GENERAL
FOREST STEWARDSHIP PLAN
City-Wide

Restoring Our Forests
Building FireWise Neighborhoods
Protecting Our Community

Sept 2009

Flagstaff Fire Department
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INTENT: The goal of this plan is to provide generalized guidance in planning and implementing forest treatments to achieve a Desired Future Condition (DFC) of our forest that is focused on enhancing community well-being by:

Protecting the community from catastrophic wildfire by mitigating or reducing hazard,
Ensuring forest sustainability by improving long-term forest health, and
Maintaining the aesthetic qualities, recreational opportunities, watershed values, wildlife habitat, native plant diversity, and other features of the forest.

AUTHORITY: 1) As adopted by City Council:
a) Flagstaff Wildland Urban Interface Code (WUI Code)
b) Greater Flagstaff Area Community Wildfire Protection Plan (CWPP)
c) Land Development Code (LDC)
2) FFD Fire Prevention Supplementary Regulations and Procedures (FP-Supp Regs)
3) Operating protocols with AZ Dept of Environmental Quality (ADEQ).

RESPONSIBILITY: Program management rests with the Flagstaff Fire Dept *Wildland Fire Management* (FFD-FM) Division. The overall Wildland Fire Management Program consists of five program areas – *Prevention, Preparedness, Hazard Mitigation, Response, and Recovery.* [To learn more about these, visit www.flagstaffaz.gov/wildlandfiremanagement]

INFLUENCING FACTORS: Six partnership initiatives have influenced development and use of these Guidelines:

1) Recommendations – Governor's Forest Health Council [visit www.governor.state.az.us/fhc],
2) National Fire Plan [visit www.fireplan.gov/],
3) Western Governor's Association - Forest Health Advisory Committee [visit www.westgov.org],
4) National Firewise Program [visit www.firewise.org],
5) Northern AZ University – Ecological Restoration Institute [visit www.eri.nau.edu], and
6) Greater Flagstaff Forests Partnership (GFFP) [visit www.gffp.org].

BACKGROUND: Wildfire is the #1 fire threat to Flagstaff. We experience 60-100 wildfires per year within the city boundaries, and another 150+ on jurisdictions immediately surrounding our community.

Ponderosa pine forests are extremely well adapted to, and dependent upon, frequent low-intensity wildfires, but they are extremely vulnerable to high intensity fire events.

Societal demands and resulting management practices during the past century have created a forest that is now severely overcrowded. Unnatural fuel accumulations, exacerbated by insect, disease, and drought, have resulted in an alarming increase in both the size and severity of wildfires. These fires endanger not only the trees themselves, but also other associated resource values such as wildlife habitat, scenic quality, and watershed capacity. In addition to serious ecosystem damage, a single large-scale fire moving into the city will most-assuredly affect lives and properties, and also inflict serious, and long-term, economic harm.

Three factors influence fire behavior -- weather, topography, and fuels. Of these, only fuel can be readily manipulated: Hazard mitigation activities, undertaken in a responsible manner and throughout the general area, are vital to ecosystem health and community protection.

Such activities are not meant to eliminate wildfire from the landscape. A century of wildfire suppression, often focused on fire exclusion, has demonstrated conclusively the fallacy of such efforts. Low-intensity fire is required for a healthy ponderosa pine ecosystem, and such fires do not pose a community-wide threat. Reintroduction of such fires requires the re-creation of a forest environment that will burn in a healthy, not-threatening, manner.

The overall objectives of this plan are to:

1. Provide standardized resource management information to customers we service,
2. Permit consistent implementation standards for all vegetation management activities within the community.

COMMUNITY OVERVIEW:

Ownership: This plan covers all lands within the City of Flagstaff and adjacent suppression-contract areas. Ownership may include the City of Flagstaff, private owners, county, and state or federal agencies. This plan may be used to provide guidelines and objectives to facilitate both planning and implementation of forest treatments across jurisdictional boundaries.

Location:

1. **Site –-** Within incorporated boundaries and outlying contracted service areas (Appendix 1).

2. **General Area --** Flagstaff is the largest metropolitan community within northern AZ. Located at the base of the San Francisco Peaks, a 12,633' dormant volcano, the community is bisected by Interstate 40 and Interstate 17: Highway 180 extends to the northwest of town and highway 89 runs from the northeast corner of the state, south through Sedona.

Description:

1. **Acreage --** This plan covers approximately 64 square miles (40,704) acres within City corporate boundaries and approximately 12 square miles (7,680) acres within contract areas.

