CHAPTER 2: COMPARISON OF ALTERNATIVES, INCLUDING THE PROPOSED ACTION

This chapter describes alternative development, alternatives considered in detail, design features and resource protection measures, and compares the alternatives considered by the Forest Service for the Upper Beaver Creek Watershed Fuel Reduction project.

Alternative Development

The Proposed Action was developed to meet the purpose and need for action. The Interdisciplinary Team designed the proposal to minimize effects on resources, which caused many issues to be categorized as non-significant for the project.

The initial Proposed Action alternative was refined following initial public scoping in April, 2006. The Proposed Action was changed in response to: concerns expressed internally and from the public; new information brought forth from Rocky Mountain Research Station; new information obtained during vegetation and fire behavior modeling; and new information obtained during analysis of stand conditions in MSO PACs and in target threshold stands. The refinement of the Proposed Action resulted in changing the treatments for stands, deferring stands from thinning and prescribed burning treatments altogether, changing the upper diameter thinning objective (reducing the upper diameter thinning objective), and adding project design features or mitigation measures to further protect resources. The District Ranger, with Forest Supervisor concurrence, decided that a modified Proposed Action would be taken forward and not a section action Alternative (PR #167).

The IDT used the following general process in considering refinements to the Proposed Action. We first looked at Forest Plan Standards and Guidance for various management areas and wildlife habitat units, and then we evaluated existing and modeled stand conditions and compared that to the desired conditions. Then we looked at fire type and crown fire potential (**active or passive crown fire**) modeled for the stand. Using these data and parameters, we determined whether the proposed treatments would put the stand on a trend of meeting desired conditions, and if it did not, we then adjusted the treatment for the stand (changed the treatment type or adjusted the thinning diameter upper limit) or deferred the stand from treatment. In some cases, stands met desired conditions for basal area, stand density; canopy closure and fire type (**surface or conditional fire**) and so thinning treatments were deferred at this time. Prescribed burning treatments overall were kept as part of the proposed action for stands. Refinements made to the Proposed Action are documented in the following IDT Meeting notes and other documents in the Project Record File (PR #123, 124, 126, 132, 141, 142, 143 and 177)

No changes were made to the Meadow Maintenance Treatment. The MSO PAC Thin ≤ 16 "dbh treatment (50 acres) was deferred from treatment. The acres proposed for treatment were reduced for the MSO PAC <9"dbh, Savannah Maintenance, Thin from Below, Transition Maintenance, Timber Stand Improvement and Uneven Aged Management Treatments. Treatment acres were increased for the Uneven Aged-Goshawk and for prescribed burning (without thinning treatments). In summary, the refined Proposed Action would use combinations of thinning and prescribed burning over a total of 43,939 acres of the project area; compared to the initial Proposed Action which would have used combinations of thinning and prescribed burning 45,607 acres of the project area. Initial prescribed burning and maintenance burning (without vegetation thinning) would occur over 27,994 acres of the project area in the refined Proposed Action, compared to 27,985 acres in the Proposed Action as scoped.

The Forest Supervisor and District Ranger reviewed all of the refinements made to the Proposed Action and concluded that the changes made were not significantly different from the scope of the initial Proposed Action, and actually decreased the magnitude of the proposal (PR#167, 224). Further, the changes made are minor in scope, while fully achieving the purpose and need for the project. The refinements made to the Proposed Action came out of an interdisciplinary process to clarify the original proposal and are based on updated information that arose from environmental analysis of the proposal.

Alternatives Considered but Eliminated from Detailed Analysis

Three alternative scenarios were considered prior to the Proposed Action (PR #23) and were used to create the initial Proposed Action. A stand alone alternative was considered after scoping. A *Mechanized Harvest with No Prescribed Burning* alternative was considered to eliminate smoke impacts. This would consist of mechanical harvesting of trees, whole tree skidding and removal of slash off-site. For this analysis, it was assumed that the proposed treatment stands would be the same as the Proposed Action, but with no treatments in the meadow maintenance stands. These stands represent the greatest need for mechanical treatment because of current stand structure. This alternative was not fully analyzed in detail for the following reasons:

- First, the use of thin only treatments and no prescribed burning is not as effective in reducing stand replacing fire and in altering fire behavior than a combination of thinning and burning (Graham et al. 2004; Agee and Skinner 2005; and Strom 2005). These researchers noted that a combination of thinning and burning treatments were the most effective in retaining pre-fire canopy structure and modifying fire behavior on the Rodeo-Chediski fire. Thinning alone can alter fire behavior primarily through a reduction of crown density, but can also increase surface fuel loadings through the placement of slash on the ground (Carey and Schuman, 2003). With this in mind, the purpose and need of the project to reduce the risk of stand replacing fire cannot be fully met with thinning only.

- Second, the lack of prescribed burning does not meet the second purpose and need of the project, the restoration of a fire adapted ecosystem. By not adding prescribed fire to approximately 44,000 acres of the project area, the fire regime stays the same as the No Action alternative. Thinning stands by itself does change the condition class to desired levels; the effects would be similar to the No Action alternative. This option does not meet this purpose and need, or the central priority of the Southwestern Region.

Alternatives Considered in Detail

The Interdisciplinary Team considered two alternatives in detail: the Proposed Action and No Action. The Proposed Action was developed to meet the purpose and need for action. No other alternatives were proposed during the public scoping process; however, concerns raised in public scoping were addressed in the final Proposed Action.

All treatment acreages and other quantitative measurements were derived from a number of sources including field measurements and estimations, and remote sensing techniques using the Forest Geographic Information System (GIS). Acre estimates and other quantitative measurements have been refined since the scoping letter was mailed out and will continue to be refined, based on additional fieldwork, and may vary after unit layout and project design features and other resource protection measures are applied. Table 3 shows the acres proposed for treatment acres both inside and outside of the WUI for the Proposed Action Alternative. The amount of disturbance would not increase during implementation over what was analyzed for this EA.

No Action Alternative

The No Action Alternative would not tin or burn any acres in the project area. The analysis of the No Action Alternative provides reviewers a baseline to compare the effects of the action alternative.

Proposed Action Alternative

The purpose of this alternative is twofold: to reduce the potential of stand-replacement wildfire that threatens people, private property and natural resource values; and to begin restoring fire-adapted ecosystems. This alternative would begin to change surface fuels, stand density, crown base height, canopy closure, fire regime and condition class to desired conditions as outlined in Table 2.

Table 5 summarizes the acres treated by treatment type, by the project area and by the priority WUI area. Note that vegetation treatments are for one initial entry. Prescribed burning treatments include an initial broadcast burn in thinned stands followed by maintenance burning throughout much of the project area. Stands that have been harvested or prescribed burned in previous entries would fall into the maintenance burning program immediately. The locations of vegetation treatments, prescribed burning and fuel treatments are provided in Maps 1 and 2. Appendix A contains treatment summary Tables A-1 and A-2 which show treatments by compartment and stand number, and upper

diameter thinning objectives by stand, and estimated number of trees in the large size class that would be thinned. Appendix B contains Noxious and Invasive Weed Best Management Practices and Recommended Activities for the Upper Beaver Creek Fuel Reduction Project during Implementation of the Proposed Action Alternative.

