Southern California Fuels Treatment Effectiveness Review

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Synopsis: Several fuels treatment projects where reviewed on two national forests in the South Zone of California (R-5). The purpose of this review was to document the impact of prior fuels treatments upon the spread of the Grand Prix, Old, Coyote and Cedar Fires which occurred during a Santa Ana wind episode in late October, 2003. In addition to the effects upon fire spread, anecdotal information was gathered with regard to the effectiveness of these treatments upon the tactical and safety considerations associated with the suppression of these large fires. It was concluded that while many of the fuels treatments were in the early stages of implementation, most had some positive influence upon the rate and direction of fire spread and firefighter safety.

Wildfires in Southern California-2003 Season

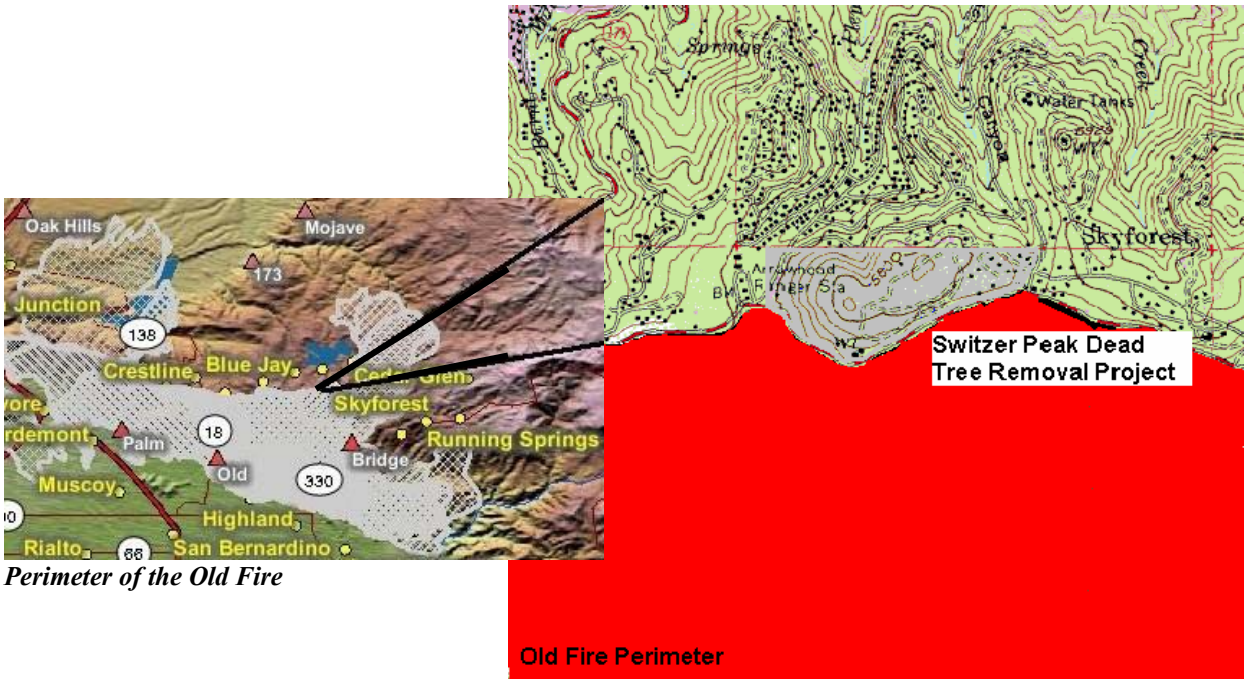
The "Perfect Firestorm"

In the past two years the National Forests of Southern California have been experiencing an epidemic of Pine Beetle infestation in which over 50% of the over story of pine has been killed. In addition to the beetle kill, several years of drought has lead to an increase in the mortality of brush at lower elevations within the chaparral plant community. Add to this scenario the ever increasing population of Southern California with its associated development within the urban interface, add an episode of Santa Ana winds and you have a convergence of events that can best be described as the "Perfect Firestorm".

The San Bernardino National Forest

The first forest visited was the San Bernardino NF. In addition to the smaller impact of numerous other fires at various times during 2003, the San Bernardino NF has been impacted the most by the Grand Prix and the Old Fires which occurred in late October, 2003. On this forest many fuels treatments were in the initial stages when these large fires occurred. The following is a summary of several treatments which proved significant in the management of the Old Fire.

Switzer Peak Dead Tree Removal Project



Perimeter of the Old Fire

Switzer Peak Dead Tree Removal Project.

Photo was taken on Hwy.18 looking west. The treated area is on the right. During the Old Fire, Hwy.18 was used as a control line during extensive firing operations (Left side of road).

Switzer Photo 1

The Switzer Peak Dead Tree Removal Unit was 20 acres in size and was initiated in late August, 2003 after two months of planning. Large diameter dead pines were thinned so as to open the canopy above Highway 18 just east of the Skyforest Ranger District Office. This treatment served to connect other fuels reduction projects between the Skyforest Ranger District Office and the community of Skyforest. This project was accomplished by utilizing a commercial thinning service contract and was administered by local Forest personnel who were committed to other projects yet still available to manage it. This treatment served to help in holding an important stretch of Highway 18 during critical firing operations on the Old Fire. While spotting did occur within the unit during firing operations, the recent reduction in fuel loading offered firefighters an opportunity to safely extinguish the spot fires with minimal impact on the overall firing operation. In essence the firing operation could proceed more rapidly because the intensity of the spot fires had been reduced as a result of the Switzer Peak thinning project. If the fire had successfully crossed the road, several thousand structures, including the Skyforest Ranger District Office, Arrowhead Villas and Crest Park Subdivisions would have been directly threatened.