2. **Elevation --** Elevation in Flagstaff averages 7,000'.

3. **Slope --** Slope gradient varies on individual properties, but generally slopes to the south away from the San Francisco Peaks.

4. **Aspect --** Aspect is generally to south facing but varies on individual properties.

5. **Physical Characteristics –** Flagstaff has a varied topography consisting of ridges, hilltops, plateaus, and canyons. Two major washes, the Rio de Flag and Sinclair wash, run through Flagstaff and typically flow after fall monsoon rains and spring snow melt. Special features of Flagstaff include Observatory Mesa on the west side of town and Switzer Mesa and McMillan Mesa to the north.

6. **Climate --** Chilly winters with cool, mild summers are the norm. Humidity is moderate, and large daily temperature fluctuations are common. Annual precipitation is around 20 inches -- half of which occurs as snow (Dec - Mar) and half as summer rains (July - Sept). May and June are usually very dry. The last killing frost of the year is usually around June 15th, with the first around Sept 1st.

7. **Forest History –** The forests around Flagstaff have been and will continue to be influenced by the interactions of humans with the land. Extensive railroad logging occurred in-and-around Flagstaff from 1880 - 1930. Throughout the general area, it is estimated that as much as 80% of the merchantable volume was removed during these operations.

   These past harvest practices, in combination with fire suppression and extensive livestock grazing, resulted in an unnaturally-dense second-growth forest blanketing the area. Prior to Euro-American settlement of this area our forests contained fewer, albeit larger, trees interspersed with numerous open grassy areas. This human influenced change to current forest structure has been accompanied with a significant decrease in overall forest health.

   Indicators of the decline in forest health are evident in the considerable decrease in soil moisture and nutrient availability, the decrease in over-story and under-story species diversity, an increased occurrence of damaging insect and diseases, increased large tree mortality and an increase in the size and severity of destructive wildfires.

8. **Surrounding Land-Use –** Flagstaff is predominantly surrounded by the Coconino National Forest. A checkerboard of State lands is interspersed to the southwest of town with several State parcels located directly to the east.

Camp Navajo Army Depot is located approximately 10 miles west of Flagstaff on Interstate 40. National Park lands are located to the east (Walnut Canyon National Monument) and to the Northeast (Sunset Crater Volcano and Wupatki National Monuments).

ECOSYSTEM DESCRIPTION:

***General*:** Previous research has established that pre-European southwestern ponderosa pine forests contained larger trees scattered throughout an open landscape. "Until the 1870's light surface fires every two to five years, along with grass competition and regular drought, maintained an open and park-like landscape dominated by grass, forbs, and shrubs with scattered groups of ponderosa pine" (Covington et al. 1994).

Following Euro-American settlement heavy grazing, fire suppression, logging and climatic events favoring regeneration of pine closed the park-like conditions. As a result of increased in-growth, ponderosa pine has increased dramatically in trees per acre (TPA) and total basal area (BA).

The public's "forest paradigm" has undergone a major shift in the past decade. A growing realization that dense forests are susceptible to disease, insect, drought, and fire have resulted in widespread acceptance of well-planned and executed forest treatments designed to counter the current downward spiral.

Current Conditions: Results from a study in the Ft. Valley area north of Flagstaff (Table 1 – following page), shows that ponderosa pine increased from 22.8 trees per acre in 1876 to 1,253.5 trees per acre in 1992 (Covington et al. 1994).

This influx of small diameter trees from several dominant cohorts produced the continuous canopy cover that we see today. In 1876, 19% of the surface area was under pine canopy, with the balance (81%) representing grassy openings. In 1992 pine canopy covered 93% of the area with only 7% left in grassy openings. Depending upon site conditions, some areas in-and-around Flagstaff have seen a much greater in growth of small pines than depicted in this single study, greatly affecting under-story plant diversity and water run-off.

Table 1. Data extrapolated from a study in the Ft. Valley area illustrating the change in Ponderosa pine trees per acre and basal (1876 to 1992).

DBH class (in)	Trees per acre 1876	Trees per acre 1992	BA per acre 1876	BA per acre 1992
0-4	0.9	945	0.0	20.6
4-8	2.6	243	0.5	47.7
8-12	2.8	46	1.5	25.1
12-16	3.6	6.7	3.8	7.2
16-20	5.1	1.6	9.0	2.8
20-24	3.7	2.5	9.8	6.6
24-28	3.2	2.4	11.8	8.8
28-32	1.2	4.1	5.9	20.1
32-36	0.4	1.7	2.5	10.7
36-40	0.6	0.3	4.7	2.4
40-44	0.3	0.2	2.9	1.9
Total	24.6	1253.5	52.5	154.0

A 2006 stand survey of the City well fields, located several miles south west of Flagstaff, revealed an extremely high seedling count similar to what may have spawned the cohort that dominates today's landscape. Results are listed in two categories (Table 2): Burned, where a prescribed burn occurred one month prior to data collection; and Unburned, where the area was burned a year prior to data collection.