Table 5. Upper Beaver Creek Watershed Fuel Reduction Project Vegetation and Prescribed Burning Treatments

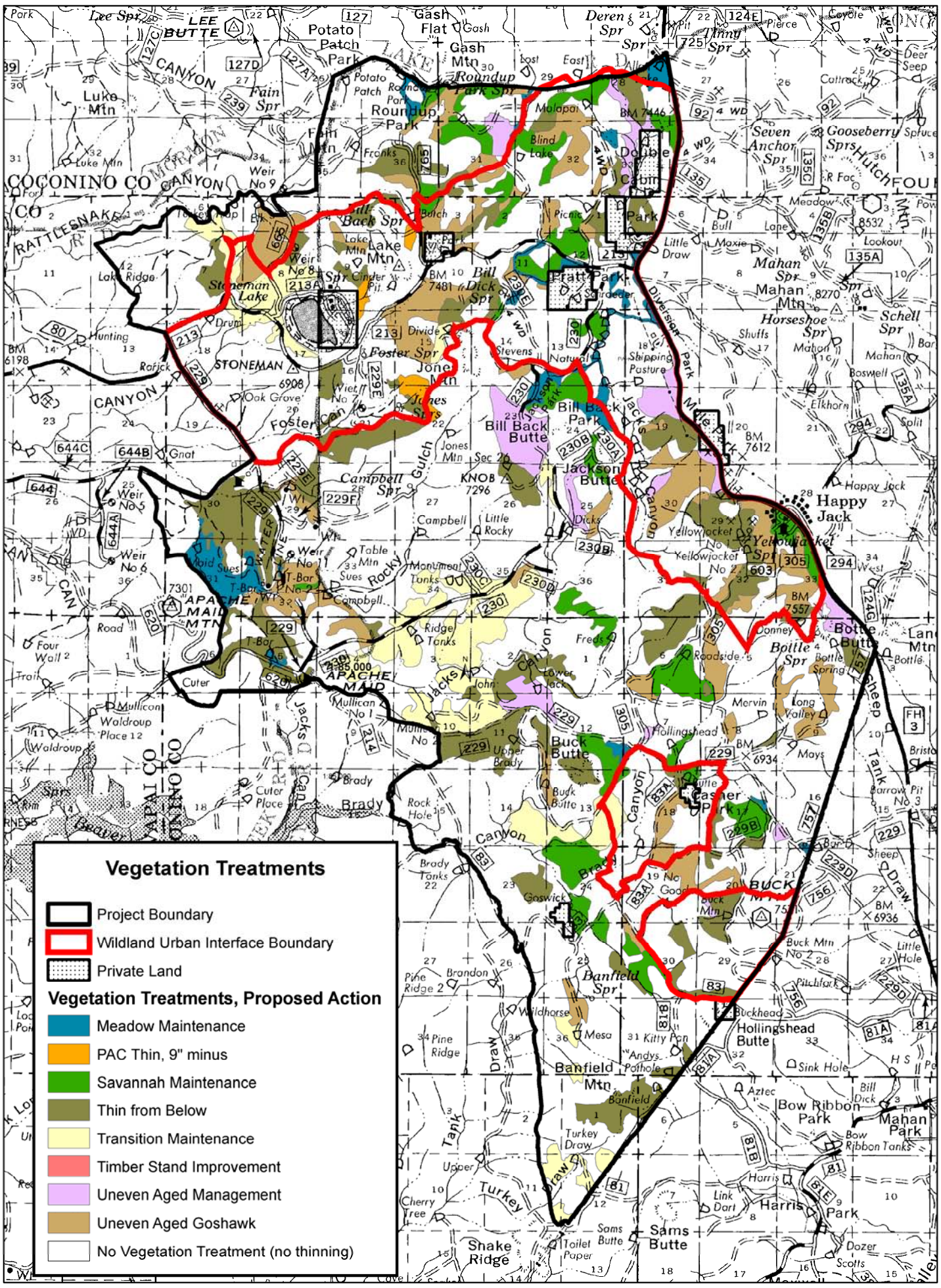
Vegetation Treatment	Total Acres	WUI Total Acres*
Meadow Maintenance	913	278
PAC 9" Minus	159	135
Savannah Maintenance	2,294	844
Thin from Below	4,900	1,723
Transition Maintenance	2,680	575
Timber Stand Improvement	37	24
Uneven Aged Management	1,215	391
Uneven Aged Management - Goshawk	3,609	1,926
Total All Vegetation Treatments	**15,807**	**5,897**
Total No Vegetation Treatment (no thinning)	**32,372**	**11,160**
Total Acres	***48,179***	***17,057***
Prescribed Burning Treatments	**Total Acres**	**WUI Total Acres***
Broadcast Burn in Vegetation Treatment Areas	11,712	4,286
Broadcast Burn and No Vegetation Treatments**	19,450	6,584
Total Broadcast Burn Acres	**31,162**	**10,870**
Maintenance Burn in Vegetation Treatments	4,109	1,631
Maintenance Burn and No Vegetation Treatments	8,635	2,523
Total Maintenance Burn Acres	**12,744**	**4,154**
Total All Prescribed Burning Treatments	**43,906**	**15,024**
Total No Treatments (no thinning, no burning)	**4,273**	**2,033**
Total Acres (all prescribed burning + no treatment)	***48,179***	***17,057***

*WUI Treatment Acres are a subset of the Total Treatment Acres.
** Includes 50 acres of rough pile and burn.

Map 1. Proposed Action Alternative Vegetation Treatments

Upper Beaver Creek Watershed Fuel Reduction Project
Proposed Action Alternative -- Vegetation Treatments

Mogollon Rim and Red Rock Ranger Districts
Coconino National Forest



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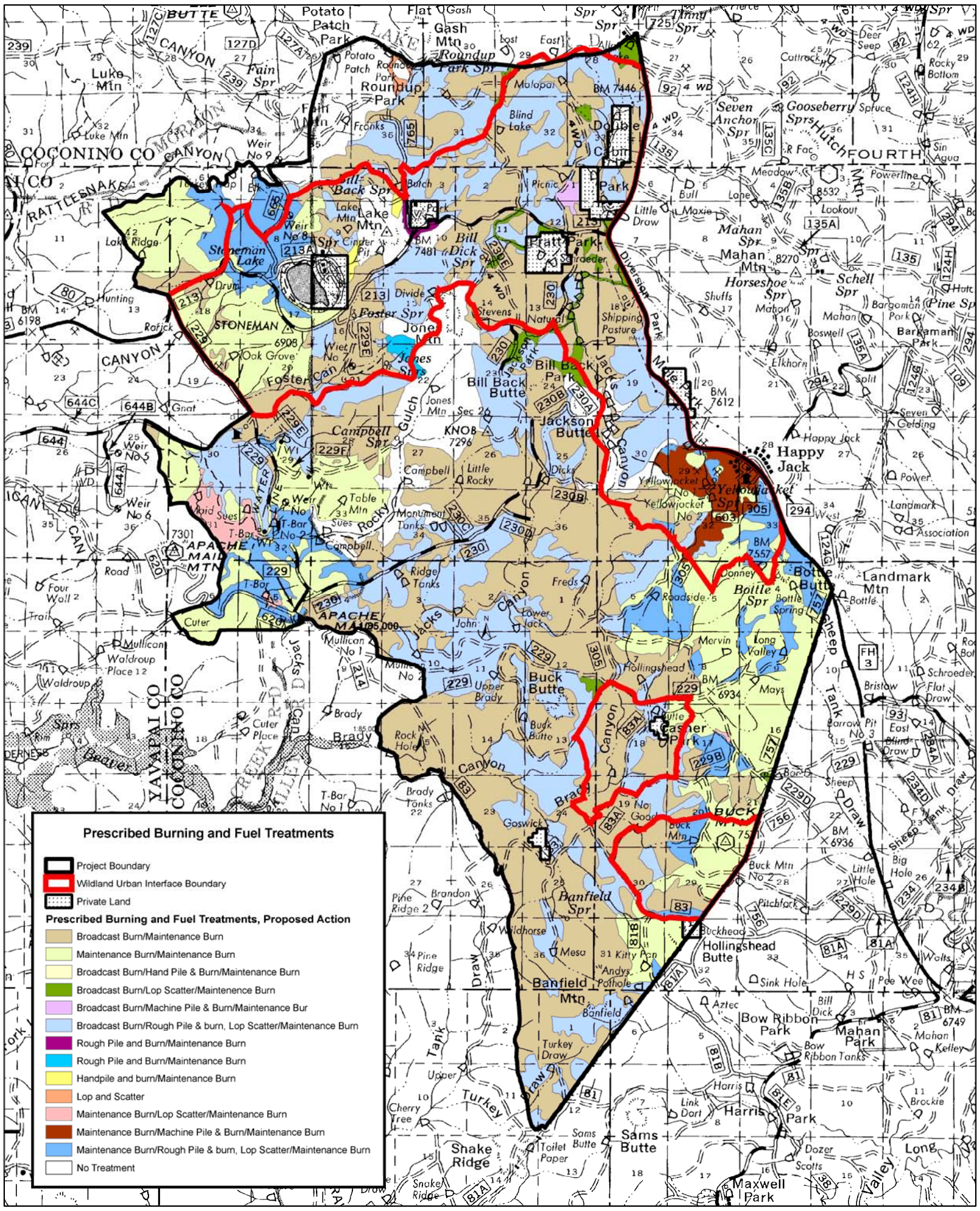
Map 2. Proposed Action Alternative, Prescribed Burning and Fuel Treatments