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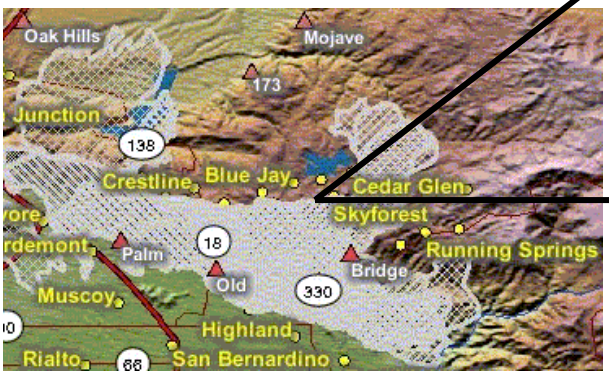
Photo was taken from Hwy.18 looking south below the highway. This area was fired from the highway during suppression operations.

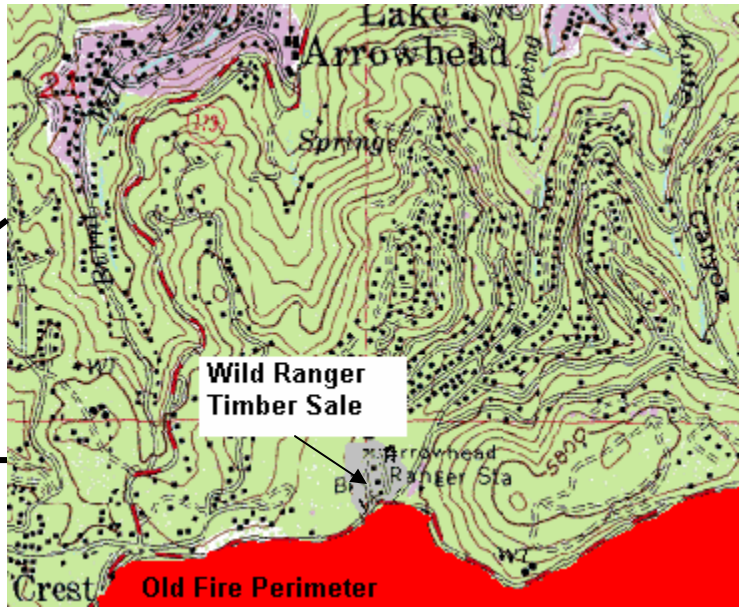
Switzer Photo 2

Photo 3 was taken from Hwy.18 looking north above the point where photo 2 was taken. Note that mortality is still occurring in thinning area.

Switzer Photo 3

The Wild Ranger Timber Sale





Perimeter of the Old Fire

Sky Forest Ranger District Office

Sky Forest RD Photo 1

The Wild Ranger Timber Sale was initiated in June, 2003 and removed 500,000 board feet of dead timber in 10 acres around the Sky Forest Ranger District Office Compound.

Sky Forest RD Photo 2

The Wild Ranger Timber Sale was initiated during the first week of June, 2003 and encompassed 10 acres directly adjacent to the Sky Forest Ranger District Office. The objective of this treatment was to open up the tree canopy by partially removing the dead over story of large diameter pines while thinning the understory of brush and small diameter trees. The project removed 500,000 board feet of dead timber that was sold as is, or otherwise treated under a service contract which involved chipping the material using a whole tree chipper. The removal and modification of the smaller diameter understory material in and around the ranger station compound was accomplished through the use of agency force account as well as Hotshot crews.

Once again with the area cleaned up and fuel loadings reduced around the ranger station, firefighters were allowed to proceed faster in their race to fire out from Highway 18 which was one of the last major lines of defense against the Old Fire's onslaught of late October, 2003. This treatment also allowed fire suppression resources to be freed up for other critical assignments in the area.

Fuels treatments like the one that was initiated around the Sky Forest Ranger District Office Compound on the San Bernardino NF served to save critical structures and provide firefighters with "anchor points" in which to conduct tactical operations during the Old Fire.