Table 2. A 2006 seedling count in the City well field.

SITE	RANGE (#'s/A)	AVERAGE (#/A)
Unburned	4,900 – 15,300	9,500
Burned	0 – 5,600	800

Vegetation: The over-story of the Flagstaff's forest is predominantly Ponderosa pine (*Pinus ponderosa* P. & C. Lawson var. *scopulorum* Engelm.). Ponderosa pine is found in pure, even aged stands or with Gambel oak (*Quercus gambelii* Nutt. Var. *gambelii*). Gambel oak is typically found in clumps within canopy openings or as a co-dominant on rocky slopes. Alligator juniper (*Juniperus deppeana* Steud.), Rocky Mountain juniper (*Juniperus scapulorum* Sarg.) are found sporadically throughout the forest. Rocky Mountain Douglas-fir (*Pseudotsuga menziesii* (Mirbel) Franco var. *glauca* (Beissn.) Franco), and quaking aspen (*Populus tremuloides* Michx.), are located in small patches mostly in and around drainages and slopes.

Many under-story plants species are found in the forest. The most dominant grass species in the area include blue grama (*Bouteloua gracilis*), bottlebush squirreltail, (*Elymus elymoides* (Raf.) Swezey), Arizona fescue, (*arizonica* Vasey), and mountain muhly (*Muhlenbergia montana* (Nutt.) A.S. Hitchc.).

Forbaceous species include broom snakeweed (*Gutierrezia sarothrae* (Pursh) Britt. & Rusby), spreading fleabane (*Erigeron divergens* Torr. & Gray), ragleaf bahia (Bahia disecta (Gray) Britt.), and silvery lupine (*Lupinus argenteus* Pursh). Common shrubs include rabbitbrush, (*Ericameria nauseosa* (Pallas ex Pursh) Nesom & Baird), New Mexico locust, (*Robinia neomexicana* Gray).

The area is represented by FBPS Fuel Model #2 closed canopy with grass under-story, and #9 -- closed-canopy pine stands with needle under-story.

Insect and Disease: Southwestern Ponderosa Pine Dwarf Mistletoe (DM) is the most widely-found disease agent in southwestern ponderosa pine forests: throughout the southwest, it is estimated that over 1/3 of the total ponderosa pine acreage is infected.

Bark beetle activity is increasing throughout the southwest. Three species are of prime concern in this particular area. They are Western Pine Beetle (WPB), Ips Engraver Beetle (IEB), and Red Turpentine Beetle (RTB). Two other species may also be evident on a periodic basis: Roundheaded Pine Beetle (RBP) and Mountain Pine Beetle (MPB).

It should be noted that dense, overcrowded stands of ponderosa pine provide ideal conditions for development of large populations of WPB, RTB, RPB, and MPB.

Soils: In general the soils in this area are sedimentary derived or volcanic derived. Parent material may be of a basaltic origin, though limestone regions and cinder regions of restricted extent are found. They are generally shallow, well-drained with bedrock below 18 inches of the surface. Permeability is moderate, shrink-swell potential is low - moderate, and both compaction potential and erosion hazard is low. The soil is neutral to mildly alkaline. A detailed site soil map and data are found in stand-alone documents maintained in the FireWise Services Branch Field Office at Fire Station #6.

Wildfire:

1. **General:** Catastrophic wildfire has become a major concern in the southwest as well as in Flagstaff, AZ. During the last century forest health conditions have declined due to drought, high tree densities, grazing and fire exclusion (Fule et al., 2002). As a result, fuel loads have accumulated to an unnatural degree. Fuels include duff, leaf and needle litter, coarse woody debris, under-story and over-story vegetations. Current conditions have left ponderosa pine forests susceptible to stand replacing fires due to an increased density and fuel loads. Timber operation and pathogen outbreaks have also contributed to increased mortality in greater amounts of fuels (Fule et al., 2001). Fuel loading in many stands around Flagstaff is excessive; especially in stands of high density pole-sized trees influenced by density–dependant competition and suppression from overlapping intermediate trees. This competition for resources results in increased mortality leading to higher fuel loads. Recommended approaches to minimize fuel loads include thinning, prescribed burning and utilization of woody material.

