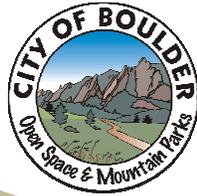


2011 Forest Management Summary Report

City of Boulder Open Space and Mountain Parks

and

City of Boulder Fire Department



Prepared by Chris Wanner, Forest Ecologist
January 2012

Cover photos:

Left: OSMP and Fire Department crews helped the County burn a portion of Hall Ranch in October.

Center: Top-The OSMP forest crew discusses forest management with Junior Rangers.

Middle- OSMP and Fire Department crews work on the Abbey Pl thinning project.

Bottom- Trees thinned from OSMP forests are used in the South Boulder Creek restoration project.

Right: A forest vegetation monitoring site on the Lindsay property.

EXECUTIVE SUMMARY

The 2011 field season was the eighth consecutive year Open Space and Mountain Parks (OSMP) committed full time resources to the implementation of the Forest Ecosystem Management Plan. In total, 165 10-hour days were spent on forest management by the OSMP crew between April 4 and December 21, 2011. One hundred and sixteen forest acres were thinned in 2011. Much of the success during the 2011 season can be attributed to a grant from the Colorado State Forest Service and a continued collaborative effort with the City Fire Department Mitigation Crew. The field season also included a continued emphasis on vegetation monitoring, continued data modeling, mapping, and analysis, and collaborative efforts on issues such as prescribed fire and mountain pine beetle management.

BACKGROUND

In June of 1999, the City Council approved part one of the City of Boulder Forest Ecosystem Management Plan (FEMP). The plan established a framework, policy guidelines, and management direction for forest ecosystem management on city lands. The goals of FEMP are to:

- Maintain or enhance native plant and animal species, their communities and the ecological processes that sustain them
- Reduce the wildfire risk to forest and human communities

FOREST MANAGEMENT PROGRESS

During the period 1999-2003 a lack of equipment and minimal staffing reduced the effectiveness and efficiency of forest management on OSMP lands. Most wood skidding and removal was dependent on private contractors. In many cases using contractors resulted in increased expenses, increased resource damage, and increased staff time because of logistical and planning issues. OSMP acquired its own chipper and tractor in 2004, dramatically improving the efficiency of projects and reducing reliance on contractors.

Prior to 2004, forest management on OSMP lands was solely dependent on the city Fire Department fire mitigation crew and occasional help from OSMP staff. In 2004 OSMP hired its first full time seasonal forest management crew of four. Although the fire mitigation crew was fully staffed, they were unable to devote significant time to OSMP projects in 2004. In 2005 OSMP and fire staff developed the first Service Level Agreement (SLA) to define the annual work plan for both the OSMP and fire crews. Crew coordination and a strong working relationship with the Fire Department have continued through 2011.

Forest management on OSMP has made a shift over the past years from doing smaller, partial projects to larger complete projects (Figure 1). This shift can be attributed to better equipment, broader scale planning, and more committed staff time. Large complete projects are much more efficient because less time is spent on layout and logistics and there is no follow-up work for

future seasons. Larger projects also have ecological benefits. Impacts are greatly decreased by doing one large project instead of a series of smaller ones (one access road, one pass with the skidder, etc.). Large projects also have a more dramatic impact on the landscape by improving more habitat for wildlife and understory plants, increasing vigor and health of entire stands of trees and by decreasing the threat of large catastrophic fire events.