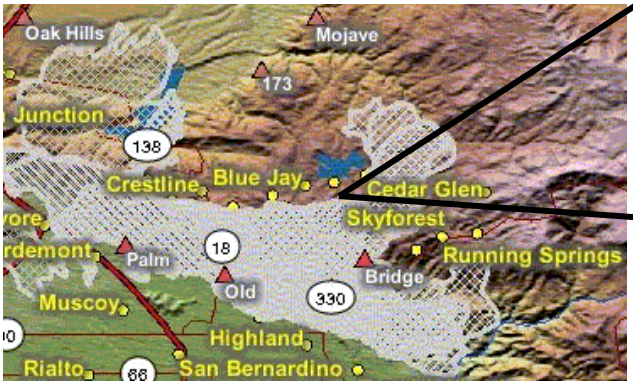
Sky Forest RD Photo2

Sky Forest RD Photo 3

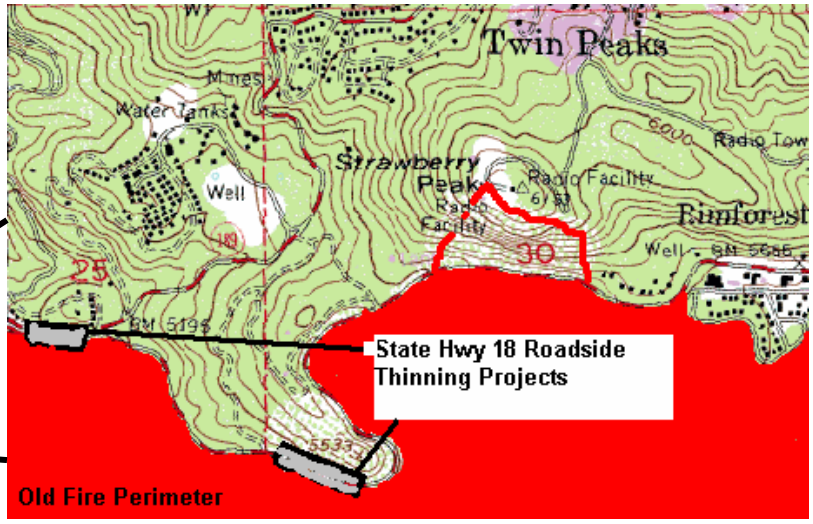
Fuel Modification by Chipping around Sky Forest District Office Sky Forest RD Photo 4

Sky Forest RD
Photo 5

Roadside Tree Removal Project State Highway 18



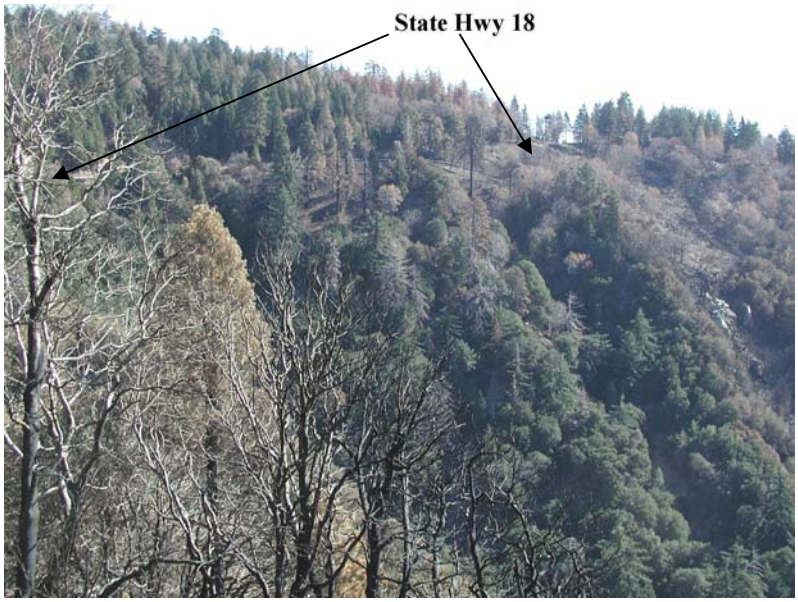
Perimeter of the Old Fire



Areas denoted above represent two of the multiple roadside thinning areas which were completed between the communities of Crestline and Running Springs.

State Hwy 18 Photo 1

State Hwy 18 served as a critical control point during the Old Fire. Photo at right shows an area where dead trees were removed below the Hwy thus reducing the spotting potential above the Hwy.



State Hwy 18 Photo 2

Roadside tree removal projects are an ongoing interagency fuels reduction effort sponsored by MAST (Mountain Area Safety Taskforce). MAST is a consortium of state and local wildland agencies, as well as businesses and non-governmental organizations dedicated to developing and implementing collaborative solutions to the complex fuels issues facing the mountain communities which lie in and adjacent to the San Bernardino National Forest.

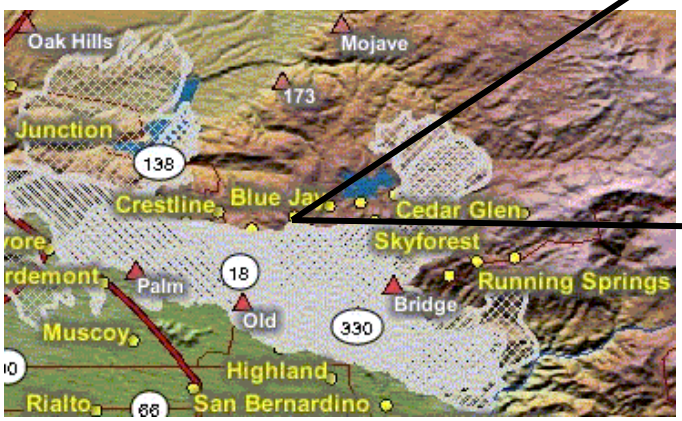
Approximately 8 miles of State Hwy 18 had been treated through the cooperation of MAST agencies, including the California Department of Forestry and Fire Protection (CDF), U.S.D.A. Forest Service, California Department of Transportation (Caltrans) and San Bernardino County. The primary objective of these ongoing roadside fuels reduction projects is to ensure the integrity of evacuation routes during emergencies like the Old Fire. As the Old Fire progressed along State Hwy 18, these roadside treatments allowed for successful backfiring and holding of approximately 10 miles of midslope road between Crestline and Running Springs. Through the use of special use administrators, Caltrans was allowed to remove trees under the condition that they would also treat or remove the slash. Strategic roadside fuel reduction proved critical in the containment of the Old Fire.