Upper Beaver Creek Watershed Fuel Reduction Project
Proposed Action Alternative -- Prescribed Burning and Fuel Treatments

Mogollon Rim and Red Rock Ranger Districts
Coconino National Forest



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Treatment Descriptions

Treatment locations, objectives, general prescription, fuel treatment, and the desired conditions post treatment are described below. The interdisciplinary team distinguished eight categories of vegetation treatments and a range of prescribed burning and fuel treatments based on forest biophysical setting, vegetation characteristics, past vegetation and prescribed fire management history, location within the WUI, and wildlife habitat management areas/components.

Thinning as described in the Proposed Action Alternative means reducing a stand's tree density to a desirable level to meet fuels reduction and vegetation objectives. The majority of trees that would be cut in thinning treatments are in the 5 to 12 inch size class.

Although burning is described in most cases as the first treatment, commercial thinning rather than burning may be the initial treatment if it achieves the implementation objectives. Fuel treatments of rough piling[1] or machine piling assume traditional harvest methods. This means that trees would be felled by hand, limbed in the woods, and logs skidded to a landing. Slash would be piled in the stand and not at the landing. If trees are cut by mechanized equipment, the whole tree would be skidded to a landing, and then the tree would be limbed at the landing. In this case, the fuel treatment would consist of machine piling at landings. It would not be necessary to rough pile or machine pile in the cutting unit itself. More timber sales on the Coconino National Forest are now using mechanized equipment rather than traditional harvest methods.

The proposed thinning will achieve a clumpy, groupy structure. Variation in tree spacing, clump or group sizes, and canopy gaps will provide a mosaic pattern of individual and clustered trees interspersed among openings or meadow areas. A clump can consist of 3-20 trees of similar age and size, often occurring with interlocking crowns. Clumps can range from 0.1 to 0.5 acres in size. A group is a non-uniform distribution of trees, often including several clumps. Groups can occur up to 4 acres in size. Groups typically have some interlocking crowns within the structure, yet have openings in the crown as well. Groups will vary in density, spatial arrangement, and canopy covers across the landscape to meet a variety of project objectives. Openings in treated areas will be ¼ to 4 acres in size and are expected to attain ponderosa pine regeneration.

Proposed thinning will also not remove mature "yellow pine" ponderosa pine. To ensure that mature ponderosa pine is not removed, the marking guideline will use a tree classification guideline that was outlined in Schubert (1974) where four age classes for ponderosa pine were developed based on visual tree characteristics. Marking of trees for removal will only remove trees in age class 1- young blackjacks mainly under 12 inches dbh, and age class 1 and 2 - blackjacks 12 inches and over, generally less than 24" in diameter and less than 150 years old. Trees within these two classifications (1 & 2) have unique limb structure and crown structure. Limbs of young-aged trees slope slightly upward and the crown (top) of the tree is pointed. Age classes 3 and 4 describe mature

[1] Rough piling by mechanized equipment would occur where there are large concentrations of created slash. Not all slash would be machine piled; some would be left where concentrations are lower depending on fuels and other resource objectives for the site.

ponderosa pine. Older trees have a flat limb structure and a rounded crown. Trees with the older characteristics will be retained. The Proposed Action includes the following treatments detailed below.

Meadow Maintenance (913 acres)

The proposed treatment includes cutting all ponderosa pine trees from saplings to young trees up to 9 inches dbh that have encroached into meadows. The slash would be lopped to a height of no greater than two (2) feet and scattered within the meadow. After lopping and scattering, the meadows would be maintenance burned on a short return interval (< 20 years). Prescribed burning would be implemented to achieve a patchy mosaic of burned and unburned patches. Approximately 278 acres proposed for treatment are within the WUI.

PAC 9 inch minus (159 acres)

The proposed treatment would include thinning sapling and young ponderosa pine trees up to 9 inches dbh in two Mexican spotted owl PACs. Existing Gambel oak and alligator juniper trees will not be thinned, thus maintaining these clumps and groups of trees within the stands. The slash would be piled by hand, rough piled by machine or lopped and scattered, then burned. The stands proposed for treatment in the Lake Mountain and Jones Mountain PACs would be evaluated after the hand piling and burning slash treatment to determine if Forest Plan Standards and Guidelines for down woody material could be attained with prescribed burning. If so, maintenance burning would be conducted at intervals of 3 – 15 years to maintain the desired levels of dead-and-down material, litter and fine fuels. If not, then maintenance burning would be deferred until such time as the Standards and Guidelines for down woody material were achievable with maintenance prescribed burning. Forest Plan standards and guidelines for timing of treatments to protect wildlife species will be adhered to. Approximately 135 acres proposed for treatment are within the WUI. All treatments would occur outside of the Mexican spotted owl (MSO) nest buffer zone.

Savannah Maintenance (2,294 acres)

The proposed treatments consist of broadcast burning or maintenance burning and group selection cuts in combination with prescribed fire. The treatment is designed for areas that contain Mollisol soil types, which suggest a grassland evolution. The proposed treatments would be used to create new openings or to enlarge existing openings in the stand. Trees selected for thinning would range up to 18" on about 1,774 acres; and up to 16" on about 520 acres, with the majority of the trees removed across the total area being < 12 inches dbh. Target basal areas are 40 to 60 square feet per acre of ponderosa pine. All yellow pines would be retained, along with Gambel oak and alligator juniper. Thinning slash would be either rough piled and burned where there are high concentrations of slash, lopped, scattered and burned where slash is less than 10 tons per acre, or machine piled and burned where slash is concentrated over areas too large to rough pile. Maintenance

burning would occur at intervals of 3 – 15 years to maintain the desired fuel profile. Approximately 844 acres proposed for treatment are within the WUI.

Thin from Below (4,900 acres)

The proposed treatments consist of broadcast burning or maintenance burning and thinning. Trees from 1 inch to 18 inches dbh would be thinned with the majority of the trees removed being < 12 inches dbh on about 2,005 acres; trees from 1 inch to 16 inches dbh would be thinned with the majority of the trees removed being < 12 inches dbh on about 1,995 acres. All yellow pines would be retained, along with Gambel oak and alligator juniper. Thinning would occur over a range of size classes, leading to an uneven-aged condition. Target basal areas would vary by aspect, with north slopes ranging from 60 to120 square feet per acre, and south and southwest aspects ranging from 40 to 80 square feet per acre. After thinning, slash would be machine and rough piled and burned, or lopped and scattered and burned depending on the amount of slash generated and where it is concentrated. Maintenance burning would occur at intervals of 3 – 15 years to maintain the desired fuels profile. Approximately 1,723 acres proposed for treatment are within the WUI.