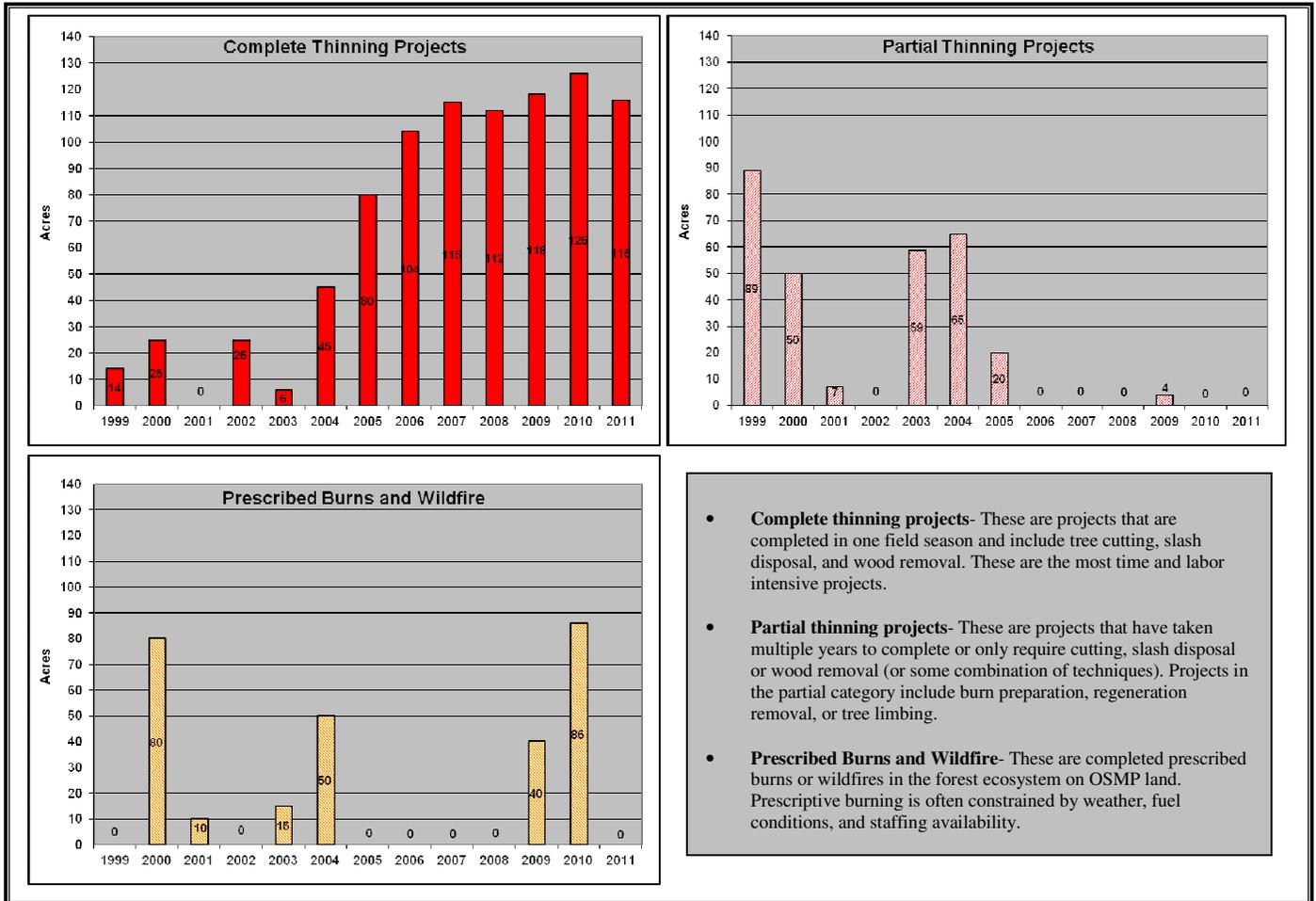


Figure 1: Annual FEMP progress

Major Forest Management Projects by Year:

- 2011:** Flagstaff Summit, Flatirons Vista, Abbey Pl., Kneale Rd.
- 2010:** Anemone Hill thinning, Watertank thinning, Dome wildfire
- 2009:** Enchanted Mesa thinning, S3 prescribed burn, Flatirons Vista Grassland restoration
- 2008:** Shanahan Ridge (four units east of Mesa Tr.)
- 2007:** Flagstaff Road Corridor, Pinebrook Fuel Break, Marshall Mesa
- 2006:** Lindsay/Jeffco-NE, Marshall Mesa, Lindsay/Jeffco-SE
- 2005:** Lindsay South, Olson/McIntosh, Daman, Enchanted Mesa Reservoir, Lindsay Road
- 2004:** S3 Cutting and Skidding, McIntosh, Conda Meadow, Watertank/FLVI Burn Prep, Lindsay Meadow Burn
- 2003:** S3 Cutting, Volunteer Regen Cutting, Conda Meadow, Lindsay North Burn (3)
- 2002:** ST3, Shanahan/Devils Thumb Neighborhood Thinning
- 2001:** Lindsay North Burns (1, 2), Wittemyer Fuel Break
- 2000:** Lindsay North, Enchanted Mesa, Shanahan Burn
- 1999:** Lindsay North, Enchanted Mesa, Flagstaff Top Shop

The efficiency and effectiveness of forest management on OSMP lands has steadily increased since the seasonal OSMP crew was added in 2004. The 2011 season shows a fairly consistent treatment area with previous years. Some of the variation in treatment area from year to year is a result of season length, tree density, weather, and access to the work area. The 2011 season was 14 work days longer than the previous year and included projects with very high tree densities and aggressive thinning objectives.