2. **City:** The biggest fire threat to Flagstaff is destructive wildfire. Overly dense stands of unhealthy trees have created conditions ripe for high intensity fire. Abundant surface fuels provide an ideal fuel-bed for the ignition and sustaining of rapidly moving fire. Short, drought stressed trees and abundant low hanging branches provide ideal ladder fuels enabling surface fires to climb into the canopy to torch trees or produce destructive and dangerous crown fires. The result could easily be a high-intensity fire that is both difficult to control and may quickly threaten and damage/destroy property. In addition, it will create long-lasting visual scars on the property, potentially increase soil erosion, negatively impact current wildlife habitat and require significant financial expenditure to control.

   A City-Wide Threat Assessment mapping project completed in 2006, and updated in 2009, revealed that over 70% of the community was at High-Extreme risk of wildfire (Figure 1 shown below). This was determined using eight variables considered to be important influencing factors of ignition during a wildfire. These eight variables were weighted according to their significance and include: past forest treatments, vegetation, slope, roof type, construction type, hydrant distance, road condition and accessibility.

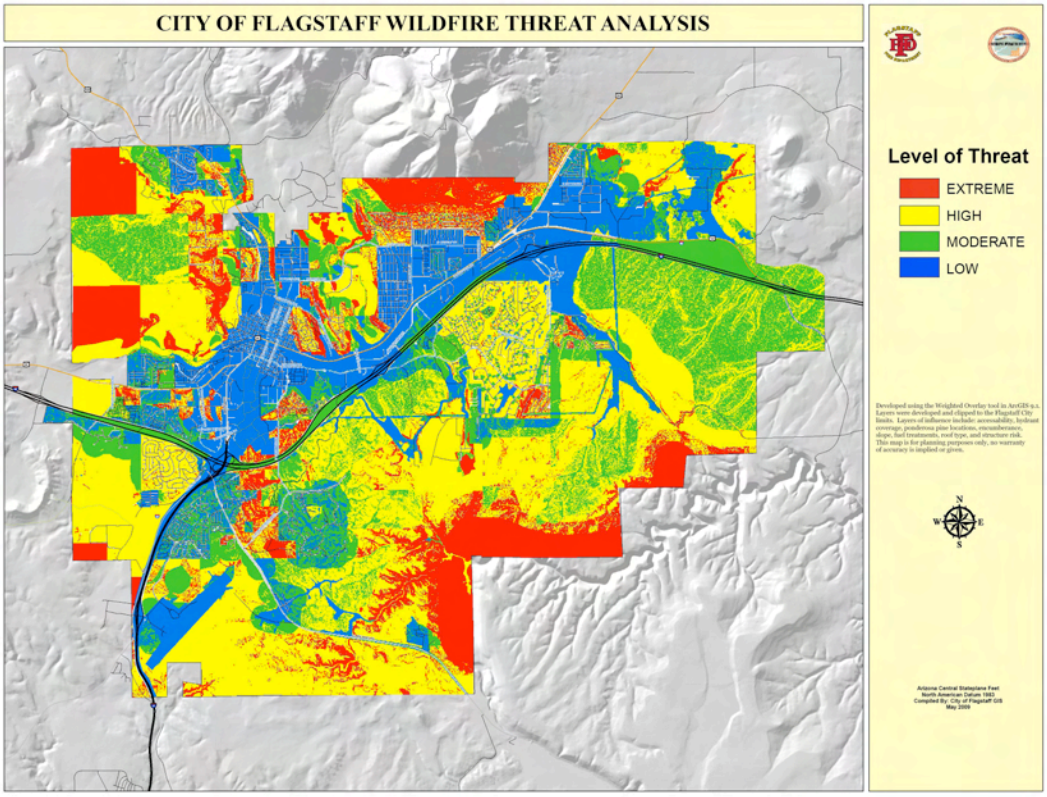

Figure 1. City of Flagstaff Wildfire Threat Analysis map

3. **Surrounding Area*:*** Conditions in the forests surrounding Flagstaff pose a severe threat of large fires with broad flame fronts and long range spotting from embers. An analysis completed by Forest ERA, based on slope and fuels classifications, has classified the lands covered in the CWPP into one-of-four Fire Behavior categories. The results indicate 43.5% of the area surrounding Flagstaff will likely experience passive fire behavior and almost 23.5% will experience active fire behavior (Table 3 – shown below).

