



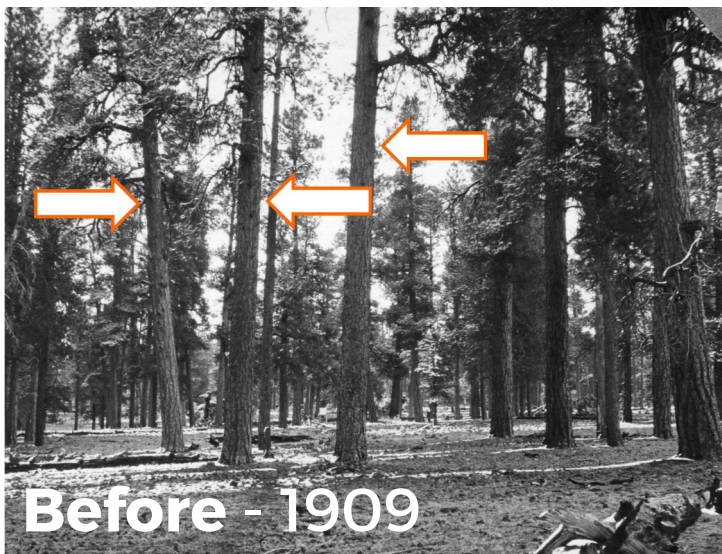
FWPP

Flagstaff Watershed Protection Project

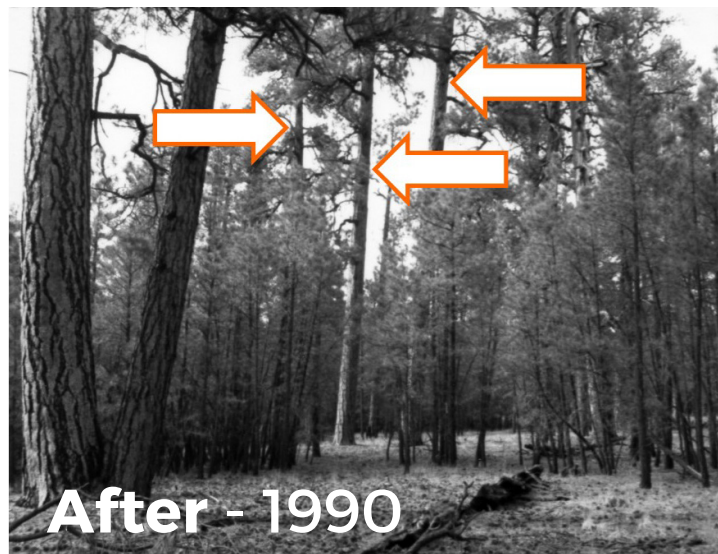
“A vast forest of gigantic pine, intersected frequently by extensive open glades, sprinkled all over with mountain meadows and wide savannahs, filled with the richest grasses, was traveled by our party for many successive days.”

– Edward F. Beale, 1857, traveling west toward the San Francisco Peaks

FOREST IN DISTRESS



Before - 1909



After - 1990

Federal government surveyor Edward Beale gave an exuberant description of northern Arizona’s ponderosa pine forest in the mid nineteenth century. His description is important for many reasons. It reveals what the “pre-settlement” forest looked like with groups of big trees interspersed with grassy, parklike meadows.

And though Beale may not have witnessed them, fires were natural and frequent – light ground fires ran through the ponderosa forest every two to 12 years. Fire kept numbers of pine seedlings in check, reduced buildup of woody debris on the ground and recycled nutrients into the soil. Ponderosa pine evolved in fine tune

with ground fire.

With settlers came grazing, logging, and town-building and a rule of forest management of putting out all fires. A century of fire suppression essentially eliminated natural fire and dramatically altered the Southwest ponderosa forest.

In the absence of fire—nature’s “housecleaner”—tree seedlings sprouted and the forest became choked with too many small to medium-sized trees, all competing for water, and none doing very well. Densities of ponderosa pine have increased far beyond historical conditions -- from 40 or 60 trees an acre to hundreds, even a few thousand, per acre.

Added to these overcrowded conditions is a warming, drying climate. Wildfires now reach the crowns of trees, throw embers much farther, and burn far hotter. Single catastrophic fires in the past decade have charred nearly half a million acres, destroyed homes, and taken lives.

The forest now is vulnerable to severe “megafires” and to disease and insects. When fires or other disturbances do occur, the forest is less resilient, it doesn’t bounce back. Plus, the forests’ invaluable “ecosystem services” have been weakened—things like clean water and air, plant pollination, carbon storage, and places to recreate and renew our spirits.