2011 FOREST MANAGEMENT CREW

Most of the implementation of the Forest Ecosystem Management Plan is carried out by a dedicated and hard working seasonal crew. In 2011 the OSMP forest crew consisted of four members that worked from April 4 to December 21. The crew spent a total of 165 work days (up from 151 in 2010) on various OSMP projects with the emphasis on forest thinning (Figure 2). The OSMP crew also spent time in 2011 on other departmental priorities including monitoring, IPM and restoration work, training other seasonal crews and a variety of other tasks.

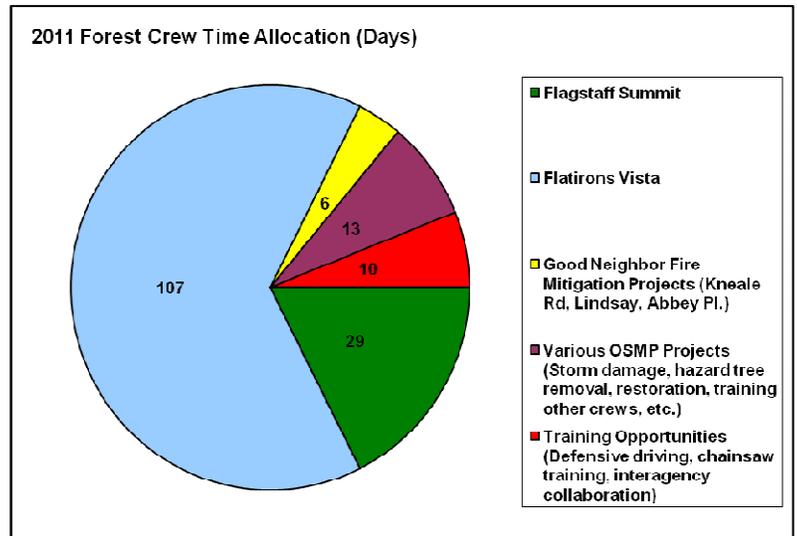


Figure 2: Time spent on 2011 projects by the OSMP forest crew.

The OSMP crew received help on thinning projects from the City Fire Department's seasonal mitigation crew. The fire crew spent 49 days on OSMP forest projects in 2011, which is up from 32 days in 2010 and 46 in 2009. The fire crew is also an essential part of prescribed fire operations and planning. In 2011, fire staff helped plan for future prescribed burning on OSMP property and responded to various wildfires. The Fire Department was responsible for and completed smoke permitting, collaboration with local fire districts, resource coordination,



collaboration on burn plan development and staff training. In 2011, Fire Department staff conducted chainsaw training for OSMP staff and continued to help the forest crew advance their sawyer certifications. This training was essential for keeping staff safe when using chainsaws.

The OSMP forest crew is funded through the annual OSMP

operating budget and annual staffing is variable based on funds available. In 2011 OSMP funding covered a crew of four for approximately 6 months. Luckily, OSMP was able to use the

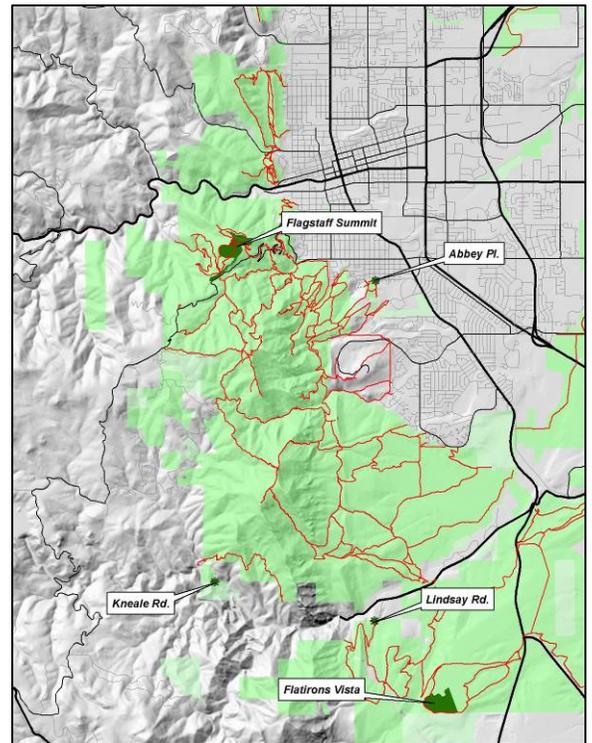
existing budget to match grant funding from the Colorado State Forest Service. OSMP received grant funding for the Flagstaff summit project totaling \$25,000. The grant allowed OSMP to continue forest work for an additional three months, thin far more acres than would have been possible without grant funds, and decreased the cost of treatment to the City by about a third.