Table 3. Predicted Pre-Treatment Fire Behavior in CWPP Analysis Area

Type Fire Behavior	**Acres**	**% of Total**
Active	219,181	23.5%
Passive	420,282	43.5%
Surface	99,207	10.5%
No Prediction	201,066	21.5%
TOTAL	**939,736**	**100%**

Active Fire Behavior = Fires readily transition into tree crowns and actively moves through the canopy, with large group tree torching common: associated long-range spotting (≥0.5miles) is common.
Passive Fire Behavior = Fires will transition into tree crowns, but does not move through the canopy and only small-group or individual tree torching common: associated long-range spotting (≥0.5miles) can occur.
Surface Fire Behavior = Fires stay on the ground, with little tendency to transition into tree crowns except in isolated cases: short-range spotting (≤0.25 miles) can occur.
No Prediction = No data were available in the ForestERA format that allowed a fire behavior prediction to be made.

4. **Economic Impact—** The physical and ecological effects of a severe wildfire are often immediately visible, while intangible effects may be less apparent but often quite severe. A 2003 white paper report evaluated the financial impacts a large wildfire would have in Flagstaff which damaged or destroyed 300 homes. The results of this paper are based on post fire consequences of the 1,300 acre Indian fire and the 465,000 acre Rodeo-Chediski fire of 2002. It was determined that such a fire would cause serious impacts to all community values and would produce a ripple-effect, with first-year financial loss (sales tax, property tax and business revenue) potentially reaching approximately $69.1 million dollars: See Appendix 2 for details.

Wildlife: Wildlife is a desirable and indispensable part of forest ecosystems and must be considered when managing the forests around Flagstaff (Barnes et al. 1998). Flagstaff and the surrounding area are recognized for their natural beauty and wildlife resources. Elk, deer and antelope are common throughout the area and contribute to the local economy by attracting hunters and visitors seeking a natural wilderness experience.

Wildlife is highly dependant upon the health of the land and its presence consequently reflects forest health conditions. Biodiversity is critical to maintaining ecosystem integrity and assuring sustainability of natural resource management (Hunter 1999).

In order to maintain biodiversity and survival of all wildlife species we must manage the forest to satisfy habitat requirements of a wide variety of wildlife species by creating a forest structure which where possible represents all successional stages from seedlings and saplings to old-growth forest. The forest structure necessary to meet these wildlife goals often aligns with the optimal structure to reduce wildfire risk and promote forest health. Incorporating wildlife values in to forest treatments is an important consideration but should not supersede treatments necessary to the protection of life and property.

Noxious Weeds: Exotic and invasive plant species are common throughout Flagstaff, as they are in most southwestern ponderosa pine forests Several of the most common exotic species include wooly mullein, (Verbascum thapsus L.), Dalmatian toadflax, (Linaria dalmatica (L.) P. Mill), diffuse knapweed (Centaurea diffusa Lam.), Russian thistle (Salsola tragus L.). Exotics are a considerable threat to ecosystem health; because they often out-compete natives due to a lack of biological control such as insect predators, plant pathogens, and fungi (Friederici 2003). Once established these plants can alter rates of nutrient cycling, displace native populations of plants/animals as well as disrupt the disturbance regime including wildfire by creating continuous fuel bed which can increase expected fire frequency and behavior. Care may need to be exercised when working on sites with noxious weeds and may be addressed in the Operations Site Plan (if required) in Appendix 3.

MANAGEMENT RECODMMENDATIONS:

Treatments: A general outline of the proposed work and the three initial treatment stages is summarized below:

1. **Stage 1** – Generally, treatments will vary from parcel to parcel depending on condition and location of a site. The target tree-density for any-given site following thinning is 60-90 Basal Area. It will most-likely, however, be somewhat higher (100-120 BA) on sites that will undergo development in the near future, thus allowing for anticipated additional tree loss during construction activities. Where possible, trees will not be evenly spaced, but retained in a clumpy-pattern, thereby mimicking the historical pattern of interspersed meadows and tree clusters.

   Trees will be removed which show signs of poor vigor, are suppressed or are suppressing otherwise healthy trees, are themselves damaged, deformed, diseased or create a ladder-fuel effect into the overstory canopy. Where possible trees shall not be evenly spaced but arranged in a clumpy pattern mimicking the historical structure of interspersed meadows and tree clusters.

Specific selective marking will be implemented for each project dependant upon the needs for each site. FFD will mark and/or approve trees for removal to reduce forest fuels and the risk of devastating wildfire. On larger parcels, the property owner may be required to use an outside contractor to mark trees for removal under the guidance and supervision of FFD.