Flagstaff sits amid the largest contiguous ponderosa forest in the world. With present forest conditions, residents have become familiar with terms like “wildland urban interface,” Firewise homes, and fire-adapted communities. During the driest days of early summer, blazes have blown up uncomfortably close to homes, and evacuations of neighborhoods have become more common.

Recognizing forest health as a priority, foresters, scientists, and ecologists are working to reduce unnatural fuel loads by forest thinning projects such as Flagstaff Watershed Protection Project (FWPP) and by reintroducing fire as a natural process in dryland forest ecosystems.

Flagstaff’s early efforts date back to 1996, when the City did the first one-acre treatment project. The City fully expanded its own forest treatment efforts and engaged with stakeholders and the wider public. All had a shared goal: taking action to address unhealthy forest conditions in the area, all the way into the backyards of most Flagstaff residents.

With this issue of Cityscape we hope to answer several questions: Where is Flagstaff Watershed Protection Project (FWPP) now? How are funds being spent? How does the project meet City Council goals and voter expectations? Where is FWPP going next?



FWPP

Flagstaff Watershed Protection Project

THE SCHULTZ FIRE



“We’re rolling the dice every year,” says Paul Summerfelt, Flagstaff’s Wildland Fire Management Officer and City project manager of FWPP. He and others agree that fires are inevitable – it’s not a question of if, but when. Still, he says, we can have some control over what kind of fires those will be.

The wake-up call for Flagstaff was the Schultz Fire on the east side of town. On a June day in 2010, a spark from an unattended campfire ignited in woods that had not been thinned or burned in a very long time. Residents watched a frightening plume of smoke tower into the sky. People in Doney Park and in town held their collective breath as firefighters fought the blaze and finally brought it under control.

In all, the Schultz Fire burned 15,000 acres on the flanks of Mount Elden. A few weeks later, heavy monsoon rains delivered devastating floods — slurries of water, rock, and soil flowed downhill, flooding homes and buildings and tearing out roads. A full accounting of the costs of the

Schultz Fire is estimated at \$130 to \$150 million, both from fire and flood impacts -- not to mention headaches and heartaches for property owners and the loss of a forest that may take a century to grow back, if it grows back at all

With the stark results of the Schultz Fire still fresh in people’s minds, the Flagstaff Watershed Protection Project was presented to the citizens. In November 2012, Question 405 was approved by three-fourths of Flagstaff voters. It authorized a \$10 million bond to reduce the risk of severe wildfire and post-fire flooding in two of the city’s major watersheds—the Rio de Flag in the Dry Lake Hills on the San Francisco Peaks, and the Mormon Mountain-Lake Mary watershed, which supplies almost half of Flagstaff’s water supply.

Issuing a bond had advantages – it did not increase property taxes and it made money available right away for the work, as opposed to incremental increases in utility bills or other sources. Flagstaff set a precedent-- it

is the only municipality so far known to approach this problem with a bond as the funding mechanism. Most importantly, approval by a public vote would signal strong community support for the effort.

City Council member Celia Barotz was an early proponent of FWPP. She thinks the public “certainly appreciated the opportunity to say ‘yes’.” And though there are challenges and tradeoffs, she sees “strong public support for the project.”

Diane Vosick, with the Ecological Restoration Institute, was another early advocate. She points to the exit poll NAU conducted as voters left polling places on election-day. For those who voted in support, the top two reasons given were to reduce risk of post-fire flooding and protect city water resources. To her, the follow-up questions are: “Has the risk of fire been lowered, have we gotten there yet and how far do we have to go?” And will that reduce the risk of flooding, the voters’ primary concern.

How much does a wildfire cost?

A lot more than reducing the threat of such fires!

\$60 million – Study completed in 2003 following the Rodeo-Chedeski fire in eastern Arizona on the financial impact a similar fire event would cost the City if it occurred in the Flagstaff area. NOTE: this study only accounted for first-year loss in tourism dollars

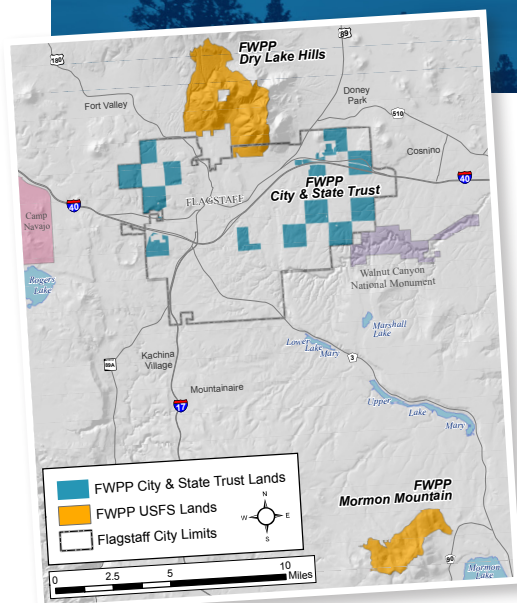
\$897 million – Projected community-wide economic loss resulting from wildfire exposure. The 2005 *City of Flagstaff Multi-Hazard Mitigation Plan* can be found at <http://flagstaff.az.gov/documentcenter/home/view/1078>

\$875,000 – Direct suppression cost for the City’s 2010 Hardy Fire. NOTE: the fire lasted only a few days and the amount does not reflect any costs associated with repairs to roads, trails, infrastructure, homes and businesses, etc.