2011 THINNING PROJECTS

A total of 142 days were spent by the OSMP forestry crew and 49 days by the fire department crew on thinning projects in 2011. The crew also benefited from the help of AmeriCorps and other work groups. Nineteen days were spent working with AmeriCorps, OSMP Junior Rangers and jail crews which usually included 8 to 12 individuals. A total of 116 acres were thinned in five treatment areas during the 2011 season (Map 1).

Flagstaff Summit

The Flagstaff summit project treated portions of OSMP property around the top shop, along both sides of the summit road, and around the structures and trails on the summit itself. A total of 29 days were spent by the OSMP forest crew on this project between April 5 and June 14. The treatment area covered a total of 57 acres of thinning, chipping, skidding and hauling. The project incorporated both restoration objectives in open forest areas as well as fire mitigation techniques around structures and along roadways.



Map 1: Forest management project locations for the 2011 season.

This project area is located adjacent to forest management projects previously completed by OSMP and built on a larger landscape scale fuel break in the Flagstaff road corridor. The thinning also addressed fuels around the structures and cultural resources at the summit area and restored forest conditions that would have been found in this area historically. This area is a low elevation ponderosa pine stand and, like many of these types of stands across the Front Range, has experienced a high level of fire suppression over the past 100 years. Prior to thinning, the area had an average basal area of 65 sq. ft./ acre and had large pockets of small diameter trees growing very closely together. High tree densities in ponderosa pine stands can lead to decreased habitat value for vegetation and wildlife, and an increased risk of a high intensity canopy fire.

The thinning in the Flagstaff summit area focused on removing many of the small diameter trees, decreasing competition among remaining trees, and breaking up the contiguous tree canopy. Much of this work was done strategically around structures and along roads to create new shaded fuel breaks and enhance the fuel breaks created by roads in the area. This work built on thinning

that was done in 2007 along Flagstaff road from the Top Shop up to Cathedral Park and expanded a larger landscape level fuel break between the Gregory Canyon and Lost Gulch areas.

Overall, the Flagstaff summit project decreased the stands average density from an average basal area of 65 sq. ft./ acre to 40 sq. ft./acre. This translates to a decrease from 70 trees per acre to 27 trees per acre after thinning. The focus on removing small to medium diameter trees also resulted in an increase of the average tree diameter in the stand from 10.8 inches to 16.0 inches. Removing a large proportion of the trees also breaks up the continuity in the canopy and removed many of the ladder fuels that could lead to a high intensity canopy fire. The canopy cover of the stand decreased from 23% to 19% (Figure 3).

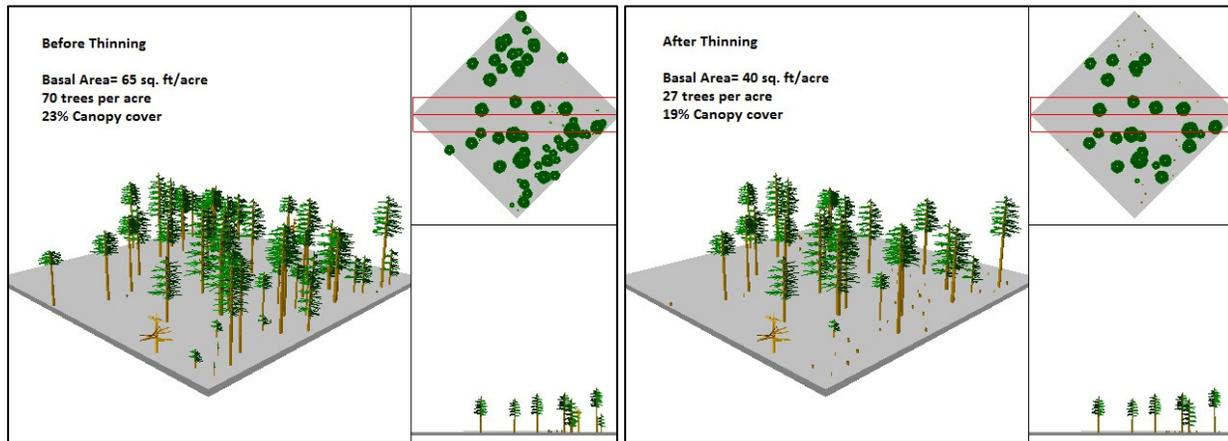


Figure 3: Flagstaff summit overstory structure change due to thinning

Good Neighbor Fire Mitigation Projects (Abbey Pl., Kneale Rd., Lindsay Rd.)