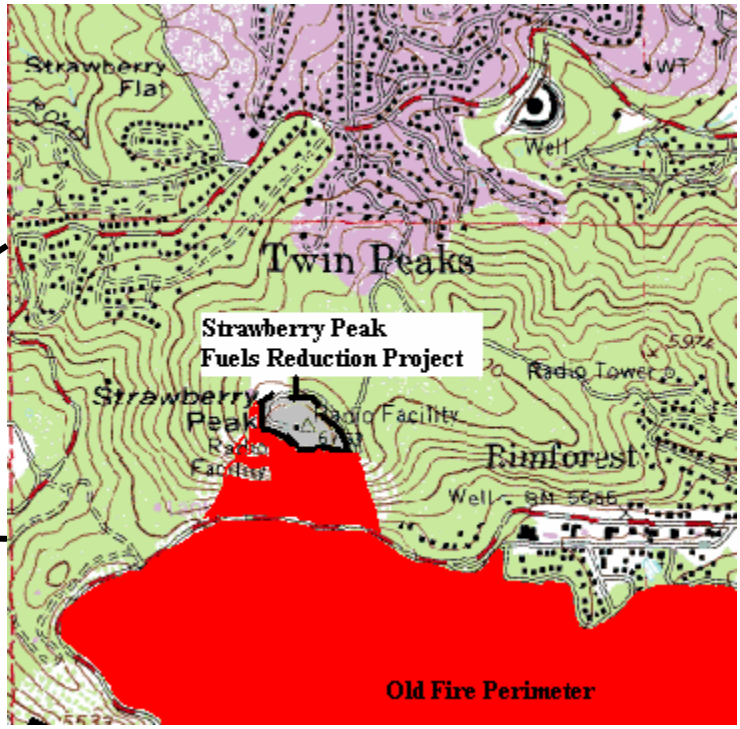
State Hwy 18
Photo 3

Approximately 8 miles of State Hwy 18 had been treated to ensure the integrity of evacuation routes which proved critical to the residents of the local mountain communities during the Old Fire.

Strawberry Peak Fuels Reduction Project

Perimeter of the Old Fire





Strawberry Photo 1

During firing operations a spot fire ignited the fuels across State Hwy 18. As the flames rushed towards a fuels reduction project on the top of Strawberry Peak, firefighters used the fuel break as an anchor point for firing.

The Strawberry Peak Fuels Reduction Project was also initiated by MAST in early June, 2003 and involved the thinning of trees and brush in addition to the chipping of both large and small material. 300 cords of firewood were produced and sold from this project. MAST identified this site specifically for the protection of critical infrastructure including microwave stations, a Forest Service fire lookout tower, and several radio repeaters serving the U.S. Forest Service, San Bernardino Sheriffs Dept., the California Dept. of Forestry and Fire Protection, the California Highway Patrol, and several local fire and emergency service agencies.

During firing operations along State Highway 18, a spot fire erupted above the highway and carried a flaming fire front up the south flank of Strawberry Peak. Firefighters quickly responded by anchoring into the fuels treatment project area around the top of the peak and began firing out ahead of the approaching fire front. Due to the Strawberry Peak Fuels Treatment Project and the quick response of firefighters, the critical mountain top infrastructure was saved.

Strawberry Photo 2

Communications infrastructure and a fire lookout, located on the top of Strawberry Peak were saved with the help of the Strawberry Peak Fuels Reduction Project.

Strawberry Peak Fuels Reduction Project

Pines still stand in shaded fuelbreak where firefighters backfired from the top of Strawberry Peak.

Strawberry Photo 3

Strawberry Photo 4

Strawberry Peak Fuels Reduction Project

Strawberry Photo 5

300 cords of firewood were extracted from the Strawberry Peak Fuels Reduction Project.

Blackened brush at right reveal the density of prior fuels arrangement on the top of Strawberry Peak.

Strawberry Photo 6

Strawberry Peak Fuels Reduction Project

Strawberry Photo 7

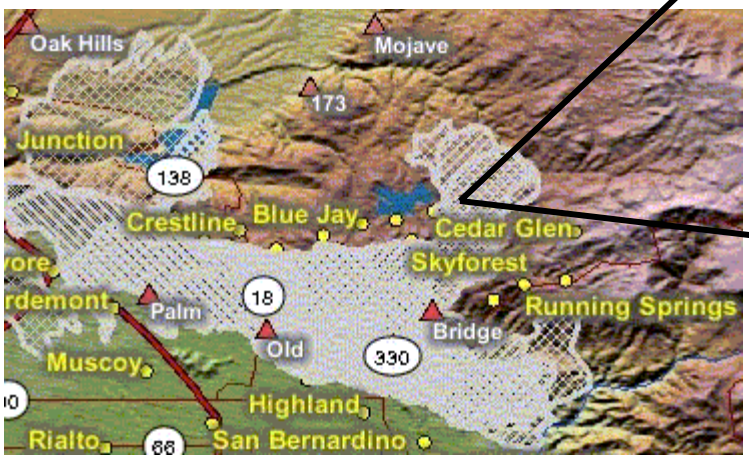
Fuels treatments reduced the amount of convected and radiant heat in the canopy resulting in a green standing overstory after the fire.