\$133-\$147 million – Full cost (suppression and recovery) of the 2012 Schultz Fire. Full report found at <http://nau.edu/eri/banner/schulz-fire/>

\$500 million - \$1.2 billion – Full cost estimate for a Schultz-type wildfire within the Flagstaff Watershed Protection Project area. Full report, completed in 2013, found at <http://www.flagstaffwatershedprotection.org/fwpp-cost-avoidance-study/>

\$100 million – Lost tourism-generated revenue reported by the Sedona Chamber of Commerce to that community in the first three months following the 2014 Slide Fire in Oak Creek Canyon



The FWPP planning area includes approximately 15,000 acres of ponderosa pine and mixed conifer forest. The exact area to be treated to reduce fuel loads, either by thinning

WHAT AND WHERE IS FWPP?

by hand and machine, and/or from prescribed burning, is expected to encompass between 10,000-13,000 acres.”

Some of the project area is city and state lands, but the greatest majority (80%) is on national forest outside the City’s boundaries. Yet flood potential maps show that a fire and flood in the Dry Lake Hills would wreak havoc in the heart of downtown Flagstaff, Northern Arizona University, neighborhoods on the east side, and elsewhere.

From the beginning, FWPP has been a unique arrangement between the two primary partners—the City of Flagstaff and the Coconino National Forest. The Forest Service manages and regulates

what happens on its lands but the City pays for most of the work—essentially the money flows “uphill” to federal lands instead of the reverse.

Other FWPP partners also fully participate-- the Greater Flagstaff Forests Partnership, Northern Arizona University’s School of Forestry and the Ecological Restoration Institute, Coconino County, Arizona Department of Forestry and Fire Management and several others. Innovative and proactive, this project serves as a model and has drawn national and international attention.

Essentially, FWPP was the culmination of a paradigm shift that had been underway in the community since the late 1990’s, from past beliefs

that “all trees are good, all fires are bad, and wildfires are your problem,” to the realization that the community needed to take responsibility to protect its watersheds and break the fire-flood cycle. The \$10 million bond is an investment to reduce the risk of a “catastrophe-in-waiting.”

Mark Brehl was the first City operations specialist for FWPP and is now assistant fire officer for the state of Arizona’s northern section. He acknowledges the undertaking “is not an easy fix.” People will rightfully be concerned when thinning moves “right up to their backyard fences.” But doing nothing was simply not acceptable. To him, FWPP is “our community taking ownership . . . we’re part of this forest.”

THE FIVE-YEAR REPORT CARD

The Flagstaff Watershed Protection Project is now at the halfway mark in the anticipated 10-year life of the bond. This five-year “report card” is presented to Flagstaff citizens to account for how their money is being spent, what’s been accomplished so far, and where the project is headed next.

Much of the following information comes from the twice-yearly reports FWPP issues to keep everyone informed of progress. The reports are available at www.flagstaffwatershedprotection.org. An interactive map is also posted there to show completed, current and future forest treatments (thinning and prescribed fire); temporary road construction; temporary trails and closures; and haul routes.

At a Glance . . .

In the past five years, we’ve completed:

- ▶ planning requirements on over 13,000 acres,
- ▶ marking on over 5,000 acres,
- ▶ treatment activities (thinning, harvesting, prescribed fire) on over 4,100 acres and
- ▶ conducted more than of 75 education and outreach events.

In addition, we’ve:

- ▶ secured nearly \$1,000,000 in outside grant funds,
- ▶ had partners contribute in excess of \$3,000,000 of their own funds, and
- ▶ benefited from over 14,500 hours of volunteer labor, and
- ▶ spent \$3.6 million of the bond.

There’s a lot going on out there!

2013

Hot on the heels of the successful bond passage, FWPP began the planning process, spelling out responsibilities of participants, formalizing key partnerships, and hammering out organizational and financial details.

Initially, a joint Implementation Plan and Communication Plan were developed as foundational documents. Forest Service resource specialists, working with the City, assessed existing conditions in the project area and subsequently released a proposed action plan for public comment.

