds and an increased risk of erosion.

An indirect effect of management actions within the potential habitat of Flagstaff beardtongue includes an increased risk of invasion from noxious or invasive weeds Incorporation of the design features, best management practices, mitigation and conservation measures in Appendix C of FEIS would mitigate the effects of increased disturbance from management activities, and help to control the spread and introduction of weeds within the habitat of hairy clematis.

Activities associated with roads and transportation in this project would be limited those needed to accomplish the management actions that will occur in the area. The effects of road construction, maintenance, reconstruction, and decommissioning can be mitigated by using the design features in Appendix C of FEIS.

There are no rock pits or in-woods processing areas near the occurrences of Flagstaff beardtongue so no effects will occur.

Cumulative Effects

The area of consideration for this discussion includes the Coconino NF within the analysis area boundary. The timeframe includes 20 years past and future.

Surveys have been conducted for Flagstaff beardtongue on several of past projects that addressed vegetation and prescribed fire treatments. These include Upper Beaver Creek Watershed Fuels Reduction Project (2010), Clint's Well Forest Restoration (2013), Mahan, Marshall Fuels Reduction and Forest Restoration Project (2011) and the Four-Forest Restoration Initiative (2014). Effects to Flagstaff beardtongue were mitigated with similar measures as are being used in Rim Country EIS.

Management activities such as grazing have occurred and will continue to occur in the area of consideration.

Other activities such as utility corridors have impacted individual plants or groups but has not contributed to a decline in the species.

Activities such as dispersed recreation and fuel wood cutting occur in the area of consideration.

Flagstaff beardtongue is showy and is cultivated and offered for sale by local and regional wildflower vendors but the effects of these activities on wild populations is not known.

Determination of Effect

It is my determination that

Management actions proposed in the Rim Country EIS may impact individuals of Flagstaff beardtongue (*Penstemon nudiflorus*) but are not likely to result in a trend toward federal listing or loss of viability.

Alternative 3 – Focused Alternative

Arizona Bugbane (Cimicifuga arizonica)

Under alternative 3, no mechanical treatments would take place in the area where Arizona bugbane is known to occur, so the effects of mechanical treatment described in alternative 2 above do not apply. The reduction of canopy closure and reduction of stand densities would not occur in this alternative. The effects on Arizona bugbane of all other management actions are similar to those described above in the discussion of effects of alternative 2.

Hairy Clematis (Arizona leatherflower) (Clematis hirsutissima var. hirsutissima) (syn. var. Arizonica)

In alternative 3, no mechanical or fire treatments are proposed in areas where hairy clematis is known to occur, so the effects of those actions are similar to alternative 1, the no action alternative. The effects of transportation and channel restoration are the same as those discussed for alternative 2, above, including the threats of noxious or invasive weeds.

Rock (cliff) fleabane (Erigeron saxatilis)

One occurrence of rock fleabane (in the Barbershop MSO PAC) will not receive mechanical and/or prescribed fire treatments in this alternative and would not move as quickly toward desired condition as compared to the potential MSO PAC treatment in Alternative 2. Two occurrences that would be treated as MSO habitat in alternative 2 will receive different mechanical treatments in this alternative. One area will receive an individual tree removal and the other will be treated using an uneven age thinning treatment. Both will receive some form of prescribed burning. The effects of these treatments may result in different overstory composition and structure but the effects to rock fleabane and its habitat are expected to be similar.

Arizona sneezeweed (Helenium arizonicum)

F**e**wer areas containing Arizona sneezeweed will be treated as compared to alternative 2. As a result, alternative 3 would not fulfill the purpose and need of the project as well as alternative 2 and there would be less progress toward the desired conditions of the forest LMRPs, including those that apply to Southwestern Region sensitive plants such as Arizona sneezeweed.