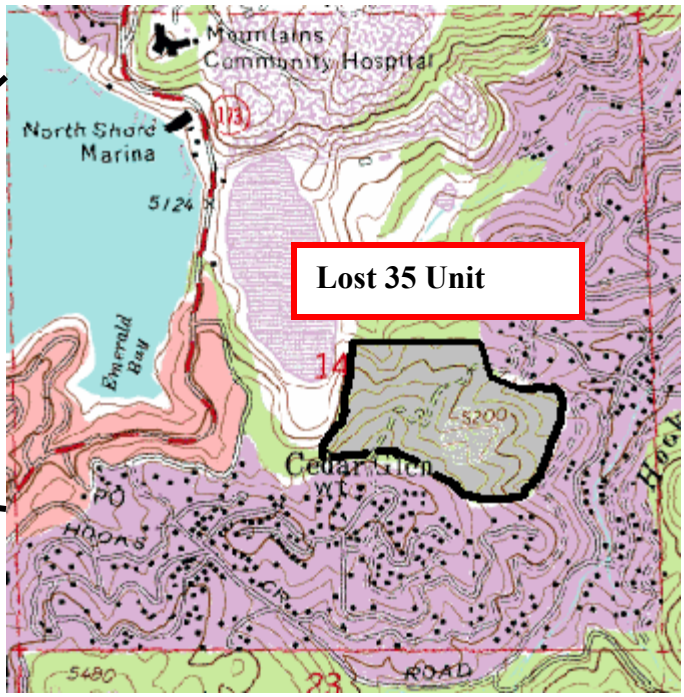
At this location trees and brush were reduced to chips during the Strawberry Peak Fuels Reduction Project thus modifying the arrangement and continuity of the fuel bed and ultimately the fire behavior of the Old Fire itself.

Photo at left reveals a smoldering fire as opposed to a rapidly advancing crown fire.

Strawberry Photo 8

The Lost 35 Unit





Lost 35 Photo 1

The Lost 35 Unit is located on an isolated Forest Service land holding surrounded by private subdivisions just east of Lake Arrowhead. The Old Fire generally ran through this treatment as a ground fire.

The Lost 35 Fuels Reduction Project was also initiated in early June, 2003 and involved the thinning of trees and brush in addition to the chipping of both large and small material. 85% of the dead trees were removed from this project, while the non-commercial material was reduced down to a two inch layer of chips.

While the Lost 35 Project was a relatively isolated treatment in an ocean of mountain subdivisions, it served to bring the Old Fire to the ground thus reducing its intensity.
The Lost 35 Project became an important anchor point from which to control the direction and spread of the old fire.

85% of the dead trees were removed from the Lost 35 Project.

Lost 35 Photo 2

Non-commercial material was reduced down to a two inch layer of chips.

Lost 35 Photo 3

The Lost 35 Unit

The Lost 35 Unit is surrounded by private property.

Lost 35 Photo 4

Photo 5 shows the upper edge of the Lost 35 Fuels Reduction Project where the remains of a private summer residence can be seen at the right of the photo. While fuels treatment in the urban interface can promote fire resistance, it cannot guarantee it.

Lost 35 Photo 5

The Lost 35 Unit

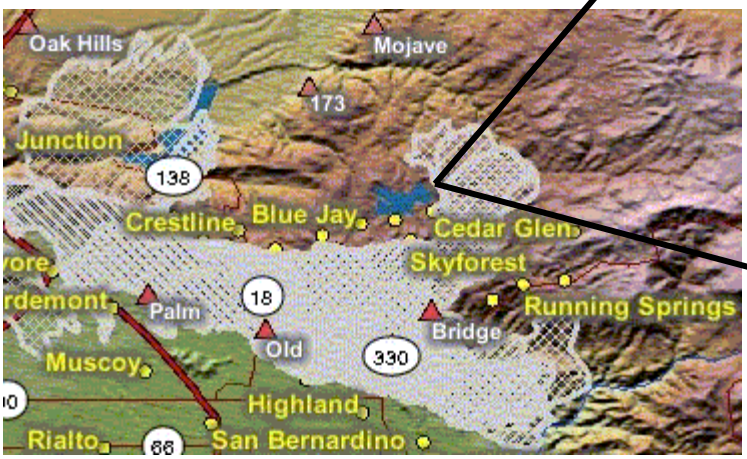
Photo 6 shows a residence adjacent to the destroyed residence which survived the fire.

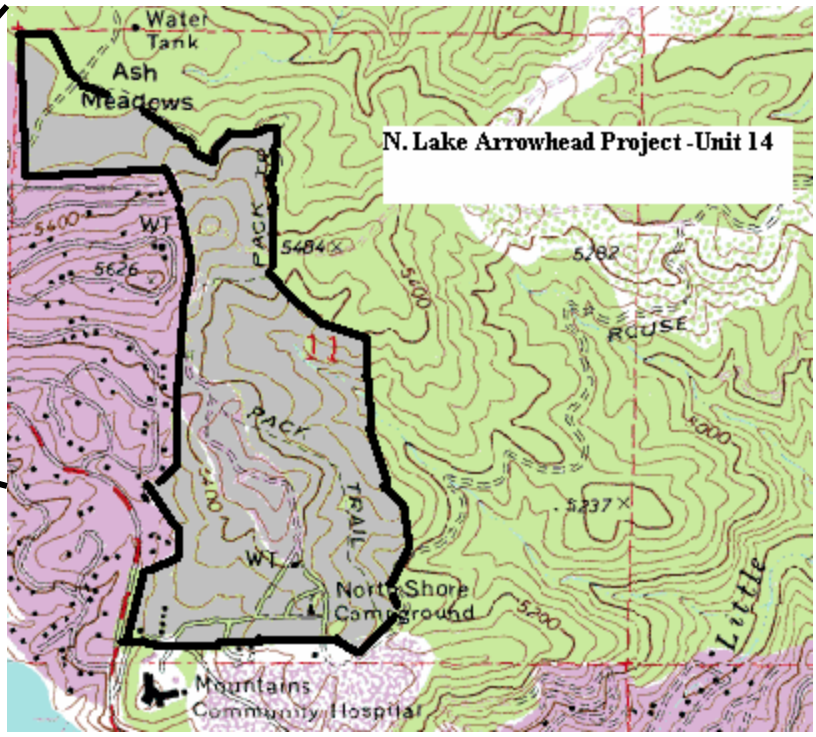
Lost 35 Photo 6

The Lost 35 Unit served as an anchor point and formed a portion of the flank of the Old Fire.