At a signing ceremony in April, the City and Forest Service signed a Memorandum of Understanding and various other agreements.

The Forest Service determined that an Environmental Impact Statement was needed to fully analyze the significant impacts associated with various treatment options.

The City and Arizona Department of Forestry & Fire Management identified and prioritized treatments for state trust lands.

Crews completed initial treatment work in the Dry Lake Hills on projects previously approved under the National Environmental Policy Act, mostly hand thinning, slash pile burning, and broadcast burning. The Orion Timber Sale on Forest Service land in the Dry Lake Hills was offered for bid. It would be one of the first mechanical treatment efforts within the FWPP area.

A pilot project was conducted on a five-acre demonstration site to test operation and impacts of logging equipment on steep slopes, along with the best ways to pile slash on slopes for later burning. The lessons learned would be applied to larger projects to come.

In addition, several public workshops were held to frame the monitoring program, which addressed voters’ questions, provided transparency, and identified potential partners and funding sources.

Thirteen Native American tribes with presence or interest in northern Arizona were contacted to solicit comments and encourage engagement in the project.



FWPP

Flagstaff Watershed Protection Project

2014



photo, Brookbank Meadow

The boundaries of the project area were surveyed and the Forest Service published the draft environmental impact statement, presenting four treatment alternatives. The 45-day public comment period on the draft EIS opened in the summer, and open houses were held in Flagstaff.



photo, visiting Indonesian delegation

The draft EIS analyzed cable and helicopter logging methods, which aren't

typical in northern Arizona. To better understand the impacts, FWPP officials made site visits to past cable logging sites in the White Mountains and consulted outside experts.

On-the-ground work continued. City and Forest Service crews did hand thinning, slash pile burning, and broadcast burning along Mt. Elden Lookout and Schultz Pass Roads; those roads were also resurfaced to accommodate heavy equipment. Thinning began on the City's newly acquired Observatory Mesa open space land. Treatments were completed on 400 acres of state trust land around Equestrian Estates.

Brookbank Meadow, a 140-acre parcel within the Dry Lake Hills, is owned by the Navajo Nation. After field trips with tribal foresters, and with tribal approval, City crews removed small ponderosa pines that encroached on the meadow. An informational trail kiosk was installed at the meadow as well.

The City completed its monitoring plan for the project. One early result was the release of the FWPP Cost Avoidance Study by NAU's Rural Policy Institute. The report estimated the economic impact if a stand-replacing wildfire and post-fire flooding were to occur in the FWPP area. Conservative estimates ranged from \$573 million up to \$1.2 billion in damages.

Public outreach continued with meetings, events, field trips and publications. FWPP hosted an international watershed symposium, with 28 countries represented, to present the project as a case study in collaborative watershed management and restoration.

Although FWPP's first two years involved mostly behind-the-scenes planning, about 1,000 acres were treated across the project area. The next few years would see the work begin to accelerate.

2015



Before



After

The Forest Service issued the final environmental impact statement by blending the four treatment alternatives. The final record of decision for the environmental impact statement was signed in the fall. It marked a major milestone toward full implementation of FWPP, because it approved fuel reduction treatments on

the rest of national forest lands within the project boundary.

Mechanical thinning continued throughout the year on City-owned land on Observatory Mesa. While FWPP has always been focused on fuels reduction, treatments on the mesa were designed to set the forest on a path toward resembling historic

processes and conditions.

Meanwhile, on national forest lands treatment "prescriptions" were completed for the base of Mt. Elden and trees were marked there on several hundred acres for mechanical thinning. On state land, crews thinned more than 100 acres near Lake Elaine in east Flagstaff.

FWPP team members went to Ashland, Oregon to tour that city's watershed and learn about its wildfire resiliency program. Ashland officials have visited Flagstaff as part of an exchange sponsored by the Fire Adapted Communities Learning Network.

The Ecological Restoration Institute published "Flagstaff Watershed Protection Project: Creating Solutions through Community Partnerships," by Anne Mottek. The white-paper is a case study of the first two years of FWPP and was designed to inform other entities considering a similar initiative.

FWPP won the national Solution Search Award of \$25,000, recognizing the project's innovation in disaster preparation. Mark Brehl, the City's FWPP field operations specialist, accepted the award in Washington, D.C.



The group gathers at the gated road up on Observatory Mesa above Flagstaff. Nearly 20 local people have turned out on a July morning to take a walk in the woods and hear a progress report on the Flagstaff Watershed Protection Project.

It's a pleasant monsoon morning, the air saturated with the scent of pine, and the roadway muddied by the week's heavy rains. Karen Malis-Clark introduces herself, a former public information officer with the Coconino National Forest and now an interpretive volunteer for the Forest Service. Matt Millar, FWPP operations specialist for the city, joins in.