Flagstaff beardtongue (Penstemon nudiflorus)

Under alternative 3 few acres containing Flagstaff beardtongue would receive vegetation treatments . Alternative 3 would not address the purpose and need to the extent that alternative 2 would. There would be less progress toward the desired conditions that affect Flagstaff beardtongue. Forest resilience and would be attained on fewer acres and the risk of undesirable fire effects would be reduced in fewer areas. Flagstaff beardtongue plants and habitat in these areas would remain at higher risk of loss.

Bebb's Willow (Salix bebbiana)

F**e**wer areas containing Bebb's willow would receive vegetation or prescribed fire treatments as compared to alternative 2. As a result, it would not fulfill the purpose and need of the project to the extent that alternative 2 would and there would be less progress toward the desired conditions and guidelines in the forest LMRPs, including those that apply to Southwestern Region sensitive plants such as Bebb's willow.

Noxious or Invasive Weeds

Assumptions

This analysis is based on the following assumptions.

1. All management activities will occur as analyzed in the various specialists reports and described in the FEIS.
2. The mitigation measures, design features, and Best Management Practices will be incorporated into project design and implementation. (See Appendix C of FEIS of FEIS).
3. Areas to be treated will be surveyed for noxious or invasive weeds before treatments are implemented.
4. These factors should be considered when identifying survey needs:
    - Likelihood of any of the species addressed in the Botany and Weeds report occurring within the treatment area
    - Amount of disturbance. For example, surveys may not be needed in areas scheduled for prescribed burning if the treatments are scheduled to be of low intensity.
5. The acreage of potential disturbance in this project is much larger than generally analyzed in similar projects, necessitating more noxious or invasive weed treatments to control invasive species.

Affected Environment

Each of the three forest has separate noxious or invasive weed treatment analyses. As a result, the targeted species and treatment methods may differ across forests. The Coconino NF was the first of the three forests to complete a noxious or invasive weed treatment analysis the *Final Environmental Impact Statement for Integrated Treatment of Noxious or Invasive Weeds, Coconino, Kaibab, and Prescott National Forests*; (USDA Forest Service 2005), analyzing 29 species for treatment. The Apache-Sitgreaves NF completed the *Environmental Assessment for the A-SNFs Integrated Forest-Wide Noxious or Invasive Weed Management Program* (USDA Forest Service 2008). It analyzed 53 species and included a variety of treatments including chemical, cultural, mechanical/physical and biological control. The Tonto NF completed the *Environmental Assessment for Integrated Treatment of Noxious or Invasive Plants* in 2012 and addressed 68 species. It includes manual, mechanical, prescribed burning, cultural, use of biological control agents, and use of herbicides. The noxious or invasive weeds throughout the Region have been rated on the basis of their known distributions and threats to ecosystems (USDA Forest Service 2014). There are four levels defined by regional guidance.

- Class A species are newly established or have the potential to become established in the area. These may pose an unacceptable threat to rare species, watershed condition, wilderness or other natural and economic resources. These species should receive the highest priority prevention, eradication, containment, control, and/or restoration. Management emphasis is to prevent and eradicate whenever possible or else use containment as a last resort.

- Class B species have limited distribution on the forest, district, or else within a particular watershed but still pose a substantial threat to rare species, watershed condition, wilderness or other natural and economic resources. Weed species in this classification receive a lower priority for eradication, control, or restoration as compared to Class A species. Management emphasis is to eradicate on a local basis or else control established infestations by using an adaptive management approach.

- Class C species are widely distributed but do not pose additional threats to rare species, watershed condition, wilderness or other natural and economic resources. (e.g., widely scattered cheatgrass infestations that do not unduly impact native vegetation or contribute to periodic fire cycles). Weed species in this classification generally receive the lowest priority for control or restoration as compared to species in other classes. Management emphasis is to use a control strategy with an adaptive management approach on a local basis only when necessary to achieve desired goals and/or objectives and to limit overall impacts.

- Class E species are widely distributed across the forest, district, or else within a particular watershed and pose overwhelming damage to natural resources. These particular wide-ranging species must be controlled continuously to prevent overwhelming damage to natural. Management emphasis is to control on a broad-scale basis by using a control strategy with an adaptive management approach to achieve desired goals and/or objectives and limit overall impacts.