Lost 35 Photo 6

North Lake Arrowhead Project Unit 14



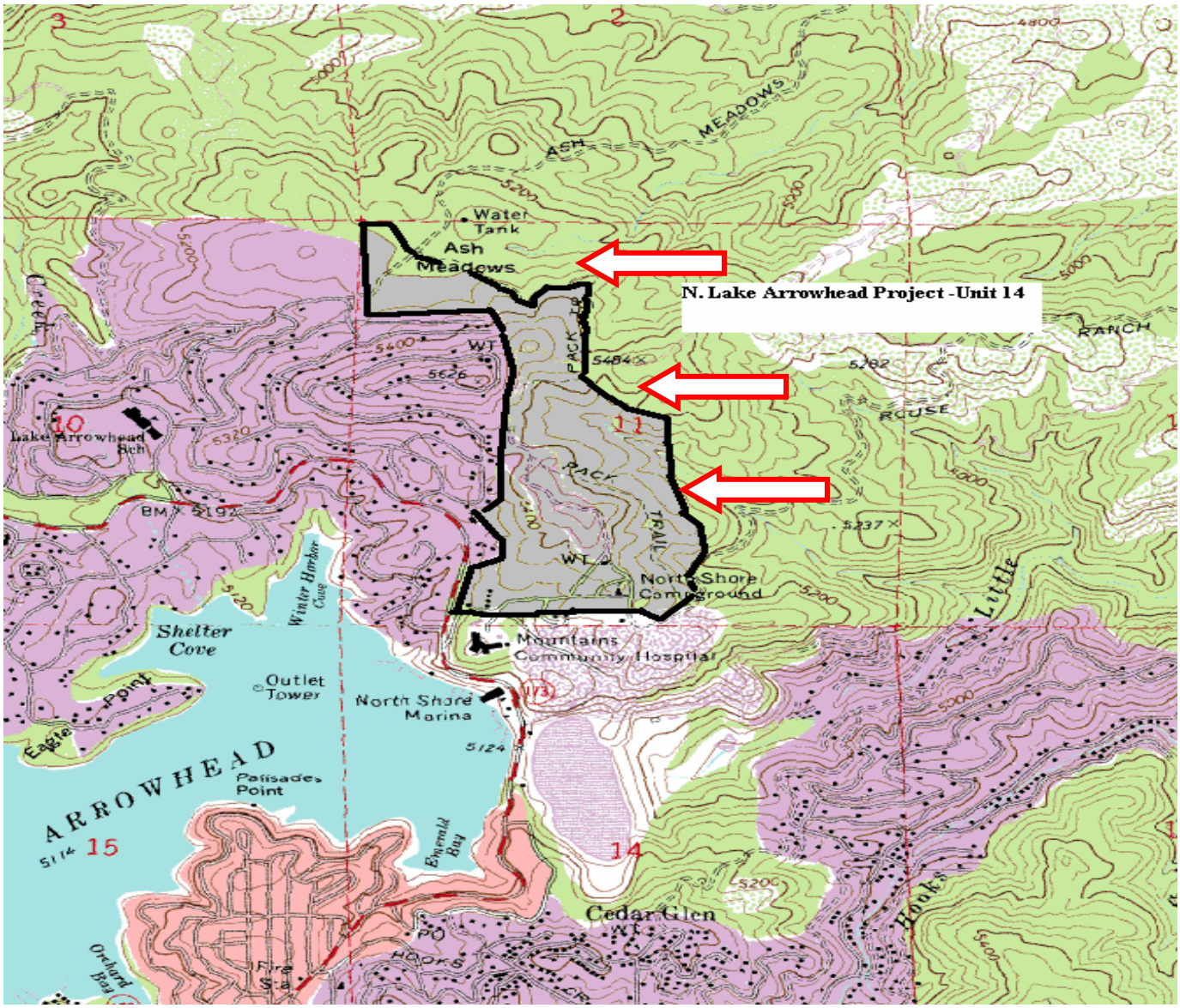


Unit 14 Photo 1

The North Lake Arrowhead Project Unit 14 proved to be the last line of defense for numerous expensive homes located above the lake.

The North Lake Arrowhead Fuels Reduction Project was initiated in late August, 2003 and involved the thinning of the over story to a spacing of 30 feet. The brush was thinned and piled as well; however the large oak component was left intact to retard suckering from stumps. As no herbicide or grazing is allowed in this area, fuel managers need to consider alternatives which produce the same results.