The wildfires of 2010, including both the Fourmile fire and the Dome fire, stimulated considerable interest in fire mitigation and fire management across the community. A number of private property owners contacted OSMP and the Fire Department in the winter and spring of 2011 to ask questions about fire, for tips on mitigation techniques and for help on mitigation projects. In a few situations, private property owners had taken some initiative on their side of the fence to mitigate the wildfire risk and they asked if the City could help with fire mitigation on adjacent OSMP land. In one situation the project was larger and could not be fit into the 2011 workplan for the forest crew. In that case a commitment was made to revisit the project and work with the private property owners in the future. In the majority of cases however, the projects involved one or two days of work and were



added to the workplan for 2011. These projects involved light thinning, limbing, and the removal of fuels from the areas.

The first of these “good neighbor” projects was done on the Tippitt property near the intersection of 17th and King Avenue. Some of the neighbors in the area contacted the fire department about a number of juniper trees on OSMP that had become overgrown and close to the homes. OSMP and Fire Department staff met with neighbors on site and had a public meeting to discuss the tree removal. Staff worked with the neighbors in the area to mitigate the risk these flammable trees posed while maintaining much of the privacy some of the trees provided. The OSMP and Fire department crews spent all day June 20th on this project.

A similar project was done along Kneale Rd. on the Rice property west of Eldorado State Park. In this case the private property owner at the end of the road had done substantial mitigation work on his property and contacted OSMP about improving the road for egress in the event of a wildfire. Additional work had also been done in the area by Rocky Mountain Fire Authority (RMFA) to create a landscape scale fuel break. OSMP staff spent a total of two days in June cutting and chipping small diameter trees to create a buffer in the fuels along the road.

The third good neighbor project OSMP completed was near the Lindsay gate at County Rd 67 adjacent to the yoga ashram. The ashram staff had worked with RMFA to do considerable mitigation work around their buildings. OSMP spent two days in August removing ladder fuels, cutting small trees, and dragging fuels away from the fence and ashram buildings.

Flatirons Vista

The Flatirons Vista project started treatment on a large forest stand at the grassland/ forest edge. The treatment area is located to the east and north of the Flatirons Vista South trail and west of the powerline two-track access road. This season’s treatment is part of a larger restoration effort in the Flatirons Vista area that will eventually include thinning all the tree stands and reintroducing fire to the area. During 2011 the OSMP forest crew spent 107 work days and thinned, chipped and hauled trees from a total of 59 acres in the Flatirons Vista project area.

This project is designed to address a number of goals including grassland restoration by removing trees in the grassland/forest edge, the improvement of habitat for ground nesting birds,

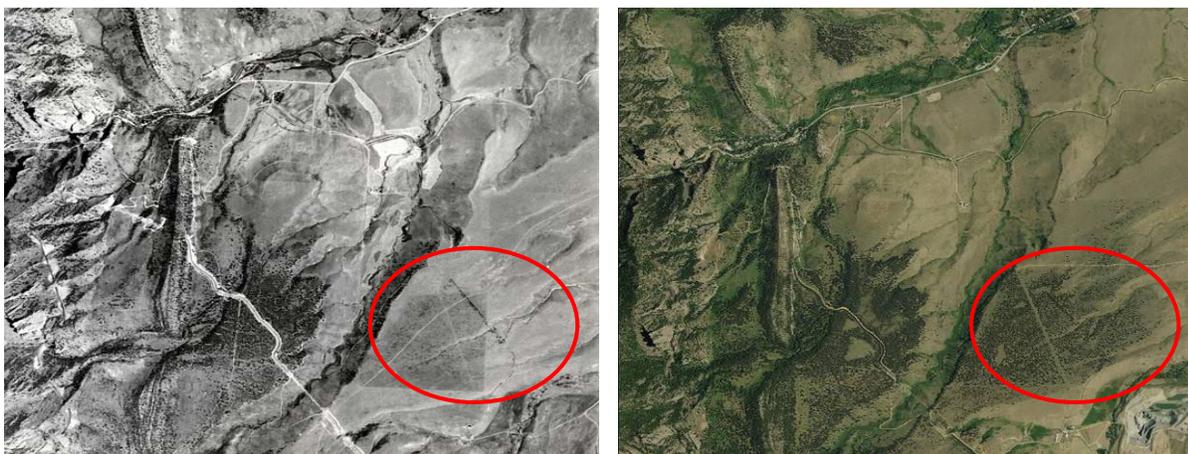


Figure 4: Aerial photos of the Flatirons Vista area taken in 1938 (left) and 2008 (right). The photo comparison shows a dramatic increase in tree density over 70 years.

and the reintroduction of fire to the system. The forested areas on Flatirons Vista are relatively young and have shown dramatic increases in tree densities over the past decade. In fact, the average tree age in the area is about 60 years and historic photos show virtually no trees in the area 70 years ago (Figure 4). This shift in composition from open grassland to a dense ponderosa pine forest can probably be attributed to a combination of historic fire suppression and grazing that kept the competition from grasses down and favored tree establishment.