This is Section 8, 385 acres within the Observatory Mesa Natural Area, a crown jewel of Flagstaff open

A walk on Observatory Mesa

space. A yellow and orange sign just beyond the gate advises "Tree Work Ahead," and an engine drones in the background.

Crews in hard hats and plaid shirts are with Perkins Timber Harvesting Company, a small multigenerational family business based in Williams, Arizona, contractor for this job. Matt describes two big pieces of machinery parked beside the road – a Morbark drum chipper and a shiny new Doosan excavator.

The big mound of leftover browning pine branches, called a slash pile, will be run through the chipper. The chips, hundreds of tons of them, will be used as mulch or for power production. Or the slash pile will stay where it is and be burned, most likely in fall or winter.

Matt hands out information on the fire and logging history of this particular piece of ponderosa forest. He has laid out a "prescription" that dictates the tree cutting and he's been out nearly every day overseeing the work. The group watches as a skidder drags out cut logs and

sees the logs stacked in a pile and lifted onto a truck like a bunch of pickup sticks. The logs will then be taken to a landing area and eventually trucked to a pallet plant in Phoenix. There's not much money to be made with this small-diameter wood, Matt explains, because present economics just don't support it.

The fourth and final season for mechanical thinning on Observatory Mesa is winding up. In all, about 2,000 acres will have been "treated by hand thinning or mechanical harvesting," Matt says. Prescribed burning began last year: pile burning is expected to last for the next three years or so, but broadcast burning will occur at various locations for the foreseeable future.

"This is what modern logging looks like," Karen observes. "It might not look real natural now, but keep coming back." Wait another year after the monsoon rains come, she says, and see how the grasses and understory grow back. As if on cue, thunder rumbles and the sky blackens. The rains are coming.

2016



With the Forest Service's final record of decision, full-scale implementation of FWPP took off.

An updated implementation plan sets out a three-phase general timeline for work on the Forest Service portion of FWPP. Phase 1 started with temporary road construction and timber preparation at the base of Mt. Elden – survey, permitting, layout, and tree marking-- and a contractor was selected. When completed, Phase 1 will cover 1,428 acres. Additionally, on the

national forest, more than 200 acres on the Orion sale area in the Dry Lake Hills were thinned.

Hand thinning and pile burning continued on City and state-owned parcels at the lower elevations in Dry Lake Hills and mechanical thinning by contractor Perkins Timber Harvesting was apace on Observatory Mesa.

The Forest Service issued a permanent campfire closure order in the Dry Lake Hills, and some roads were decommissioned.

Technology in the cab

In the good old days, a timber cruiser went into the woods with a clipboard, tape measure, and paint, marking each and every tree with blue paint if it's to be cut, with orange if it's not. In many areas of the Flagstaff Watershed Protection Project, that labor-intensive method is still the method.

But new technology has come on the scene that's changing the game entirely. It's called digital restoration guide technology, and it's helping FWPP managers streamline on-the-ground thinning operations.

With an app on a handheld device, a forester goes into the woods and electronically maps a timber layout. He or she can cover hundreds of acres without the cost or effort of painting each tree. The map is then loaded onto a tablet mounted inside the cab of a feller buncher. The machine operator follows the map as mechanical thinning is carried out.

The digital map can designate a range of density reductions in given



locations, indicate openings and identify places that are not to be cut for any number of reasons (cultural site, important wildlife habitat, etc). On Observatory Mesa, with relatively flat terrain and continuous ponderosa pine, it was "a perfect fit," says Neil Chapman, The Nature Conservancy's Northern Arizona program restoration manager.

A built-in global positioning system also allows the machine's real-time location to be marked, along with the exact location of each tree that is cut. "The big ticket," says Chapman, is that not only can more acres be cut faster, but now loggers are collecting implementation monitoring data.

The Nature Conservancy has pioneered this in-cab tablet technology. It's proved worthwhile for FWPP and may one day become old hat for forest treatments.



FWPP

Flagstaff Watershed Protection Project

2017

Mechanical and hand thinning was completed on Observatory Mesa in the summer with nearly 2,000 acres in total treated. Additional hand thinning and prescribed burning are planned to continue.

Phase 1 began with Arizona Conservation Experience, Forest Service and City crews doing hand thinning on the lower slopes of the Dry Lake Hills. Phase 1 mechanical thinning in the area began in late summer and is to be completed by the end of the year.