Transition Maintenance (2,680 acres)

The proposed treatment would consist of broadcast burning or maintenance burning and thinning. Pine trees up to 18" will be thinned on about 1,910 acres; and up to 16" on about 770 acres, with most of the trees removed < 12 inches dbh. All yellow pines would be retained, along with Gambel oak and alligator juniper. After thinning, concentrated slash would be rough piled and burned, and slash less densely concentrated (< 10 tons/acre) would be lopped and scattered and burned. Maintenance burns would occur at intervals of 3 to 15 years as needed to maintain the desired fuels profile.

The proposed treatments would occur in stands that are transitional between the ponderosa pine and pinyon-juniper vegetation types. The desired stand condition after treatment is to reduce the basal area of pine and to improve the overall condition for oak and juniper. The target basal area after treatment is 40-100 square feet per acre for all species. The desired stand condition would also aim to increase the average crown base height to 10 feet or greater. Approximately 575 acres proposed for treatment are within the WUI.

Timber Stand Improvement (37 acres)

The stands have had previous timber management and timber harvest. The proposed treatments consist of broadcast burning or maintenance burning and thinning young ponderosa pine, predominantly < 9 inches dbh. The pine trees would be thinned at a varied spacing to provide species diversity and to help promote the growth of oaks and junipers. Slash would be hand piled and burned over most the acres proposed for treatment. Maintenance burning would occur at intervals of < 20 years to control fuel loads and stand density. Approximately 24 acres proposed for treatment are within the WUI.

Uneven-aged Management (1,215 acres)

The stands selected for treatments are ponderosa pine and oak. These stands already have characteristics of multi-storied stands and multi-aged trees with existing openings where young trees are growing. The proposed treatment consists of broadcast burning or maintenance burning and thinning. Using the individual and group tree selection methods, thinning would increase the existing uneven-aged condition of the stands by creating additional openings for pine regeneration, improve tree health and promote large-tree components. Trees would be thinned up to 18 inches dbh on about 410 acres and up to 16 inches dbh on about 805 acres, with the majority of the trees removed being in the 5 – 12 inch dbh range. All yellow pines would be retained, along with Gambel oak and alligator juniper. Activity slash would be gathered into piles, or lopped and scattered (depending on concentrations), then burned. The desired stand condition after treatment would aim for a stand basal area of 40-120 square feet per acre based on aspect (80-120 BA on north and east aspects and 40-80 BA on south and west aspects and within the WUI), 5-10 tons per acre of dead fuels, and an average crown base height of 10 feet or greater. The treated areas would be maintenance burned on a 3 – 15 year schedule depending on fuel loads. Approximately 391 acres proposed for treatment are within the WUI. Some of the stands are tied to retention visual quality objectives along Forest Highway 3.

Uneven-aged Goshawk (3,609 acres)

The proposed treatment includes broadcast burning or maintenance burning, and thinning and group selection cuts to create small openings (1/4 to 4 acres in size). Trees would be thinned up to 18 inches dbh on about 1,111 acres; and up to 16" on about 2,498 acres, with the majority of the trees removed being in the 5 – 12 inch dbh range. All yellow pines would be retained, along with Gambel oak and alligator juniper. The slash would be rough piled, machine piled, or lopped and scattered and then burned. Treated areas would be maintenance burned on an interval of 3 –15 years.

This proposed treatment is similar to the uneven-aged management except that the stands proposed for treatment are not presently exhibiting multi-canopied and multi-aged characteristics. This would be followed by tree thinning and group selection cuts to create small openings, ¼ to 4 acres in size, as recommended in the Forest Plan goshawk guidelines. The desired stand condition after treatment aims toward the objective of having a stand basal area of 40-120 square feet per acre based on aspect. North and east aspects would range from 80-120 BA and on south and west aspects and within the WUI, BA would range from 40-80 BA. Approximately 1,926 acres proposed for treatment are within the WUI.

Broadcast burning (19,450 acres over the project area with no thinning)

This treatment would be conducted generally in areas that have not been previously treated with prescribed or wildland fire within the past 20 years or more. This is an initial entry prescribed burn. The proposed treatment consists of low to moderate intensity prescribed burning that result in the consumption of surface litter and logs. Course woody debris of five tons per acre would be retained in the WUI, and 5 – 10 tons per acre outside the WUI. Maintenance burning would be implemented to maintain fuel loadings and the desired fire return interval. Approximately 6,584 acres proposed for treatment are within the WUI.

Maintenance burning (8,635 acres over the project area with no thinning)

The proposed treatment consists of low to moderate intensity prescribed burning that result in the consumption of surface litter and small logs. Course woody debris of five tons per acre would be retained in the WUI, and 5 – 10 tons per acre outside the WUI. Maintenance burning would be implemented to maintain fuel loadings and the desired fire return interval. Approximately 2,523 acres proposed for treatment are within the WUI.

Rough Pile and Burn (50 acres)

The treatment consists of rough piling and burning concentrations of dead and down fuels using mechanized equipment. Course woody debris needed for prey base and MSO habitat would be retained in the WUI. Prior to future maintenance burning, the stands would be evaluated to see if Forest Plan Standards and Guidelines for down woody material could be attained. If so, maintenance burning would be conducted at intervals of 3 – 15 years to maintain the desired dead-and-down material, litter and fine fuels profile. The stands proposed for treatment are in the Lake Mountain PAC, but are outside the nest buffer area. All 50 acres are within the WUI.

Long-term maintenance burns (43,906 acres over the project area after initial prescribed burns, maintenance burns and all thinning treatments)

This proposed treatment would occur after the initial treatments (thinning and prescribed burning) were completed. The treatment consists of low to moderate intensity prescribed burns that result in the consumption of surface litter and small logs. Course woody debris of five tons per acre would be retained in the WUI, and 5 – 10 tons per acre outside the WUI. Maintenance burning would be implemented over the long term to maintain fuel loadings and the desired fire return interval. Approximately 15,023 acres proposed for treatment are within the WUI.

Table 6 below describes the objectives and desired conditions post treatment for each of the proposed treatments.

Table 6. Vegetation and Fuels Treatment Objectives and Desired Conditions Post Treatment

Treatment	Treatment Objective	Desired Condition Post Treatment	
Meadow Maintenance	Remove young pine trees that have encroached into the meadow and use prescribed burning as a tool to limit future tree regeneration.	A meadow system dominated by grass and forbs without tree encroachment.	Beginning stages of restoration of a fire-adapted ecosystem.
MSO PAC < 9 inch Thin	Utilize prescribed burning followed by thinning to reduce the potential for crown fire initiation by raising crown base heights, and reducing stand density (trees per acre) within selected stands within the PACs. Use prescribed burning to reduce the buildup of excessive fuel loads.	Elevated crown base height, moderate to high basal area, (BA) ≤ 150, retention of woody debris larger than 12 inches in diameter, retention of snags, clumps of broad-leafed vegetation, and hardwood trees > 10 inches diameter at root collar (drc).	
Savannah Maintenance	Use prescribed burning, thinning and selection cuts to create open sites as defined by soil taxonomy. Use prescribed burning to maintain desired fuel profile and stands in an open condition.	Open stands ranging from 40-60 BA in ponderosa pine, with retention of all older yellow pine trees, oak and alligator juniper.	
Thin from Below	Use prescribed burning and thinning to raise crown base heights, and decrease stand density (trees per acre) within selected stands. Use prescribed burning to reduce the potential for crown fire initiation and to reduce the buildup of excessive fuel loads.	Elevate crown base heights to an average of 10 feet; aim for a stand BA ranging from 40-120 square feet per acre, and 5-10 tons per acre of dead fuels. Lower BAs would occur within the WUI and on south and west aspects; greater BAs would occur on north and east aspects.	
Transition Maintenance	Maintain the transition vegetation type by thinning out young ponderosa pine saplings, making openings in the stands. This would promote the growth of older pine trees, Gambel oak and alligator juniper trees. Use prescribed burning to reduce fuel loads.	Elevate crown base height to an average of 10 feet or greater, reduce the BA of pine and improve the overall condition for oak and juniper. The target BA is 40-200 square feet per acre for all species.	
Timber Stand Improvement	Utilize prescribed burning and thinning to raise the crown base height, reduce horizontal fuel continuity, and improve tree health by reducing the competition between trees.	Stands that have a reduced crown fire initiation potential and thinning the current stocking of pine trees to a more varied spacing in order to provide species diversity and to help promote the growth of oak and juniper.	