Property owners may choose to remove additional trees following the City of Flagstaff Land Development Code (LDC) resource protection standards. Trees removed as required by the FFD will not be counted against the LDC's allowable removal.

Prior to new construction or site development Hazard Fuel Mitigation work must be completed as directed by the FFD to reduce the risk of destructive wildfire. This may be in addition to the LDC standards, which permits unrestricted removal of trees meeting the following criteria:

1) Substantially within the drip-line of another tree,
2) Diseased or infested with insects,
3) Damaged, dead, or dying,
4) Less than 6 inches in diameter (chest high), and/or
5) Intermediate or suppressed.

2. **Stage 2** -- Material generated during Stage 1 shall be chipped, hauled off-site, or piled and burned.

   If chipped, the material may be stockpiled for use as landscape material elsewhere on the properties, or removed from the site. Chipping is expensive: it often doubles the cost of treatment.

   If piled for later burning, the material must dry for a minimum of 6-12 months to reduce smoke emissions during burning and ensure maximum consumption of material. Only Flagstaff Fire Department personnel will be permitted to burn within the City. Property owners outside the City, but within contract areas, are able to burn, but are encouraged to first obtain a Burn Certificate from FFD. The certificate will specify the conditions under which burning is approved, as well as the actions which must be taken prior to, during, and after the operation.

   Pile burns conducted by FFD will only occur after careful planning and only when proper fuel and weather conditions exist to ensure maximum consumption while minimizing smoke impacts to the community.

3. **Stage 3** – Broadcast burns, if desired, should be completed within one year of completion of Stage 2 where appropriate and when proper conditions occur to produce desired effects. Only Flagstaff Fire Department personnel will be permitted to burn within the City. As with Stage 2, property owners outside the City, but within contract areas, are able to burn, but are encouraged to first obtain a Burn Certificate from FFD.

Broadcast burning should be considered to reduce remaining fuel levels, accelerate recycling of nutrients, and invigorate native grasses and shrubs.

As with pile burning, this stage should occur only after careful planning and only when proper fuel and weather conditions exist to ensure minimal tree mortality and scorch while achieving desired surface fuel consumption. When performing broadcast burns, FFD will follow the operational guidelines listed in our Hazard Mitigation Best Management Practices.

Where possible, this phase should be repeated approximately every 3-10 years to mimic natural conditions and fire return intervals.

Sequence: The following applies to larger-parcels and/or complex projects: it does not apply for individual hazard tree removal or smaller parcels. Specific determination will be made by Staff.

1. A Vegetation Management Plan (See *Hazardous Fuels Mitigation Guidelines* - Appendix 3) may be required to be completed by the property owners and submitted to FFD for review and approval prior to initiation of any work.
2. Selected vegetation is marked by FFD-FM staff: if marked by a consultant or owner, it must be approved by Staff prior to cutting. Either a "cut tree" or "leave tree" mark, depending on stand density, may be employed.
3. A field visit, hosted by FFD-FM Staff, to the site may occur with various agency representatives to review proposed treatments and discuss operating timeframes.
4. Following the field trip, FFD will either issue a Notice to Proceed, Approve with Modifications, or deny the site work plan.
5. Following receipt of a notice to proceed, the owner/developer may initiate work. For new developments, all forest treatment work must be completed before combustible building materials are brought on-site.
6. During all stages, work will be monitored by the FFD.

Impacts:

1. **Soils and Drainage --** Recommended forest treatments will not result in undue compaction of soils. Chip or Slash piles should be located so as not to impede any run-off from the site. Broadcast burns shall be planned so as not to burn so intensely they damage soil and lead to erosion problems. Forest treatments are expected to increase soil water availability to remaining trees. It is also expected that thinning and burning will increase nutrient availability to both over-story and under-story vegetation.

2. **Cultural –** If cultural sites are discovered, work will be temporarily stopped or re-directed until such time as the site can be evaluated and/or, if deemed necessary, protection measures are put in-place.

3. **Wildfire –** Implementation of the recommendations will reduce the fire hazard. This in turn will ensure the safety of nearby residents, protect property values and natural resources and increase forest health of the area.

4. **Vegetation –** The recommendations are designed to improve existing conditions. If no work is undertaken, forested areas will remain overstocked and worsen with time. This will lead to a continued decrease in individual tree vigor and health. In addition, potential for damage from fire and insects and disease will remain unacceptably high. Following implementation of these recommendations, long-term sustainability will be greatly enhanced. Tree growth will increase and vigor will improve.