Existing Condition

Noxious or invasive weeds are present within all three forests in the project area. The presence of noxious or invasive weed species have been documented by various surveyors including Forest employees. Disturbances such as wildfires, management activities, roadways and activities by the general public but not regulated by the Forest Service have contributed the introduction and spread of various species. Tables 17, 18 and 19 show the species present on each forest and the objectives by forest for each species. Various references have been used to identify species that could potentially occur in the area including the field guide prepared by Mitchell White in 2008 (White 2008).

Table 16. Noxious or invasive weeds on Apache Sitgreaves NF and within the project area

Scientific name	Common name	Management goal/treatment objective	Regional Ranking	Comment
Acroptilon repens	Russian knapweed	Prevent/eradicate	E	Within project boundary but not in treatment units
Carduus nutans	musk thistle	Prevent/control/eradicate	A	
Centaurea solstitialis	yellow star-thistle	Prevent/eradicate	E	
Centaurea biebersteinii	spotted knapweed	Prevent/eradicate	E	
Cirsium vulgare	bull thistle	Prevent/control/eradicate	B	
Linaria vulgaris	butter and eggs	Prevent/eradicate	A	
Tamarix ramosissima	salt cedar	Prevent/control/eradicate	E	

Table 17. Noxious or invasive weeds on Coconino NF and within the analysis area boundary

Scientific name	Common name	Management goal /treatment objective	Regional Ranking	Comment
Acroptilon repens	Russian knapweed	Contain/Control	E	Most infestations are along or near highways
Alhagi maurorum	camelthorn	Contain/Control	E	All infestations are along highways except on FSR 316 which leads to private property

Scientific name	Common name	Management goal /treatment objective	Regional Ranking	Comment
Bothriochloa ischaemum	yellow bluestem	Not ranked*	B	All infestations are along Highway 260
Bromus arvensis	Japanese brome	Not ranked*	B	
Bromus tectorum	cheatgrass	Contain/control certain populations	B	
Carduus nutans	musk thistle	Eradicate	A	
Centaurea biebersteinii	spotted knapweed	Eradicate	E	Mostly along FH 3 and Highway 87
Centaurea diffusa	Diffuse knapweed	Contain/control	E	Mostly along roadways
Cirsium vulgare	Bull thistle	Contain/control	B	Most infestation are 1 acre or less and are on severely disturbed sites.
Eleagnus angustifolia	Russian olive	Contain/control	E	Single location along Highway 87
Euphorbia esula	Leafy spurge	Eradicate	E	
Linaria dalmatica	Dalmatian toadflax	Contain/control	B	Widespread weed in pine type on Coconino NF
Linaria vulgaris	butter and eggs	Not ranked*	A	One location near Happy Jack administrative site.
Onopordum acanthium	Scotch thistle	Eradicate/control	E	
Tamarix ramosissima	Salt cedar	Contain/control	E	Along Rds. 316 and 625 from Hwy 87 to private land

Table 18. Noxious or invasive weeds on Tonto NF and within the analysis area boundary

Scientific name	Common name	Management goal /treatment objective	Regional Ranking
Acroptilon repens	Russian knapweed	A -Eradicate	E
Alhagi maurorum	Camelthorn	A - Eradicate	E
Arundo donax	Giant reed	B –Contain spread/reduce population	E
Brassica tournefortii	Asian mustard	C – control outlying populations with long term goal of eradication	B
Bromus japonicus	Japanese brome	C – Strategic treatment of certain populations.	B
Bromus rubens	Red brome	C– Strategic treatment of certain populations	B
Bromus tectorum	Downy brome	C– Strategic treatment of certain populations	B
Carduus nutans	Musk thistle	A - Eradicate	A
Centaurea diffusa	Diffuse knapweed	B – Contain/Eradicate	E
Centaurea melitensis	Malta starthistle	C - Contain	A
Centaurea solstitialis	Yellow starthistle	B – Contain existing populations, treat new detections first.	E
Cirsium vulgare	Bull thistle	C –Treat priority sites	B
Convolvulus arvensis	Field bindweed	C – Low priority for treatment	C