The project was in progress when the Old Fire occurred and proved to be a valuable point from which firefighters could anchor fireline and conduct firing operations. As the fire flanked the unit during a major push to the north, a finger of the fire established itself on a slope and followed the terrain uphill toward the west and numerous expensive homes in a subdivision north of Lake Arrowhead. Fingers of fire did spot into the project area, but were knocked down quickly by the rapid action of numerous firefighters. Because of the reduced fire intensity, firefighters could attack the fire directly thus holding the ridge and preventing the fire from entering the subdivision.



Arrows represent direction from which the Old Fire threatened a subdivision north of Lake Arrowhead.

North Lake Arrowhead Project Unit 14

Unit 14 Photo2

While spotting occurred in the shaded fuel break, fire intensity had been reduced to a manageable level.

Unit 14 Photo 3

North Lake Arrowhead Project Unit 14

Arrow denotes a flank of the Old Fire that eventually moved uphill toward the N. Lake Arrowhead Project Unit 14

Unit 14 Photo 4

The N. Lake Arrowhead Project served to break up the continuity and arrangement of the fuels that surround several subdivisions.

Unit 14 Photo 5

North Lake Arrowhead Project Unit 14

The N. Lake Arrowhead Project reduced the overstory density to a spacing of 30 feet.

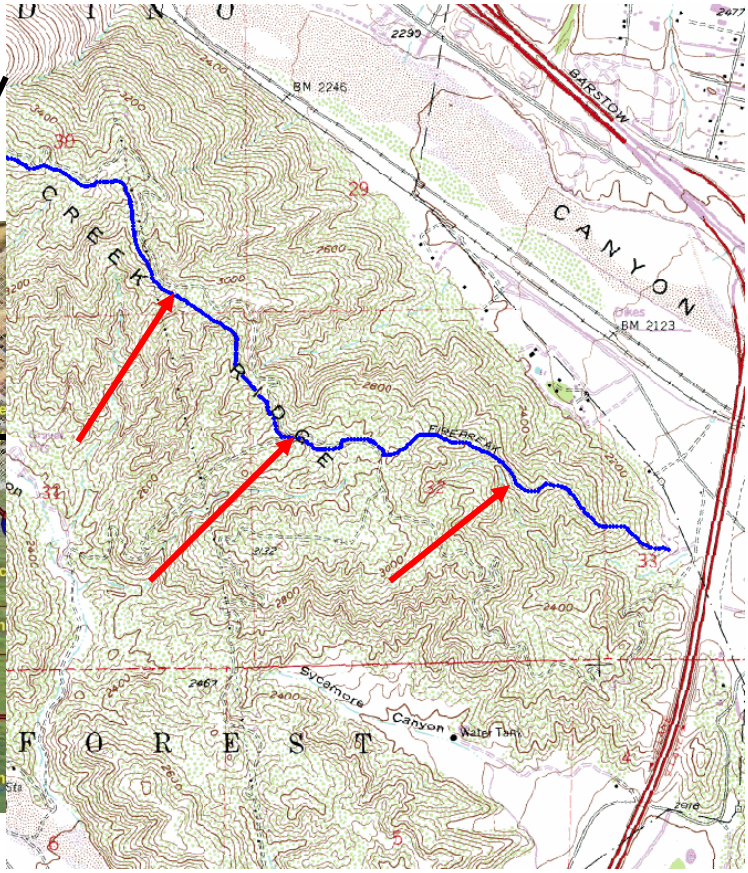
Unit 14 Photo 6

Many homes in the Lake Arrowhead area of Southern California are hidden by dense vegetation and are difficult to access with fire apparatus. This atmosphere of "being in the forest" is a value that motivates many property owners to reject the notion of defensible space. The Old Fire may have changed many attitudes with regard to defensible space but for how long?

Unit 14 Photo 7

The Lower Divide Fuel Break

Perimeter of the Grand Prix Fire



The red arrows above show the direction of the Grand Prix Fire's spread

The Lower Divide Fuel Break was successful in stopping the spread of the Grand Prix Fire along its entire completed length.

Lower Divide Photo 1

The Lower Divide Fuel Break represents the conventional South Zone chaparral fuel break, roughly three to four dozer blades wide and located on a ridgetop. At one time firebreak maintenance was routine in Southern California, however budget restraints and environmental concerns resulted in many fuel breaks being neglected. The Lower Divide Fuel Break was successful in stopping the spread of the Grand Prix Fire along its entire completed length with only the use of air support. In the area where the fuel break was uncompleted, the fire skirted through.

When fire managers develop fuel breaks, they are preparing to fight the inevitable fire before it starts, thus saving time and resources when fire suppression is actually in progress.

Lower Divide Photo 2

Air support was the only suppression resource that was available to hold the Lower Divide Fuel Break.

Lower Divide Photo 3

Individual Fuels Treatments

The importance of defensible space was demonstrated around several Forest Service facilities including City Creek, Lytle Creek, Sycamore, and Del Rosa Stations.