Treatment	Treatment Objective	Desired Condition Post Treatment	
Uneven-Aged Management	Reduce crown fire initiation potential by removing a portion of the ladder fuels and use prescribed burning to reduce fuel loads.	The desired stand condition after treatment would aim for a multi-aged stand with a BA of 40-120 square feet per acre based on aspect. On north and east aspects, BA would range from 80-120 and on south and west aspects, and within the WUI BA would range from 40-80 BA. Fuels would range from 5-10 tons per acre of dead fuels and crown base height would average about 10 feet or greater.	Beginning stages of restoration of a fire-adapted ecosystem.
Uneven-Aged -- Goshawk	Use thinning and creation of openings in the stands to reduce horizontal fuel continuity in the overstory. Use prescribed burning to reduce fuel loads.	The desired stand condition after treatment aims toward the objective of having a stand BA of 40-120 square feet per acre based on aspect. On north and east aspects BA would range from 80-120 and on south and west aspects and within the WUI, BA would range from 40-80 BA. Fuel loads would range from 5-10 tons per acre of dead fuels, and crown base height would average about 10 feet. The openings created in the stands would provide opportunities for tree regeneration to begin to create a multi-aged stand condition in stands that are currently even-aged. In addition it would provide for improved tree health and large-tree components. Over time, an uneven-aged stand would develop.	
Broadcast Burn/ Maintenance Burn, **Maintenance Burn/ Maintenance Burn**	Use prescribed burning to maintain low surface fuel loads of litter and dead and down wood, low crown fire potential, and high crown base heights. This treatment is intended to mimic the historic fire regime in both fire occurrence and fire severity and intensity, and to reintroduce fire into the ecosystem.	Course woody debris ranging from 5-10 tons per acre outside the WUI and up to 5 tons per acre inside the WUI. Elevated crown base heights to about 10 feet or greater. No greater than 10% mortality of remaining live trees (black-jack, intermediate and mature pine trees). Acceptable mortality patch size is up to 4 acres.	
Rough Pile Burn/ Maintenance Burn	Reduce surface concentrations of dead and down fuels by piling and burning. Use follow-up prescribed burning to maintain low surface fuel loads of litter and dead and down wood, low crown fire potential, and high crown base heights.	Course woody debris for prey base would be retained, with large concentrations of fuels piled and burned. Elevated crown base heights to about 10 feet or greater. No greater than 10% mortality of remaining live trees (black-jack, intermediate and mature pine trees). Acceptable mortality patch size is up to 4 acres.	

Roadside Fuel Reduction and Hazard Tree Removal Maintenance

This treatment would occur along identified major travel routes in the analysis area (FH-3, Forest Roads 83,83A, 213, 229, 229B, 230, and 305). Vegetation and prescribed burning, and fuel reduction treatments would be the same as described above. Where treatments are adjacent to the travel routes listed above, part of the prescription would be to evaluate hazard trees and site distance along the roads. Hazard trees and vegetation would be cut to maintain a safe travel way on these roads. Table 7 displays the roads that are adjacent to the vegetation treatments.

Table 7. Roadside Fuel Reduction and Hazard Tree Removal Maintenance

Vegetation Treatment	Roads	Vegetation Treatment	Roads
Meadow Maintenance	FH-3, 230	Thin from Below	FH-3,83A,213,229,229B,230,305
PAC 9 inch minus	None	Transition Maintenance	230
Savannah Maintenance	FH-3,83,213,229,230,305	Uneven Aged Management	FH-3,229,230
		Uneven Aged Goshawk	83A,213,229,229B,230,305

Fuels cleanup and hazard tree removal along roads are needed because roads are a common initial fire start location, roads are critical for fire protection, public and fire fighter access/egress, and they can function as a control point for prescribed fire or fire suppression.

Road Use and Maintenance

All roads used for project implementation would receive routine maintenance. No additional permanent roads would be constructed. No new temporary roads would be constructed. Existing temporary roads would be reopened and then decommissioned after use. Existing rock pits within the project area would be used for pit run aggregate material for spot rocking and other road maintenance needs during project implementation. There are two cinder pits: Buck Butte Pit (T15N, R8E, Sec. 12, SW1/4, SE1/4) and Oak Grove Pit (T16N R8E, Sec. 19, NW1/4, NE1/4). Rock material would be developed and removed from existing pit boundaries. After use, rock pits would be water-barred and shaped for proper drainage. Rock pit development plans would be prepared if anticipated use is more than 5,000 cubic yards of material.

Proposed Action Implementation Methods

Implementation of the different aspects of the Proposed Action Alternative would be accomplished through various methods or combinations of methods, such as contracts formal agreements, volunteers, community-service crews, and Forest Service work crews. The type of contract, agreement, or work crews selected for use would be part of an

overall project implementation strategy based on methods that best meet each project goal or objective, combined with Federal Acquisitions Regulations, and funding available for implementation. The types of contracts most commonly used for fuel reduction treatments are stewardship, service and timber sale contracts. The methods of implementation are not a decision to be made on this EA.

Proposed Action Alternative Design Features

Integrated project design features are elements of the project that reflect applicable Coconino Forest Plan, Best Management Practices, Regional guidance and Forest Service Manual and Handbook direction. The following design features have been developed specifically for this project and will be incorporated into project implementation to minimize and mitigate potential adverse environment effects. Additional standard design features are included in Appendix B. Design features listed below are grouped by resource area and project activity.

Soil and Watershed Protection

Thinning and Timber Harvest

- Mechanical harvesting can be used on slopes up to 40% throughout the entire project area. Exceptions are stands listed in Table A-3 in Appendix A where mechanized harvest is limited to slopes less than 25%.

Fuel Treatments and Prescribed Burning

- On areas to be prescribed burned in ponderosa pine stands outside of the ¼ mile buffer around private land inholdings, retain 5-10 tons/acre of course woody debris on-site after the prescribed burns to maintain long-term soil productivity (BMP 31.12). Within the ¼ mile zone around private land inholdings, there is no minimum course woody debris requirement – these areas should be treated to maintain the desired fire behavior.

Wildlife

Project design features have been developed to reduce impacts to wildlife from project activities and to benefit wildlife habitat through project design and implementation. Other measures are designed to mitigate effects to Threatened, Endangered and R3 Sensitive wildlife (TES) species and their habitat. Many of the following design features will protect fisheries resources.

Chiricahua and Northern Leopard Frog

- At designated occupied/critical breeding sites; there will be a no treatment buffer (no thinning, no ignition) ¼ mile distant from the tank or designated along logical

topographic breaks. See Table A-5 in Appendix A for the list of location/sites where the ¼ mile buffer occurs. The district wildlife biologist will work with implementation teams to determine the habitat protection buffer boundary.