In addition, inventory, layout, tree marking, and other preparations were completed for Phase 2, on steep slopes and

higher elevations in the Dry Lake Hills on Forest Service land. The difficult terrain will require specialized helicopter and cable logging equipment on a small portion of the area, as well as thinning in Mexican spotted owl and northern goshawk habitat. When complete, Phase 2 will cover 3,810 acres.

Mike Elson, district ranger for Flagstaff District of the Coconino National Forest, has been in on FWPP planning since the beginning. Now, he says, “it’s exciting to be on the cusp of really getting it implemented.” He believes FWPP will go a long way toward reducing risk of a large catastrophic fire.

ACE crew

The whine and howl of chainsaws echoes through the woods in a call and response song. The saws are operated by an “ace” crew of eight young men and women hand thinning trees along the Rocky Ridge Trail at the foot of Mount Elden.

ACE stands for American Conservation Experience, a Flagstaff-based nonprofit that employs young adults age 18 to 25 for jobs in the woods.

This chainsaw crew was hired specifically to do this hand thinning work after receiving special training -- they learned how to properly fell, buck, and limb trees, and how to take care of their equipment and themselves.

For the Flagstaff Watershed Protection Project, these sawyers and slash pilers work 10-hour days, eight days on and six days off, for six months. They receive a weekly stipend, an education award at the end of their commitment, free housing and all they can eat while on the job.

Kevin Sperzel, who hails from the Sierra Nevada in California, got his college degree in mechanical engineering. But he wasn’t satisfied, and “took a bit of a left turn” to be outdoors and do something beneficial for the environment. His personal best so far was an astounding 115 trees cut in one day!

Working alongside him is Emilie Zahurones, a geography major, who says she “loved the idea” of becoming a sawyer. Moving up into the cool forests from the hot desert was a decided benefit too.

Nineteen-year-old Bella Sarno, the crew’s youngest member, wields a chainsaw like an extension of her arm. She says she’s happy to get so much “trigger time” with a saw, experience that will help her realize her dream of becoming an arborist or forestry technician.

This heavy, physical labor inspires healthy appetites, and a few food fantasies. Meals in camp at night won big compliments, especially the mushroom risotto. Beyond the good food, the impact and importance of this work, says Bella, is “a huge motivation for all of us.”



WOOD PRODUCTS



FWPP managers appreciate the importance of using the voluminous quantity of wood harvested from the project area. Most of the harvest is small-diameter trees and the cost of transporting the materials out of the woods to a mill or factory is often not economical. Still, they continue to explore opportunities to find a viable market for what otherwise would be a “waste” product.

So far, wood harvested by FWPP has gone to a pallet factory in Phoenix, some is given away in free firewood programs and the slash is piled and burned in place, or chipped and used mostly as mulch. Thousands of tons of wood chips are generated by the thinning operations. One recent outlet for the chips is for rangeland restoration experiments. On Babbitt Ranch land near Flagstaff, plots of wood chip mulch are being examined in field tests to see how the mulch can help stabilize soils and encourage grassland recovery. The chips are also being test-burned with coal to see if they can be used to generate electricity.

Though FWPP is not necessarily aiming to make money on the sale of harvested wood, it’s certainly a consideration because it could help defray some of the project costs. FWPP managers are always watching wherever and whenever markets might become available. They do not want to hold up necessary work in the woods to wait for an active, widespread product use, however.

Counting chips

The Salt River Project (SRP) has completed the state’s first test of cogeneration of electricity using wood and coal, and results have been favorable.

In October 2016, SRP tested wood chip biomass at its Coronado Generating Station in St. Johns in eastern Arizona. The company obtained a portion of the chips from FWPP, then tried different percentages of them mixed with coal to see how they would function in a power plant designed to burn coal.

Bruce Hallin, SRP’s director of water supply, said nearly 3,000 tons of biomass – limbs, needles, and chips— were burned in two, 10-day tests. Technical issues, such as maintaining a steady rate of heat in the boilers, were analyzed. They also looked at the optimal size and moisture content of the chips. Economics, especially transportation costs, were also a factor.

The tests showed a mix of 2% to 3% wood chips was technically feasible at the Coronado station. The results were encouraging enough that SRP will engage in longer-term tests, possibly in the spring of 2018, Hallin said.

The Salt River Project, which supplies electricity and water to the greater Phoenix area, is conducting these experiments as part of a larger interest in seeing Arizona’s forested watersheds returned to better health.



MONITORING



FWPP has provided students at Northern Arizona University with many educational and research opportunities.

From the beginning, monitoring was built into FWPP to evaluate treatment effects. The Forest Service included monitoring components in the environmental impact statement and the City completed a supplemental plan to help answer voters’ questions.

Several workshops were held initially, focusing on relevant monitoring questions, and four broad categories were identified-- fire behavior, hydrologic response, socioeconomic and other issues primarily relevant to wildlife. The workshops identified monitoring already underway, and gaps that needed to be filled.