Scientific name	Common name	Management goal /treatment objective	Regional Ranking
Eragrostis curvula	Weeping lovegrass	C – Widespread distribution, prevent new introductions.	B
Eragrostis Lehmanniana	Lehmann's lovegrass	C – Widespread distribution, prevent new introductions.	B
Erysimum repandum	Spreading wallflower	A -Eradicate	B
Linaria dalmatica	Dalmatian toadflax	A Eradicate	E
Onopordum acanthium	Scotch thistle	B - Contain/Eradicate	E
Tamarix ramosissima	Saltcedar	C –Treat priority sites	E
Ulmus pumila	Siberian elm	A – Treat new sites aggressively	B

Tonto Weed List: Class A weeds are of limited distribution in Arizona, or unrecorded in the state. They pose a serious threat. Management goal is eradication. **Class B weeds** are of limited distribution in Arizona, common in some places in the state. Management goal is to contain their spread, decrease population size, then eliminate. **Class C weeds** have spread beyond our capability to eradicate them. Management goal is to contain spread to present size, then decrease the population, if possible.

Environmental Consequences

Alternative 1 No Action

There would be no effects to noxious or invasive weeds from management activities because none would occur. Alternative 1 would not increase forest resiliency and sustainability or reduce the risk of undesirable fire effects.

There would be no improvement in terrestrial or aquatic habitats. There would be no surveys for or treatments of noxious or invasive weeds. Survey and treatment would continue in other projects, as part of the forests' noxious weed program, and by other entities such as Arizona Department of Transportation.

Weed infestations that would have been detected and treated would go unnoticed and continue to expand unless detected by other surveys or independent observations. Treatments that would have been part of the mitigating actions would not be accomplished. As a result, treatment of weed infestations would not occur unless the locations are included in another project area or are treated by a cooperating agency. For example, treatments along highways or roadways in coordination other agencies would continue but these treatments would not expand outside of highway right of ways.

The guidance of past analyses that would allow treatment of noxious or invasive weeds on the forests, specifically the Environmental *Assessment for the A-SNFs Integrated Forest-Wide Noxious or Invasive Weed Management Program,* the *Final Environmental Impact Statement for Integrated Treatment of Noxious or Invasive Weeds, Coconino, Kaibab, and Prescott National Forests* and *the Environmental Assessment for Integrated Treatment of Noxious or Invasive Plants* for Tonto National Forest would not apply. .

The design features in Appendix C of FEIS would not be used. These design features provide an integrated approach to noxious or invasive weed management but would not be incorporated into management activities on the forests if the no action alternative is selected.

Effects Common to Alternatives 2 and 3

Direct and Indirect Effects

The purpose of the Rim Country Project is to reestablish and restore forest structure and pattern, forest health, and vegetation composition and diversity in ponderosa pine ecosystems to conditions within the

natural range of variation. Preventing, controlling and eradicating noxious or invasive weeds is complementary to the purpose and need and would improve native vegetation composition. Management of noxious or invasive weeds is consistent with the purpose and need because management of them will contribute to the vegetation composition and diversity of the native plant community in the project area.

The action alternatives would be consistent with the LMRPs and would move toward the desired conditions for native plant communities and noxious or invasive weed control. Noxious or invasive weed management would be guided by each forest's weed management NEPA. Surveys for noxious or invasive weeds would be conducted before management activities areas and needed treatments would follow the guidance of each forest's noxious or invasive weed assessment. Post implementation monitoring and treatment would occur.