- To protect potential breeding sites, a seasonal restriction (April 15 through September 15) for all proposed activities will be implemented at important water sources A buffer width of 200 feet or along logical topographic breaks will be designated at these sites. See Table A-6 in Appendix A for a list of locations and sites. The district wildlife biologist will work with implementation teams to determine the habitat protection buffer boundary.
- To protect frog dispersal habitat, a 200 foot protection zone will be established around designated stream courses (100 foot either side of the stream) (see protected streamcourse map in Appendix B). There would be no thinning and no ignition of prescribed burning within the protection zones. Designated skid trail crossings through the buffer zone will be allowed. See Table A-7 in Appendix A for list of location/sites.
- If thinning or prescribed burning activities are going to occur within 10 feet of a tank or ephemeral stream that is flowing water at time of treatment, decontamination practices for chytrid will be implemented for personnel and vehicles prior to activities**.**

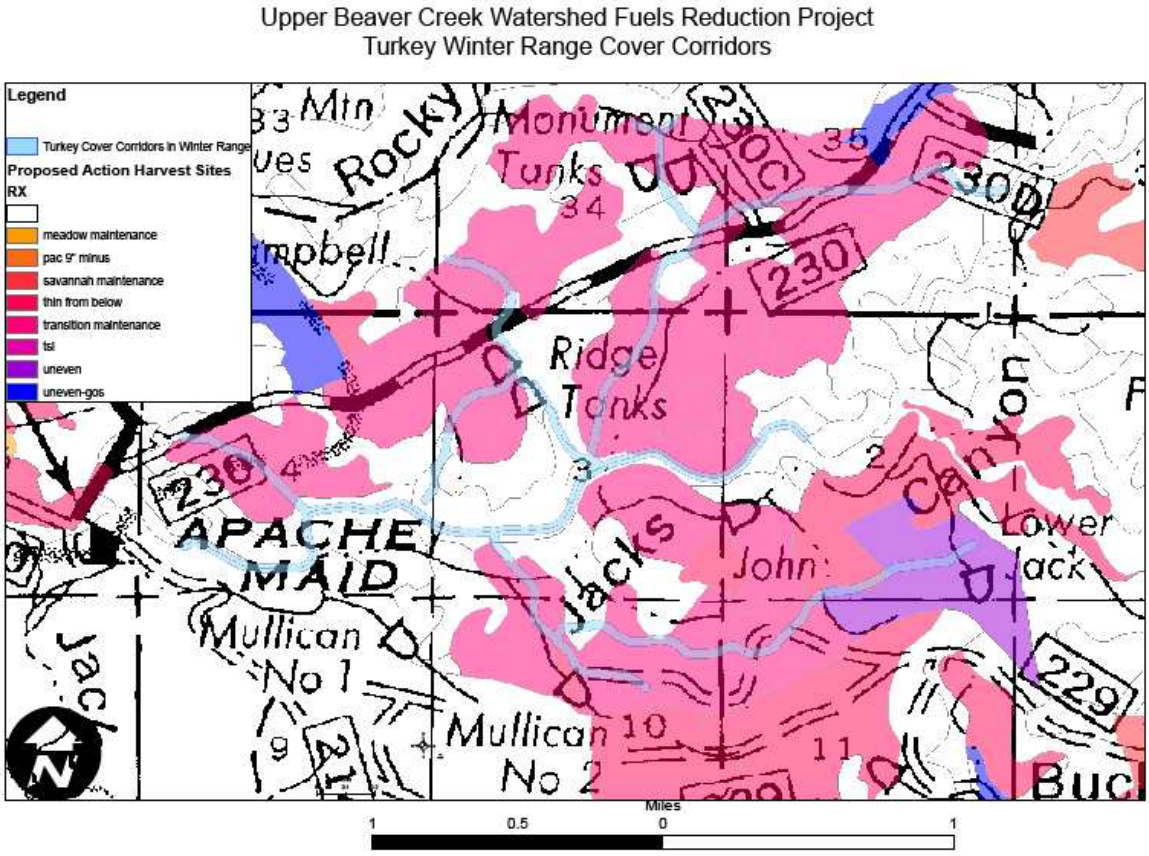
Mexican Spotted Owl

- Restrict thinning and prescribed burning in PACs during the breeding season, March 1-August 31.

Turkey

- In designated turkey migration and corridor areas, retain BA of 100-120 square feet per acre within identified 100 meter wide (50 meter either side of centerline of streams) turkey travel cover corridors for turkey cover (see map below). In order to protect the down woody component within the corridors, prescribed fire may "creep" into the corridors but direct ignition of prescribed fire within the corridors would not occur (exception, machine piles along FR 943 in location and site 5870004).

Map 3. Turkey winter range cover corridors



Habitat Components

Existing and Developing Old Growth

- Old trees within existing and developing old growth are being protected through all silvicultural prescriptions by the use of tree classification from Schubert (1973) in stand harvest prescriptions to mark only class 1 and 2 trees. In addition, thinning prescriptions in developing old growth are designed to promote increased growth rates and maintain and promote old-growth characteristics. See Table A-9 in Appendix A for location and sites where treatments are proposed in existing and developing old growth.
- In the existing old growth stands proposed for harvest listed below, harvest treatments will leave basal areas between 90-120 basal area. For burn treatments within these stands, direct ignition of logs or snags should be avoided.

Location/Site	Rx	acres	Location/Site	Rx	acres
533002204	thin from below	15	550002604	uneven-goshawk	41
539000504	uneven-goshawk	36	558002004	uneven	8
539002204	uneven	28	569000704	uneven-goshawk	15
539002404	uneven	61	569002304	thin from below	5
539002904	uneven-goshawk	22	579000104	Thin from below	12
542000904	thin from below	17	580000204	uneven-goshawk	32
543001604	uneven-goshawk	62	580001704	thin from below	25
544001804	thin from below	4	581000404	uneven-goshawk	47
550001504	uneven-goshawk	13	608003504	thin from below	34
550002104	uneven-goshawk	35			

Monitoring

Wildlife

- All known or historic breeding locations for leopard frogs will be monitored for effects after project implementation at or near the location for one year.
- Pre-treatment micro-habitat monitoring has been completed in PACs and restricted habitat prior to project implementation. Post-treatment micro-habitat monitoring will be implemented. If post burn micro-habitat monitoring displays deficits in down logs or snags as per Forest Plan guidelines, trees may be felled or snags created to meet habitat needs.
- Vegetative and prescribed fire treatments would be monitored during and after implementation to determine if the treatments meet the project objective and are within acceptable parameters of the silvicultural and burn plan prescriptions.
- Microhabitat monitoring would be conducted in MSO habitat within two years following the completion of all treatments.

Noxious and Invasive Weeds

- Monitor slash pile sites after burning and control noxious or invasive weeds during project implementation of treatments.

Cultural and Historical Resources

- The District Archaeologist or certified para-archaeologist will monitor all sites with wood features where project activities are implemented to assure the site has been protected from burning. At least 10% of sites within project areas treated by prescribed burning during that treatment season are monitored and must include

monitoring all sites where protective actions were taken, all sites along fire lines constructed by heavy mechanical equipment, some fire sensitive sites where no actions were taken, and some non-fire-sensitive sites.

- A survey and monitoring report will be prepared in writing by the end of each treatment season and submitted to the Forest Archaeologist. The report will indicate the dates of monitoring, site number(s) of the sites monitored, and condition of the sites.

Comparison of Alternatives

A comparison has been made between the outputs and effects of the two alternatives analyzed in detail, the Proposed Action and the No Action Alternative (Table 8 and Table 9 and Maps 4, 5, and 6).