5. **Noxious Weeds –** Proposed treatments are not expected to accelerate distribution or promote establishment of these plants.

6. **Property Values** – Market value of properties effectively treated through thinning and prescribed fire area expected to increase.

SUMMARY

This plan has been prepared by FFD to assist in general forest treatment planning and implementation. The recommendations will ensure a green, visually attractive, healthy forest for future generations and provide for public and firefighter safety.

Forest treatments performed in and around Flagstaff and the use of Firewise building materials and techniques greatly reduce the likely hood of devastating wildfire but will never fully eradicate fire from our ecosystem. Fire is integral to our environment, will continue to occur and is necessary to forest health. Fires will remain a threat to our community, but by ensuring adequate forest treatments are implemented we have a greatly reduced risk of large fires and the devastating damage that can result to individual properties and the greater Flagstaff Community.

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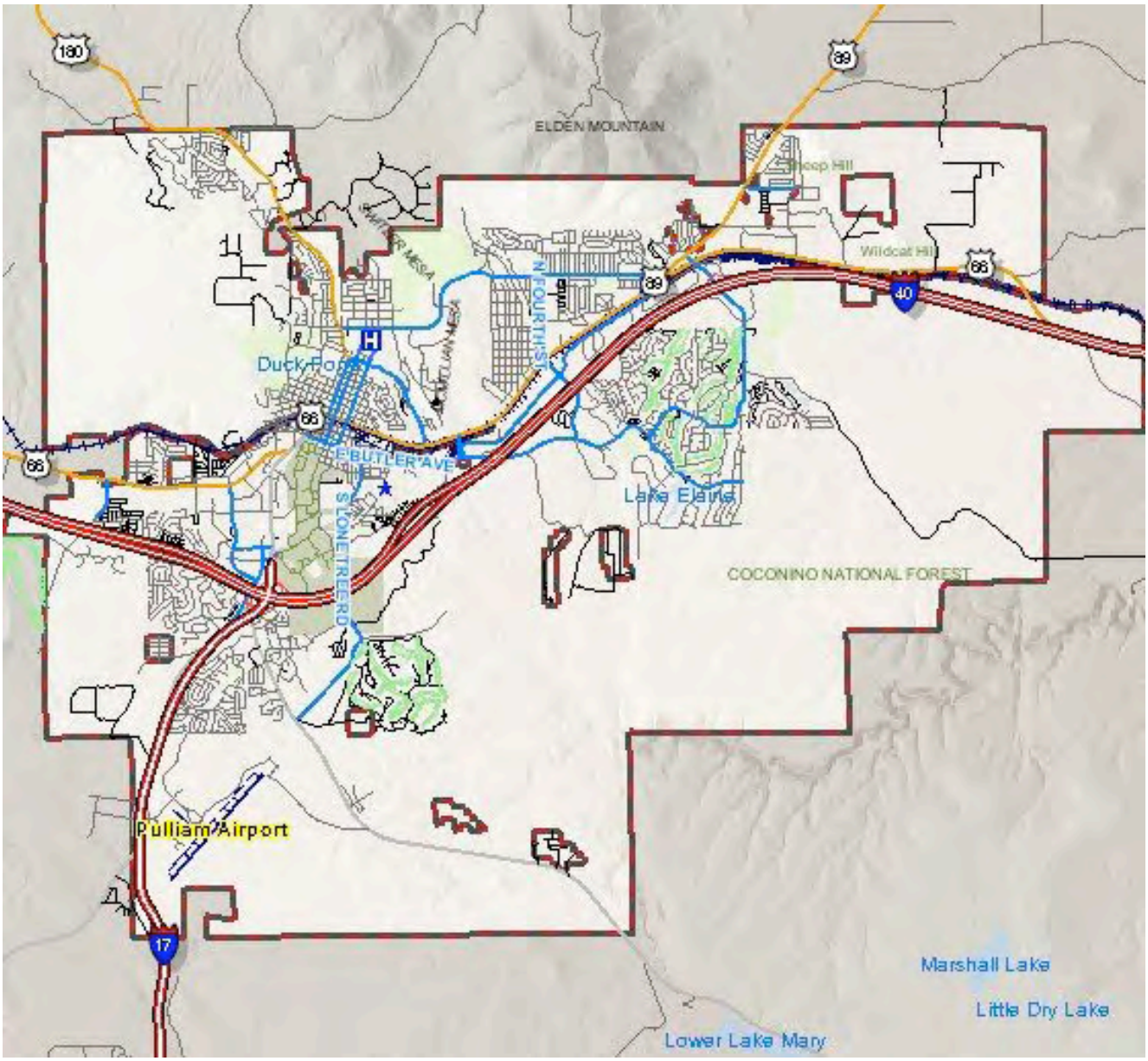
APPENDIX 1