To prevent the introduction and spread of noxious or invasive weeds by vehicles used in management activities, vehicles and equipment would be washed to remove soil, seeds and other debris from them before entering the area or when moving from one area to another. Ideally, this would occur before the equipment comes onto the forest, but it can also be facilitated with the approval of the contracting officer or timber sale administrator (see Appendix C of FEIS)

The direct effects of management activities noxious or invasive weeds include ground-disturbing activities that have the potential to increase the acreage and/or density of the existing infestations within the project area. Disturbance may contribute to the spread of weeds by eliminating competition from existing vegetation and creating bare ground that is more easily invaded than undisturbed areas. Severe disturbance removes competitive vegetation, alters nutrient composition, and creates bare soil making potential sites for the invasion or spread of noxious or invasive weeds. Examples of management activities that would create localized severe disturbance include burned areas from slash piles, creation of log decks, bare soil created through road reconstruction, decommissioning, temporary road construction, in woods processing areas and rock pits.

Tree removal indirectly affects noxious or invasive weeds by reducing tree canopy and stand density. Treatments that reduce the tree canopy and lower the stand density would affect all understory plants, including noxious or invasive weeds by allowing more sunlight, increasing available nutrients, and temporarily decreasing competition. The increased availability of resources and decrease in competition can also provide favorable conditions for noxious or invasive weeds and could increase the size and density of existing populations, especially in areas where weed infestations already exist. These effects are reduced to a non-significant level by incorporating the mitigation measures and design features and by incorporating survey and treatment in the project. Design features which limit the amount of soil disturbance permitted during timber sales and regulate the depth of rutting by vehicles when soil conditions are wet, minimizing soil disturbance, would help reduce the amount of disturbance during operations, reducing the amount of bare ground for noxious or invasive weeds to occupy (Appendix C of FEIS)

Burning can release nutrients, reduce plant competition, increase the amount of available sunlight, and increase bare soil. Most prescribed burning would be of low severity with low soil heating, retention on most ground litter and little or no change in mineral soil. These assumptions are supported by other research (Fowler, et al. 2008) (Collins, Moghaddas and Stevens 2007). They concluded that low intensity fires in open ponderosa pine forest had minimal effects on the abundance of noxious or invasive weeds. McGlone and Egan (2009) found similar results in studies they reviewed. Prescribed or managed fires generally result in lower severity and result in lower levels of noxious or invasive weed invasion as compared to uncontrolled wildfire. In some situations, prescribed fire may result in moderate to higher severity (McGlone and Egan 2009). The effects in these areas would be more severe and would be similar to slash pile burning or wildfire. The alternatives would incorporate a series of design features and

mitigations that would focus on reducing the risk of actions that would increase existing weed populations or introduce new weeds.

Alternatives 2 and 3 would incorporate a series of design features and mitigations that would reduce the risk of increasing weed coverage or extent and decrease the risk of introduction of noxious or invasive weed species not known to exist within the project area. Design features provide for collaboration between resources before the implementation of a prescribed fire. Follow-up monitoring would be conducted in areas of heavy disturbance such as large slash piles. Design features provide direction to conduct prescribed fires under conditions that promote native plant communities, hinder weed species germination, aid with controlling existing weed infestations, and prevent the spread of existing weeds.

Direct and indirect effects of temporary road construction, road reconstruction and maintenance or road decommissioning include disturbance and increased risks of dispersal of existing weed species and populations and introduction of new species. These would be mitigated by following the design features in Appendix C of FEIS.

Direct and indirect effects of temporary road construction, road reconstruction and maintenance or road decommissioning include disturbance and increased risks of dispersal of existing weed species and populations and introduction of new species. These would be mitigated by following the design features in Appendix C of FEIS.

Management activities associated with aquatic and channel restoration would increase disturbance in certain areas. These effects would be mitigated by following the design features in Appendix C of FEIS.

A series of rock or gravel pits would be needed to provide materials for road maintenance in the project area. Appendix C of FEIS provides a series of design features designed to minimize the risks of introduction and spread of noxious or invasive weeds within the project area.