The thinning across the Flatirons Vista treatment area varied to incorporate a number of goals and wildlife considerations. In a few areas a small number of Abert's squirrel nests were discovered. Only light tree removal was done in these areas to maintain a connection between the areas being used by Abert's and adjacent, denser forest stands in Dowdy Draw. In the majority of the treatment area thinning was very heavy, removing as much as 90% of the trees to restore the grassland ecosystem. Small patches and islands of trees were left for shade and cover for deer and habitat for nesting birds. On average the basal area in the stand was decreased from 61 sq. ft/acre to 15 sq. ft/acre. This translates to a decrease from 63 trees per acre to 10 trees per acre and a canopy cover decrease from 20% to 4% (Figure 5).

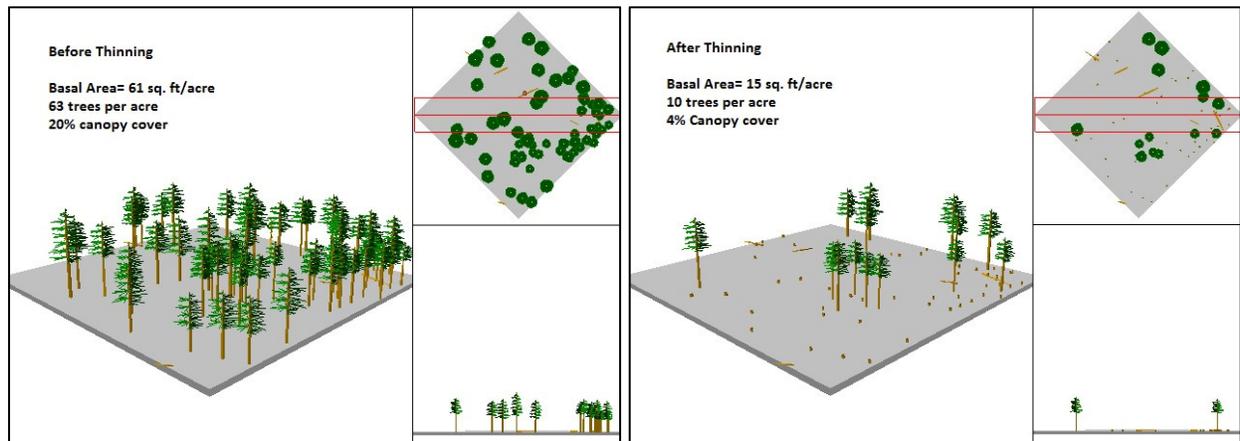


Figure 5: Flatirons Vista overstory structure change due to thinning

2011 FOREST MONITORING PROJECTS

Understory Vegetation Monitoring

Forest understory monitoring has been a consistent part of OSMP's forest management. Tracking and quantifying the impacts of thinning on the understory vegetation is an essential part of assessing the success of forest management. Over the past seven years OSMP staff has established numerous monitoring sites in treatment areas across the system's low elevation ponderosa pine stands. These monitoring sites have been used to measure the vegetation cover and composition before and after thinning treatments take place.

Throughout the monitoring time period, understory vegetation has shown a positive response to the forest thinning projects conducted by OSMP. A steady increase in both species richness and native cover has been observed in thinned stands. To date, a total of 50 subplots have been sampled in various treatment areas.

Treatment areas have shown a steady increase in native vegetation cover after thinning operations with the effect of year being statistically significant ($p < 0.001$). Treated stands have experienced an average increase in native cover of about 12% or almost double the native cover as before treatment (Figure 6). The results of comparison tests suggest there is a statistically significant difference between the percentage of native cover prior to treatment and one year after. However, there doesn't appear to be a significant difference between one, two, and four years after treatment which might imply that the increase in native cover is fairly immediate and persistent once the overstory structure changes.