A key question is whether the FWPP investment will affect fire behavior and effectively reduce the risk of catastrophic fire. The Forest Service and other partners have studies related to this question, by evaluating changes in fire behavior from pre- to post-treatment. NAU master’s student Patrick Shin looked at this question for his thesis, using new technology as opposed to collecting data with traditional field methods. His research employed remote sensing techniques with unmanned aerial vehicles (UAVs), or drones. The drone collects imagery, and from that two- and three-dimensional models are created. From the models, measurements of topography and canopy fuels are taken. Ultimately, the model will be useful in assessing the potential of crown fires before and after treatments. Use of this technology could help fire managers plan and more

quickly assess ongoing treatments, determine the effects of fuel reduction treatments on potential fire behavior and allow them to adapt as conditions warrant.



Spruce Ave gauge

Because watershed protection is a prime motivation behind FWPP, another important question is how much the project’s activities will reduce flooding and sedimentation. As a baseline, the City’s storm water division generated a flood potential map, showing which sections of the City would be most affected if a Schultz-style fire burned through the Dry Lake Hills.

That information led to installation of gauges on two major washes—one where Schultz Creek meets the Rio de Flag on Highway 180 near the Museum of Northern Arizona, and another at Spruce Avenue Wash in the Shadow Mountain community on the east side of the city, places where fire-related flooding was predicted to be especially severe. The gauges measure both amount of precipitation and stream depth.

Jim Janeczek, City stormwater project manager, explains that the two gauges installed so far are at entry points into the City, not too high in the watershed and not too low, to collect as much of the runoff from the watershed as possible. They need to be within range of radio transmission so the computerized data logger information can be gathered and sent. Permits, right-of-ways, and road access are also

considerations in selecting locations for the stations.

The gauges gather instantaneous flow data, and from that a history of flows can be constructed for comparison. The website, www.flagstaffstormwater.com, offers real-time precipitation and radar images of storms moving across the area. Additional gauges may be placed in the Dry Lake Hills in the future.

In the Upper Lake Mary watershed on Mormon Mountain, the Water Resources Section of the City of Flagstaff is also leading a water monitoring effort. A technique called “SRP Flowtopography®” is being used to photograph and record water flow, providing baseline data for comparison of before and after forest treatments within the watershed. A sediment sampler and flow gauge have also been installed at Newman Canyon, the main tributary of Upper Lake Mary.



mex spotted owl

Two other bird species, the northern goshawk and Mexican spotted owl, are of particular interest.

Mexican spotted owls, listed as threatened under the federal Endangered Species Act, do live in the Dry Lake Hills and on Mormon Mountain. They prefer to nest and roost in pine-oak and mixed conifer forests, especially on steep slopes, preferably with large trees, good canopy cover, standing dead snags, and lots of logs. Places where they’ve been observed are called “protected activity centers” or PACs, each at least 600 acres in size.

Monitoring plots have been

established in known PACs, both in areas slated for treatment and in areas that won’t be treated under FWPP. Owl surveys follow U.S. Fish and Wildlife Service protocol, and are done to see if the birds are there, or not, and whether they are reproducing. Of 15 PACs monitored in 2016, 13 had pairs of spotted owls and one fledgling was produced.

The Fish and Wildlife Service’s latest recovery plan recognizes that wildfire could be more detrimental than logging operations for the owls. So FWPP will have limited thinning and prescribed burning within protected activity centers, on a compressed schedule to minimize disturbance to the owls.

Mexican spotted owl monitoring will continue during and after the project, to see how these special birds respond to changes from forest thinning and burning in their preferred habitat.

Socioeconomic questions center on how FWPP money has been invested, and did that investment effectively reduce post-fire and flood risk and costs. The city’s annual financial reports detail how the money is spent each year, and how it has been leveraged by partners.

The full-cost accounting of the 2010 Schultz Fire can be extrapolated to illustrate the economic impact to the community if treatment isn’t undertaken in the watersheds around Flagstaff.





FWPP

Flagstaff Watershed Protection Project

WHAT'S ON TAP – 2018 and BEYOND



Over the next five years, FWPP will continue to reduce fuel loads in the two key watersheds. The public has already started to see thinning operations on the lower sections of the Dry Lake Hills north of town. There's much more to come, and FWPP is using multiple methods to keep the public well informed.

Signs along Mt. Elden Lookout and Schultz Pass Roads advise of the need for caution around work crews, logging trucks and heavy equipment. Along with signs and kiosks on the ground, trail and road closures and changes will be updated and posted on the FWPP and Coconino National Forest websites: www.flagstaffwatershedprotection.org and www.fs.usda.gov/coconino. Notices will also be put up at local outdoor shops.