Table 8. Summary of Acres of Management Practices by Alternative

Management Practice	No Action Alternative (acres)	Proposed Action Alternative (acres)	
		Project Wide	WUI
Meadow Thinning	0	913	278
Thinning in PACs	0	159	135
Other Thinning Treatments ▪ (Savannah Maintenance, Thin from Below, Timber Stand Improvement, Uneven Aged, and Uneven-Aged Goshawk)	0	14,735	5,483
Initial Prescribed Burning	0	11,712	4,286
Initial Prescribed Burning (not associated with subsequent thinning treatments)	0	19,450	6,584
Fuel Treatment in PACs (rough pile and burn)	0	50	50
Maintenance Prescribed Burning	0	43,906	15,024
Roadside Fuel Reduction and Hazard Tree Removal and Maintenance	0	380	170

Table 9. Comparison of Project Units of Measure

Environmental Indicator or Unit of Measure	Environmental Effects	
	No Action Alternative After 10 years, at 2018	Proposed Action Alternative After 10 years, at 2018
Fire and Fuels		
Change in Fire Regime Condition Class (FRCC) scale from 1-100 - Vegetation-Fuel Condition class - Fire Frequency-Severity Condition Class	**Project-Wide (ponderosa pine)** Vegetation-Fuel Condition Class = 83 Fire Frequency-Severity Condition Class = 70 Overall, FRCC of 3 **WUI (ponderosa pine)** Vegetation-Fuel Condition class = 80 Fire Frequency-Severity Condition Class = 73	**Project-Wide (ponderosa pine)** Vegetation-Fuel Condition class = 34 Fire Frequency-Severity Condition Class = 57 Overall FRCC of 2 **WUI (ponderosa pine)** Vegetation-Fuel Condition class = 35 Fire Frequency-Severity Condition Class = 61

Environmental Indicator or Unit of Measure	Environmental Effects	
	No Action Alternative After 10 years, at 2018	**Proposed Action Alternative After 10 years, at 2018**
	Overall WUI, FRCC of 3 Moves away from desired condition	Overall WUI, FRCC of 2 Moves towards desired conditions.
Change in Fire Type (See also Maps 3, 4, and 5)	**Project Wide** Active Crown Fire = 2,346 acres Passive Crown Fire = 14,290 acres Conditional crown Fire = 3,578 acres Surface Fire = 24,871 acres No Data, Non-Forest or Non-Vegetated 3,099 acres **WUI** Active Crown Fire = 350 acres Passive Crown Fire = 6,352 acres Conditional crown Fire = 698 acres Surface Fire = 7,932 acres No Data, Non-Forest or Non-Vegetated 1,725 acres	**Project Wide** Active Crown Fire = 354 acres Passive Crown Fire = 10,060 acres Conditional crown Fire = 730 acres Surface Fire = 33,941acres No Data, Non-Forest or Non-Vegetated 3,099 acres **WUI** Active Crown Fire = 63 acres Passive Crown Fire = 4,146 acres Conditional crown Fire = 150 acres Surface Fire = 10,973 acres No Data, Non-Forest or Non-Vegetated 1,725 acres

Comparison of Fire Type between Alternatives

The following table compares the existing fire type with No Action and the Proposed Action Alternatives evaluated at year 2018. A thorough discussion of fire types is included in the Fire and Fuels section in Chapter 3.

Active fire type is a crown fire that would be self sustaining though a stand. Conditional crown fire type would be a crown fire that because of current **crown base height (CBH)** in that stand would require an active crown fire from another stand to then spread into the conditional stand. Passive fire type would be individual or group tree torching but would not be sustained crown fire. Surface fire would be fire restricted to the forest floor.

Table 10. Fire Type by Alternative, including the Existing Condition

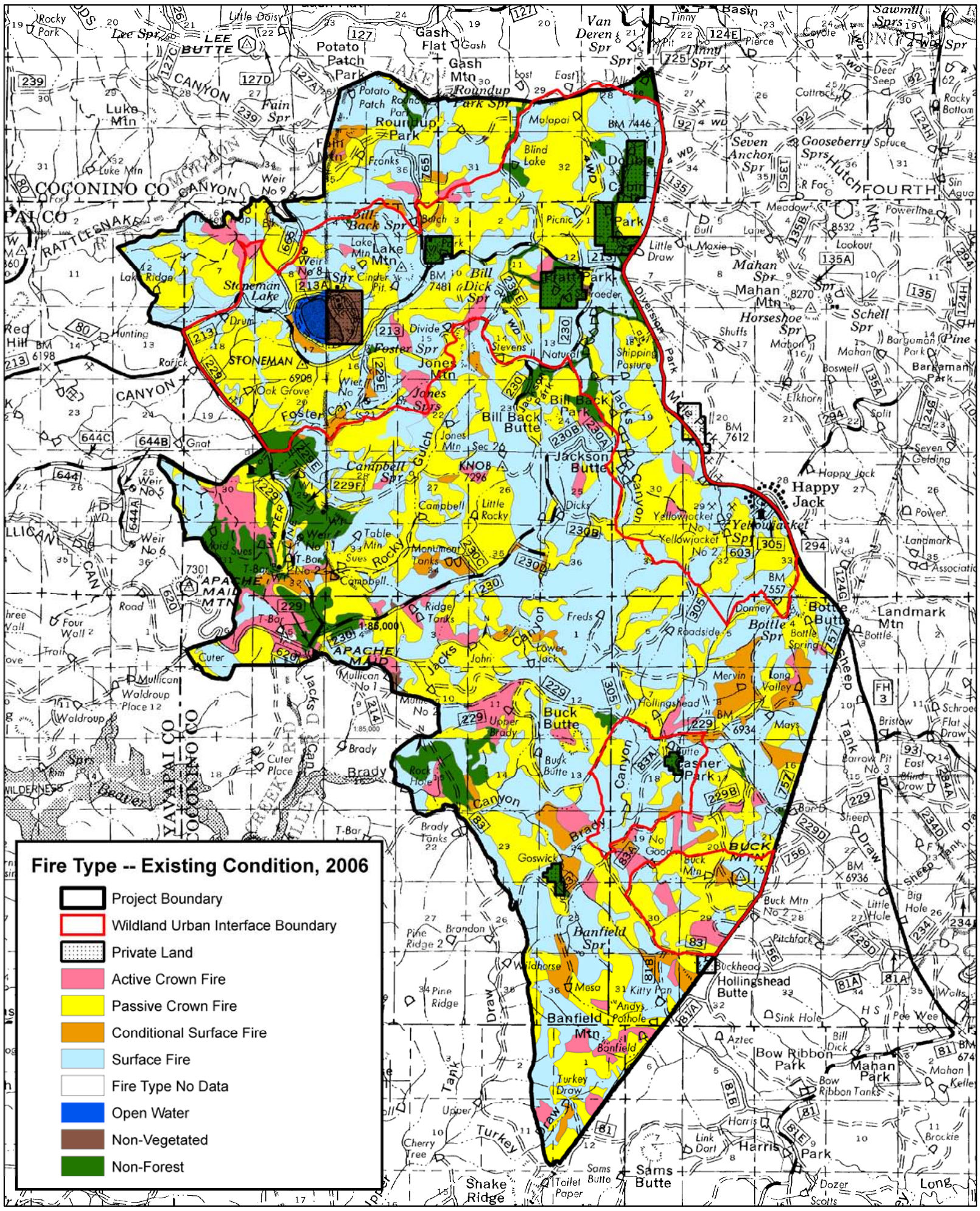
Fire Type	Existing Condition, 2008 acres	No Action, 2018 acres	Proposed Action, 2018 acres
Active Crown Fire	2,625	2,346	354
Passive Crown Fire	18,458	14,290	10,060
Conditional crown Fire	1,807	3,578	730
Surface Fire	22,196	24,871	33,941
Non-Forest or Non-Vegetated	3,094	3,094	3,094
Total Acres	48,179	48,179	48,179

Maps 4, 5 and 6 on the following pages depict Fire Type by Alternative including the Existing Condition.