Area map



APPENDIX 2

FLAGSTAFF FIRE DEPT
Wildland Fire Management

REPORT – Estimated Effect of Catastrophic Wildfire on Flagstaff

Feb 03

Background: During the summer of 2002, two large destructive wildfires directly impacted several communities within AZ. In May, the Indian Fire burned slightly over 1300 acres and broached the southern boundary of Prescott. In June/July, the Rodeo-Chediski fire burned in excess of 465,000K, essentially destroying several small towns, and severely impacting several others, in the White Mountains.

Each of these fires dramatically demonstrates that catastrophic wildfires threaten **all** community values-at-risk. (A complete discussion of these values is found in the paper *"Wildland/Urban Interface: What's Really At Risk?"* found at
www.flagstaff.az.gov/wildlandfire

Experience has shown that loss of revenue and jobs from displaced residents, lost businesses, and reduced tourism can be even more significant than the immediate physical damage from the fire. The purpose of this paper is to provide a realistic estimate of the financial impact to Flagstaff should such a fire affect the community.

Assumptions:

1. A large fire burned for 2+ weeks before it was "contained": 5 weeks later it was "out"
2. The fire destroyed/damaged 300 homes
3. The fire occurred in late May –early June
4. Regional/national media coverage was extensive
5. Some businesses were closed for a 5-7 days. Day-to-day economy (tourism, services, government) was immediately impacted for 30 days, with a 6-month ripple-effect resulting from cancelled vacations, destination-type meetings, etc. (Other factors affecting this prolonged ripple include the on-going drought, bark beetles, fire restrictions, and forest closures.)

NOTE: All assumptions are reasonable, and conservative.

Results:

Sales Tax: Approximately 32% of the general fund. Of this, 50% is generated from all non-city residents: roughly 15% of this is tourist related. A large part of the tourist revenue is derived from hotels, restaurants, and bars: other retail sales account for most of the remainder. A major part of tourist-related revenue occurs during the summer months.

A fire as described above would reduce sales-tax collection as follows:

$500K – 1% sales tax
$300K -- transportation tax
$200K – BBB tax

$1.0M – Total Sales Tax

Property Tax: Approximately 9% of the general fund (primary). Damage/loss of 300 homes would equate to a market loss of $60M ($180K/home). Based upon 80% of that total to be improvements, and using the current assessment ratio (10%) and tax rate (1.727% - primary + secondary), the impact would be: $93K

In addition, there would be a significant decrease in land value, although the exact amount is unclear.

Business Revenue: Limited business closures, and a downturn in tourist-related activities would impact the construction, real estate, retail trade, and accommodation & food service industries the hardest. Annual business receipts and payroll within Coconino County amount to roughly $1.2 billion. Approximately 75% ($900M) of this occurs within Flagstaff. A 5% decrease equals:

$45M – business revenue

This would result in increased unemployment, although the exact amount is unclear.

Total Impact: For the single year following the event, the projected impact is as follows:

City Tax Receipts = $ 1.09 M

Business Decline = $45.00 M

$46.09M

x 1.5 Multiplier effect

$69.1 M

Sources:

Personnel conversations with:
Paul Watson, Town Manager, Lakeside-Pinetop
Jerry Brownlow, Board of Supervisors, Navajo County
Darrell Willis, Fire Chief, Prescott
Steve Schaffer, Tax & Licensing Administrator, City of Flagstaff
Jeremy Christopher, Business Retention Director, Greater Flagstaff Economic Council
Christin Mazon , Coconino County Assessor

Tentative Report on Economic Effect of the Rodeo-Chediski Fire, Carrol Cox (2002)
Employment and Sales Tax Revenue Impacts of the Rodeo-Chediski Fire, Thomas, Warren, + Associates (2002)

APPENDIX 3

Publications available online at:
www.flagstaff.az.gov/wildlandfire

Hazard Fuels Mitigation Guidelines

Before You Build .. . Firewise Requirements for New Construction

FireWise – How to Make Your Home and Neighborhood FireWise

Dollars and $ense – The Value of Thinning Your Trees

It Works! [Proven Results in the Flagstaff Area]

+ Many Others