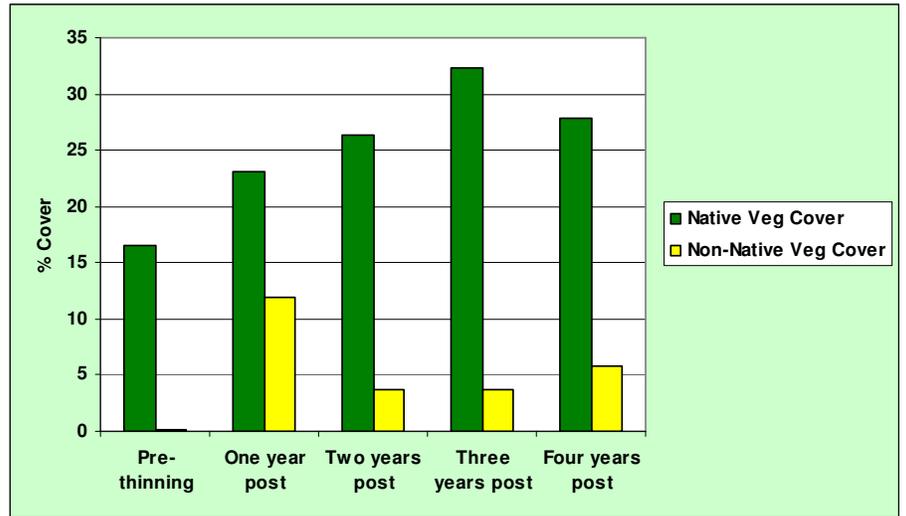
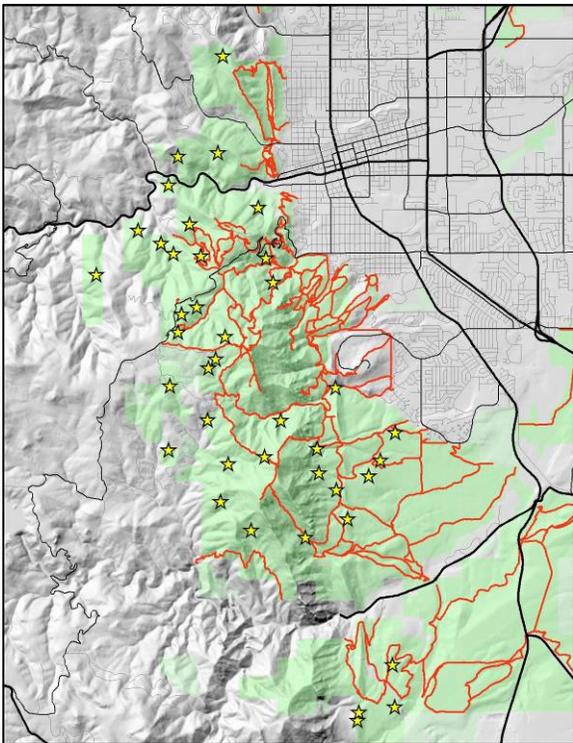


Figure 6: Mean cover values for vegetation sampled before and after thinning.



Map 2: Vegetation monitoring sites for the 2011 season.

In 2011 staff decided to reevaluate the forest monitoring and shift the objectives of the monitoring to a broader scale. Staff felt that the original monitoring question of “is forest thinning affecting the understory vegetation” had been adequately answered and a broader picture of forest understory vegetation would help inform future management. The new forest vegetation monitoring project will be parallel to the vegetation monitoring being done for the OSMP Grassland Management Plan. During the 2011 season, monitoring methods were tested, sites were selected and sample size, sample schedule, and sampling methods were finalized so monitoring work can begin in 2012.

The primary goals for the new vegetation monitoring are to determine the status and trends of selected indicators in the OSMP forest system, provide early warning of abnormal conditions to help develop effective mitigation measures and reduce costs, provide data to better understand the dynamic nature of OSMP forests, and provide a means of measuring

progress towards the overall FEMP goals. This new monitoring project will include 40 sample sites distributed across the system in the two primary OSMP forest types- ponderosa pine woodlands and savannahs and mixed conifer forests (Map 2). All of the new sampling will be done by OSMP staff in July and August. Ultimately, this new monitoring will provide a picture of what is happening in the understory of OSMP's forests, how vegetation is changing over time and with management, and where management would be the most beneficial.

Overstory and Photo Point Monitoring

Monitoring of forest stand structure and composition is done with permanent photo points and overstory inventories. Photo points have proven to be an effective way to show differences prior to and following treatment. While they are less quantitative than other forms of monitoring, photos can be useful in displaying changes in tree density, understory density, and non-native composition. Across the treatment areas in 2011, over 25 permanent photo points were established. Each point was located using GPS, marked with a tree tag, and the direction of the photos was recorded. The photos for the 2011 projects are attached to this document as Appendix A. During the 2011 season only a portion of the Flatirons Vista project was completed so only a small portion of the photo points have "after" pictures. These points will be revisited after the 2012 season.