Map 4. Fire Type, Existing Condition, 2008

Upper Beaver Creek Watershed Fuel Reduction Project
Fire Type -- Existing Condition, 2008

Mogollon Rim and Red Rock Ranger Districts
Coconino National Forest



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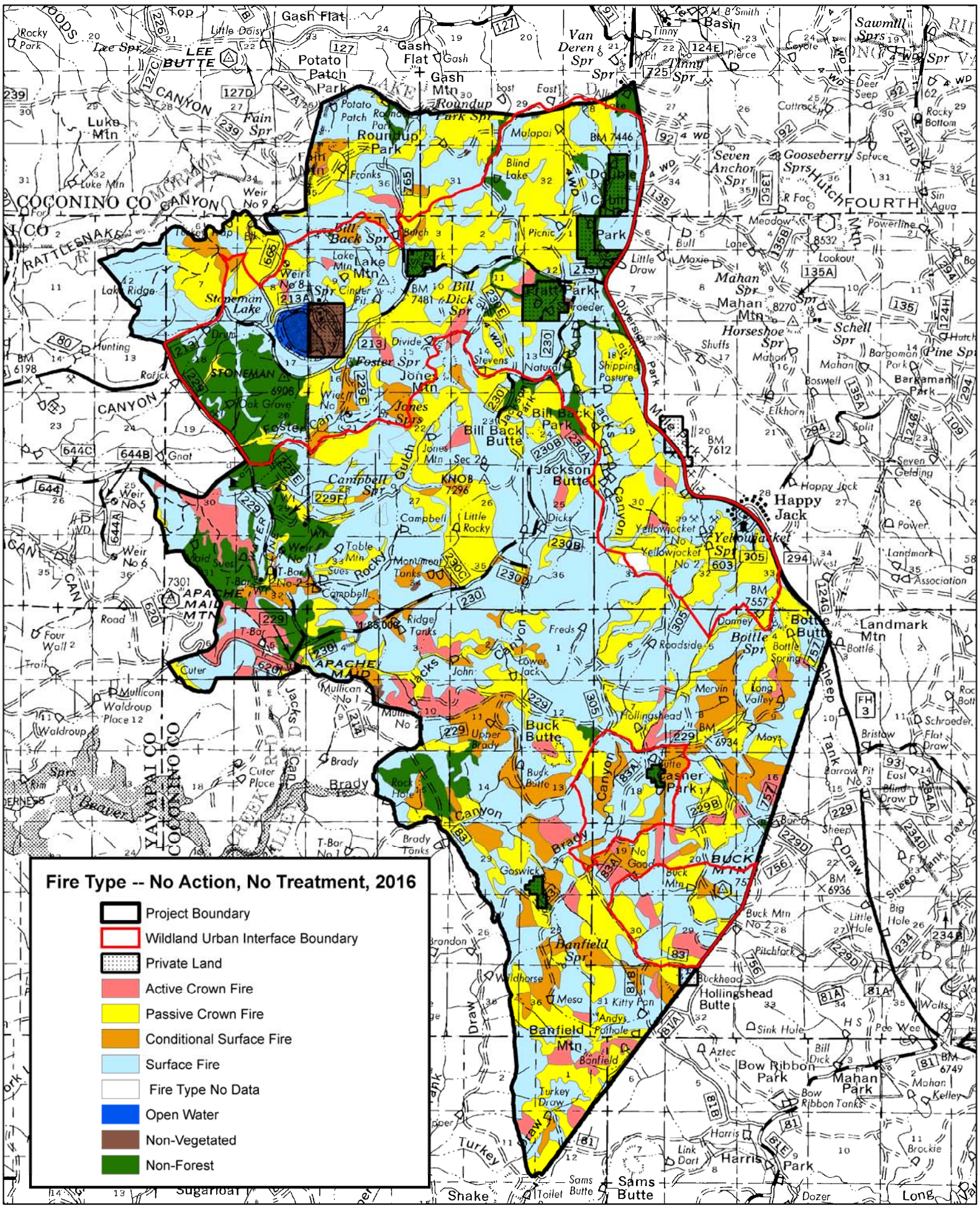
Polly Haessig - October 6, 2008
NAD 1927 UTM Zone 12

Map 5, Fire Type, No Action Alternative, 2018

Upper Beaver Creek Watershed Fuel Reduction Project
Fire Type -- No Action, No Treatment -- 2018

Mogollon Rim and Red Rock Ranger Districts
Coconino National Forest



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Miles
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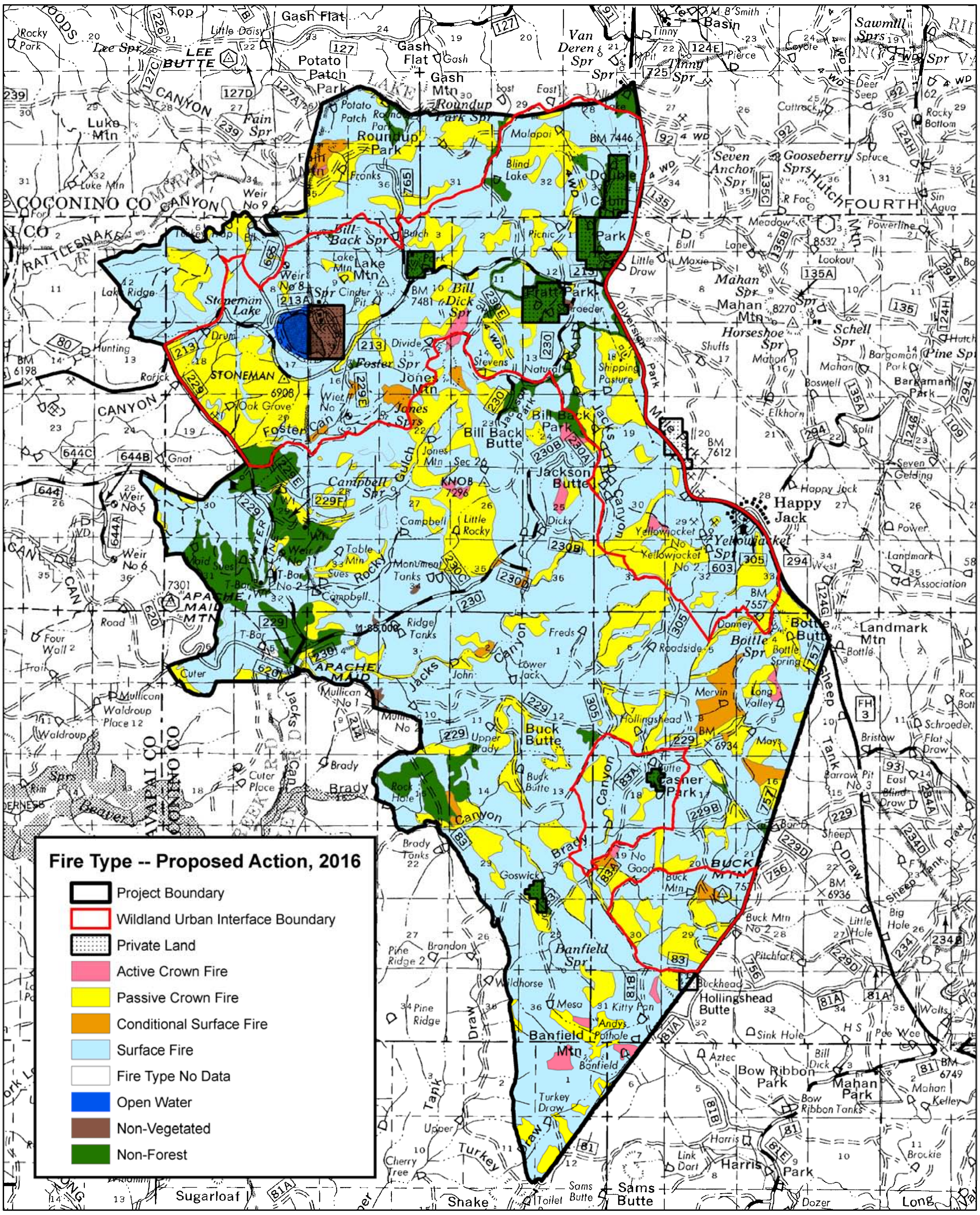
Kilometers
0 0.5 1 2 3 4

Map 6. Fire Type, Proposed Action Alternative, 2018

Upper Beaver Creek Watershed Fuel Reduction Project
Fire Type -- Proposed Action, 2018

Mogollon Rim and Red Rock Ranger Districts
Coconino National Forest



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Polly Haessig - October 6, 2008
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Miles: 0 0.5 1 2 3 4

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