Processing areas are likely to be locations where invasive weeds are established during their operation. These areas would be managed under the timber sale or special use permit. To minimize the potential for invasive species spread and transport, these would be treated as part of the reclamation once operations are complete. Implementation of the design features would reduce introduction and spread of noxious and invasive weeds. Thus, while these areas would result in localized weed populations, the spread is expected to be limited. Design features provides for rehabilitation of processing areas after they are no longer used including seeding of sites with native seed which would help re-establish native plant communities and reduce the risk if noxious or invasive weed infestations. Seed mixes of native species used for post-thinning erosion would be certified as weed-free in accordance with Southwestern Region guidance for weed-free materials with a minimum of five pounds of pure live seed per acre (USDA Forest Service 2014).

Alternatives 2 and 3 are expected to limit the establishment and spread of invasive species within and adjacent to the project area over the next several decades by decreasing the risk of high severity wildfires which are generally sources of severe disturbance. In the ponderosa and mixed conifer habitat types within the project area, nonnatives have been shown to increase with increasing fire intensity (McGlone and Egan 2009); (Fornwalt, Kaufmann and Stohlgren 2010) (Springer, et al. 2018). By decreasing fire severity, these alternatives would result in increased understory abundance and diversity which would be more resistant to invasive species over the next 10 to 20 years.

Cumulative Effects

The cumulative effects boundary for noxious or invasive weeds includes the project area plus surrounding major arteries of transportation and utility corridors that enter the project area. Major roads and utility corridors were included because of their roles in providing corridors for dispersal of noxious or invasive weeds. The timeframe for noxious or invasive weeds is twenty years prior and twenty years into the future.

The distribution of noxious or invasive weeds on the project has been shaped by past management actions and natural disturbances in the project.

Activities such as firewood cutting have occurred in the past and will continue into the future. Fuel wood cutters can introduce weeds into the area through their actions. These actions occur under permit but the forests have limited control over where these activities will occur.

Wildfires can be sources of high levels of disturbance depending on fire severity. Severely disturbed areas can be more easily invaded by noxious or invasive weeds than less severely disturbed or undisturbed areas. Numerous wildfires have occurred in the project area (see cumulative effects document). Some of these, such as the Rodeo-Chediski (2002), Juniper (2016) and Pot Fire (1996) have covered large acreages. These have resulted in large acreages of severe fire effects such as almost complete removal of the plant communities and soil erosion, leaving large areas of disturbance prone to noxious or invasive weed invasions. Some remedial actions for large fires have resulted in large acreages of non-native species that are now problematic and will be challenging to restore to native plant communities. An example of this is the large infestation of Lehmann's lovegrass that now infests the Dude Fire (1990) on the Tonto National Forest.

Fire exclusion has contributed to the risk of noxious or invasive weed invasion by promoting very dense forests with little or no resilient understory community (Springer, et al. 2018). The lack of native vegetation to compete with noxious or invasive weeds increases the risk of weed invasion. Fire exclusion also increases the risk of severe stand replacing fires and its accompanying severe disturbance.

There are numerous grazing allotments in the project boundary. The past effects of grazing and the associated activities are not completely known but may include temporary reduction of the native plant community in certain areas (especially near water sources) which would allow for plants such as the noxious or invasive weeds discussed above to enter the plant community and introduction of weeds through feed or manure. Human actions associated with range management such as driving in the area, constructing livestock improvements, and transporting livestock have also been part of the past actions.

A wide variety of recreation activities occur within the boundary of the project area including hiking, camping, hunting and recreational driving. Users can introduce noxious or invasive weeds from other areas on vehicles and personal equipment. The effects of livestock such as horses or pack animals used in recreation are similar to those in grazing and include temporary reduction of the native plant community in localized areas where animals are allowed to graze and introduction of weeds through feed or manure. Trampling and compaction can also occur if the same campsites are used repeatedly.

In the past there were few restrictions on off-road motorized travel whether for recreational or other purposes On the Coconino NF, most off-road motorized travel was prohibited with the implementation of the Travel Management Rule (TMR) in 2012. Implementation of the 2012 travel plan also reduced the number of roads open to public motorized travel, reducing the risk of dispersal of noxious or invasive weeds in some areas. The Tonto NF completed a similar analysis in 2016, restricting motor vehicle travel to roadways in some areas while allowing cross-country travel in other areas. The effects to noxious or invasive weeds were addressed in the analysis. The Apache-Sitgreaves NF is currently in the process of analyzing travel management. A final EIS for the project is expected in October 2019. The effects of this project to resources such as noxious or invasive weeds are unknown.