Quantitative data is collected by overstory inventories. OSMP has 337 inventoried forest stands with 2125 sample points. In 2011, overstory inventories focused on post-treatment sampling to measure the effectiveness of thinning. Overstory inventories were completed post management in both the Flagstaff and Flatirons Vista treatment areas. The post management inventories included measurements of tree characteristics and understory composition as well as qualitative assessments of fuel loads, wildlife habitat, and non-native plant establishment. The results of the post management inventories are summarized in the "2011 Thinning Projects" section of this report.

2012 WORKPLAN

The upcoming field season will focus on a number of project areas across the OSMP system and across a number of management plans. Work will continue in the low elevation ponderosa pine forests and will also build on the grassland restoration projects started in 2009. The strong working relationship will continue between OSMP and the Fire department as will collaborative efforts that OSMP is involved in county and Front Range wide.

Thinning projects for 2012 will be focused in a number of strategic areas and will build on existing forest restoration and fire mitigation projects. Early in the season OSMP staff will begin work in the Bison drive area on the western side of Mountain Parks and south of Flagstaff road. This project will focus on restoring the historic forest structure and creating a landscape level fuel break adjacent to the Bison Dr. and Flagstaff Rd. communities. This project will build on work that was done by OSMP in 2005 along upper Bison Dr. and will cover approximately 80 acres. This project will also fit into the larger landscape work that has been outlined in the

recently adopted Boulder County Community Wildfire Protection Plan (CWPP). The OSMP Bison Dr. project falls within the Forsythe project area of the CWPP. Forsythe was identified as the highest priority area for treatments across Boulder County.

Staff will also continue the thinning efforts in the Flatirons Vista area. The focus on restoring a more open grassland will continue and efforts will pick up where they left off in 2011. Due to the other projects planned for 2012 less time will likely be spent in the area compared to 2011.

A number of additional small thinning projects will likely be added to the 2012 work plan as the season progresses. In 2011, neighbors in the Pine Needle Rd neighborhood near Linden Dr and Cedar Brook Rd approached OSMP about a fire mitigation project adjacent to homes. The neighbors have done extensive work on private property but it wasn't possible to fit an OSMP project into the 2011 workplan. Staff will evaluate the area for treatment and possibly add a project during the 2012 season. Additional work may also be done in the Flagstaff area around the summit and the top shop.



Vegetation work in the forest will dramatically expand during the 2012 season. Understory monitoring will increase to 40 sites across the entire forested area of OSMP. This monitoring will provide a broad picture of vegetation conditions in the forests around Boulder. Staff will also begin the process of remapping the vegetation on OSMP lands. Many of the veg mapping in OSMP forests is over 10 years old and requires updating. Along with the veg mapping, staff will also work to update overstory inventories to get a more current picture of forest conditions.

In addition to new projects, many of the ongoing forest management tasks and projects will continue in 2012. The forest crew will continue to be an important resource for wildfire response. Prescribed burning will continue to be a management option if weather and fuel conditions meet prescription. A prescribed burn is still planned for the Watertank area of Shanahan Ridge. Staff will also continue a strong working relationship with the Fire Department, remain involved in county-wide treatment planning, and continue to pursue grant funding for OSMP forest management projects.

RELATED DOCUMENTS

Anchor Point. (2007). *City of Boulder, Wildland Urban Interface, Community Wildfire Protection Plan*. Report prepared for City of Boulder, Fire Department. Boulder, Colorado.

Available at: www.bouldercolorado.gov/files/Fire/city_of_boulder_cwpp_main_report_final.pdf

City of Boulder. (1999). *City of Boulder Forest Ecosystem Management Plan, Part 1*, June 1999. City of Boulder Open Space Department, City of Boulder Mountain Parks Division, and City of Boulder Wildland Fire Division, Boulder Fire Department.

Available at: www.osmp.org

Appendix A: Photo Point Monitoring

Flagstaff Summit Project Area



Flag Pt 1: March 21, 2011



June 17, 2011



Flag Pt 2: March 21, 2011



June 17, 2011



Flag Pt 3: March 21, 2011



June 17, 2011



Flag Pt 4: March 21, 2011



June 17, 2011



Flag Pt 5: March 21, 2011



June 17, 2011



Flag Pt 6: March 21, 2011



June 17, 2011



Flag Pt 7: March 21, 2011



June 17, 2011

Flatirons Vista Project Area - During the 2011 season only a portion of the Flatirons Vista project was completed so only a small portion of the photo points have “after” pictures. The points will be revisited after the 2012 season.



Flvi Pt 1: June 23, 2011



September 2011



Flvi Pt 2: June 23, 2011



September 2011