With 32 miles of popular trails in the Mt. Elden/Dry Lake Hills system,

recreational users will be affected by the project, according to Brian Poturalski, Coconino National Forest recreation staff officer. Hikers and runners, bicyclists, climbers, horseback riders, hunters, and even hang gliders will see and hear the work. Camping will still be allowed, but a permanent campfire ban has already been instituted in the Dry Lake Hills.

As logging operations ramp up, the agency will do its best to keep trails open, especially on weekends and holidays, even where cutting is taking place, he notes. But safety concerns may outweigh that and some trail closures will be necessary. Poturalski encourages users to seek alternative trail systems around Flagstaff. He's also working with coordinators of special events like runs and mountain bike rides to modify routes if necessary.

Temporary roads will be built, existing

roads may need to be rerouted, and some roads will be closed. Slash pile burning and broadcast burns will also mean periodic smoke in the area.

Generally, the public should expect the sights and sounds of a big construction operation. The noise of machinery will be most notable on weekdays. The intent is to shut down on weekends, especially closest to town, says Poturalski.

Going into 2018 and 2019, Phase 2 operations will proceed on Coconino National Forest land, on the higher, steeper slopes of the Dry Lake Hills and into mixed conifer, a rare ecosystem type in the forest. That will involve different harvest techniques, including cable and helicopter logging.

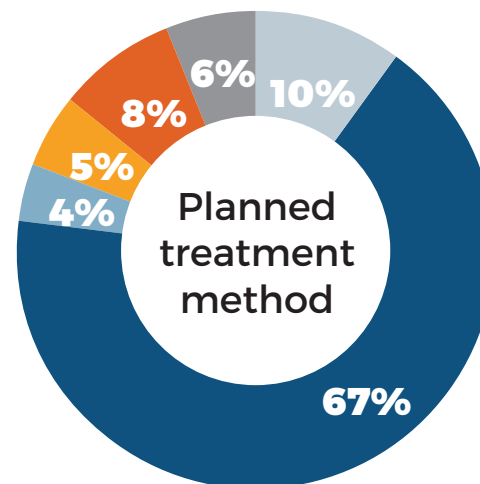
The third and final phase will see treatments in the Mormon Mountain

area south of Flagstaff in the Lake Mary watershed. Harvesting is expected to begin in 2019, with almost 3,000 acres to be thinned.

FWPP managers and partners are aware that recreational users will have concerns about closures, and the general public will have questions about the nature of the work itself and the immediate disturbances. But most have expressed understanding about the ultimate aims of the Flagstaff Watershed Protection Project – reducing the risk of severe wildfire over a majority of the project area and improving water quality and quantity for Flagstaff residents.

Matt Millar is the FWPP operations specialist and an environmental scientist by training. He tends to think like a forest, looking at time in a different perspective.

He urges the public to appreciate how long it may take for the forest to return to a more historical and natural condition. We need to think beyond a human lifespan, to at least a century, maybe longer. The hope is to put the forest on a path to health, and once that happens it may be better able to take care of itself.



- Prescribed Fire
- Ground Based Logging
- Steep Slope Logging
- Cable Logging
- Hand Thinning
- Helicopter Logging

FOR MORE INFORMATION:

www.flagstaffwatershedprotection.org

Project information and updates

www.flagstaff.az.gov/wildlandfire

Wildland Fire Management Division, Flagstaff Fire Dept

<http://www.firewise.org/> - Firewise USA

<http://www.fireadapted.org/> - Fire Adapted Communities

Best management practices

Most forestry activities involve varying degrees of land disturbance and FWPP's activities are no exception.

Mechanical thinning operations mean heavy equipment on existing and temporary roads. Skid trails where logs are hauled out will be created, along with clearings called landings where the wood is stacked and loaded. Also, prescribed burns and slash pile burning will bring smoke at times.

To minimize or mitigate disturbance to soil, water, roads and trails, "best management practices" will be observed. Where possible, existing roads will be used for skid trails and as temporary roads.

To avoid erosion, long, downhill stretches of skid trails will be avoided, and natural barriers will be used to block and

disguise skid trails and temporary roads once work is completed.

Where possible, natural openings will be used for landings, and natural firebreaks will be used to contain prescribed fires. Equipment will not be operated when the ground is too wet, and steps will be taken to prevent concentrated runoff and soil erosion.

Burning is done in consultation with the National Weather Service and with approval of the AZ Department of Environmental Quality and only under conditions that favor smoke dispersal and achievement of desired fire objectives.

The public will be kept updated of road and trail closures, and those areas will be restored after treatment if necessary.