Major highways tend to be corridors for weed dispersal by providing a source to vector weeds into the area. Management activities associated with the highway can create disturbance and spread existing weeds. Examples include past activities such as blading of road ditches where equipment passed through existing weed infestations, spreading them along the road corridor. In 2003, the Southwestern Region of the Forest Service completed the Environmental Assessment for Management of Noxious Weeds and

Hazardous Vegetation on Public Roads on National Forest System Lands in Arizona. The decision, which followed in 2004, allowing treatment of noxious or invasive weeds along state and federal highway rights-of-way through all National Forests in Arizona. Some treatments have occurred along state and federal highways as a result but the extent of these treatments is not known.

The Apache-Sitgreaves NF has surveyed and treated numerous infestations of noxious or invasive weeds within the project area since 2004. All of the treatments prior to the approval of the *Environmental Assessment for the A-SNFs Integrated Forest-Wide Noxious or Invasive Weed Management Program* (USDA Forest Service 2008) were mechanical treatments accomplished using hand tools. Herbicide use on the forest began in 2009 after the approval of the document. Some of the major areas of past treatment include Bison East, Bison West, Buckskin Wash, Decker Wash, and Hart Canyon. These and other areas will need repeated monitoring and treatment.

The Coconino NF began weed survey and treatments in about 1995 and like the Apache-Sitgreaves, they relied on non-herbicide methods to control isolated occurrences using mechanical control and alternatives such as grazing. Using sheep to control leafy spurge was utilized before the approval of the *Final Environmental Impact Statement for Integrated Treatment of Noxious or Invasive Weeds, Coconino, Kaibab, and Prescott National Forests*; (USDA Forest Service 2005). The EIS allowed use of herbicide as well as biological control. Many of the treatments have been focused on a particular species or areas of concern such as the leafy spurge, various species of knapweed and non-native thistles.

There are records of surveys along roadways on the Tonto NF beginning in 1999. These surveys were generally by Arizona Department of Transportation. The forest began surveying for weeds in 2003. Many of the treatment prior to the approval of the *Environmental Assessment for Integrated Treatment of Noxious or Invasive Plants* (2012) were done using hand tools.

The disturbance resulting from the management activities in this project will continue to be sources of disturbance that may contribute to the threat of noxious or invasive weed occurrences and will be additive to the activities discussed in this section of the report.

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Acronyms

AZGFD Arizona Game and Fish Department

HDMS Heritage Database Management System

NRM/TESP or TESP/IS -Natural Resource Manager, Threatened, Endangered, and Sensitive Plants, and Invasive Species (TESP/IS).

SEINet -SEINet Portal Network, an online network of North American Herbaria. Arizona and New Mexico data are hosted by Arizona State University.

EIS- Environmental Impact Statement

EA -Environmental Assessment

MRRD -Mogollon Rim Ranger District

WL- Wildlife or Wildlife Crew

FS- Forest Service

AZCC -Arizona Conservation Crew

FWS -Fish and Wildlife Service

USDA- United States Department of Agriculture

NF- National Forest

FSR Forest Service Road

HDMS – Arizona Department of Game and Fish Heritage Data Management System.

TNF – Tonto National Forest

A-S or ASNF – Apache Sitgreaves National Forest

LRMP – Land Management Resource Plan also known as Forest Plan.

ERU – Ecological Restoration Unit. An area of land generally used in Forest planning that is defined by factors such as vegetation.

PNVT – Potential Natural Vegetation Type. Describes the potential vegetation community and not the existing condition or desired vegetation. The difference may be used to define the departure from historic range of variation (HRV)

HRV – historic range of variation.

MA – management area. A unit of land used in forest planning. May include similar vegetation types, human activities and similar past management activities.

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