City Creek Station
Photo 1

City Creek Station
Photo 2

Individual Fuels Treatments

Del Rosa Station Photo 1

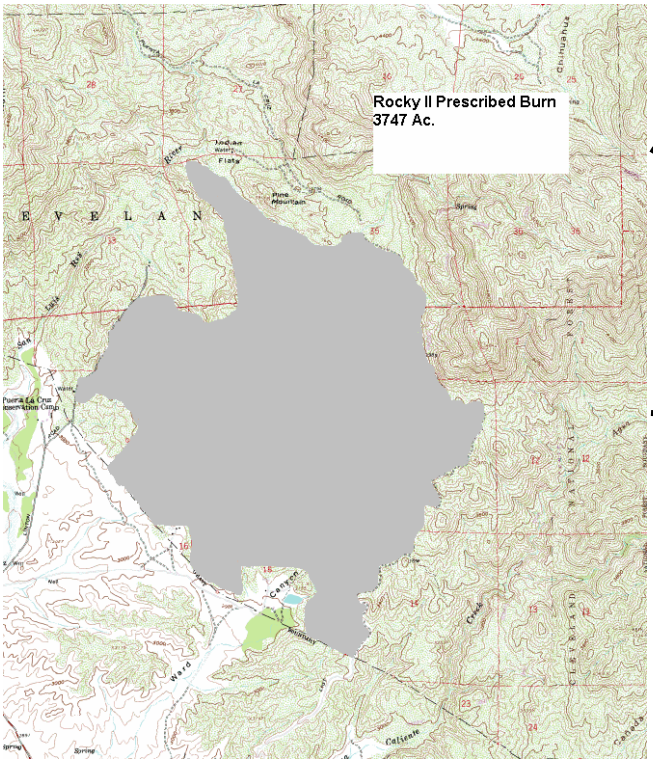
Most of the Forest Service facilities on the San Bernardino NF were significantly threatened by the fires of October, 2003. However damage was limited to one structure and several outbuildings at the Del Rosa compound. Successful thinning and removal of dead eucalyptus trees on the Del Rosa compound kept fire activity to the ground with only intermittent torching.

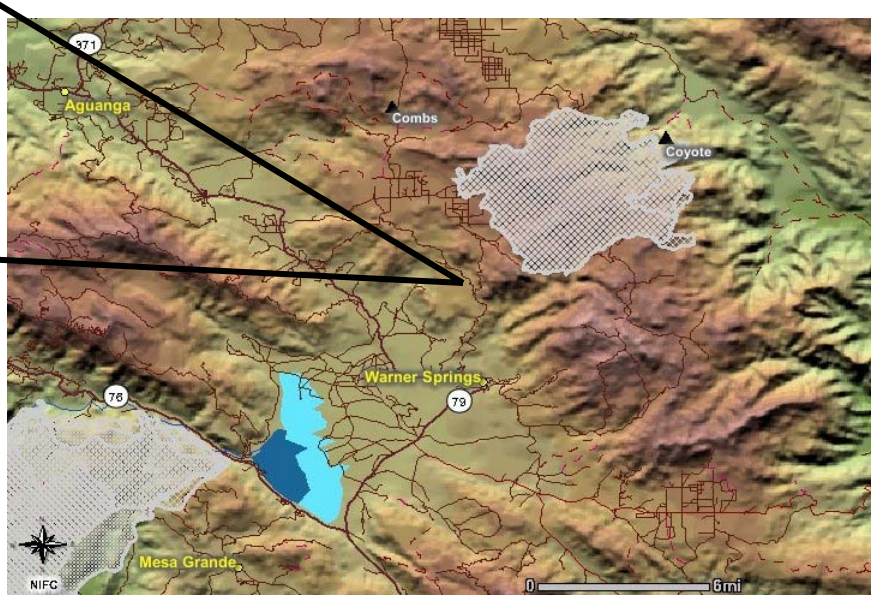
Del Rosa Station Photo 2

The Cleveland National Forest

In addition to the impact of fuels treatments on the San Bernardino NF., several fuels treatments were reviewed on the Descanso Ranger District of the Cleveland NF. The following is a summary of those treatments which proved significant in the management of the 2003 Coyote and Cedar Fires.

The Rocky II Prescribed Burn





Perimeter of the 2003 Coyote Fire (Top Right)

Perimeter preparation on the Rocky II Prescribed Fire

Rocky II Photo 1

The Rocky II Prescribed Burn

The 2,900 acre Rocky II Prescribed Burn was initiated on June 3rd, 2003 because the weather was either too wet or too dry when it was first planned in February, 2003. In Southern California's chaparral fuel type this is too often the case. Fuel planners prefer to burn in late winter because the brush has not greened up yet, but has at least picked up a little moisture to aid in control. Unfortunately it is said that the chaparral either burns hot or not at all, which makes conducting prescribed fires even more difficult. Another element that makes burning difficult is the fact that several years of drought has killed 50% of the brush in the area. Implementation of the Rocky II Prescribed Burn lasted eight days and was accomplished for about $200.00/Acre.

. Rocky II Photo 2
The south flank of the Rocky II Prescribed Burn reveals fire intensity of chaparral in June, 2003

The objective of Rocky II Prescribed Burn was to break up the continuity of the brush and provide protection for the community of Warner Springs and many of the scattered residences in the surrounding area. The burn contributed to a larger community protection strategy based upon the premise that if fuels treatments can be placed in such a way as to provide an anchor point to other treatments, then fire managers are provided an opportunity to "connect the dots" during suppression operations. When the Coyote Fire erupted later in the season to the northeast of the Rocky II burn, fire managers decided to use the burn as an anchor point in which to initiate contingency lines.

The Rocky II Prescribed Burn

During the Coyote Fire contingency dozer lines connected the Rocky II RX Burn with an old wildfire scar.

Rocky II Photo 3

"Connecting the dots"

Old fires and well placed fuels treatments offer firefighters strategic opportunities to anchor dozer lines during suppression operations.

Old dozer lines were connected to new RX burns to create contingency lines during the Coyote Fire.

Rocky II Photo 4

The Rocky II Prescribed Burn

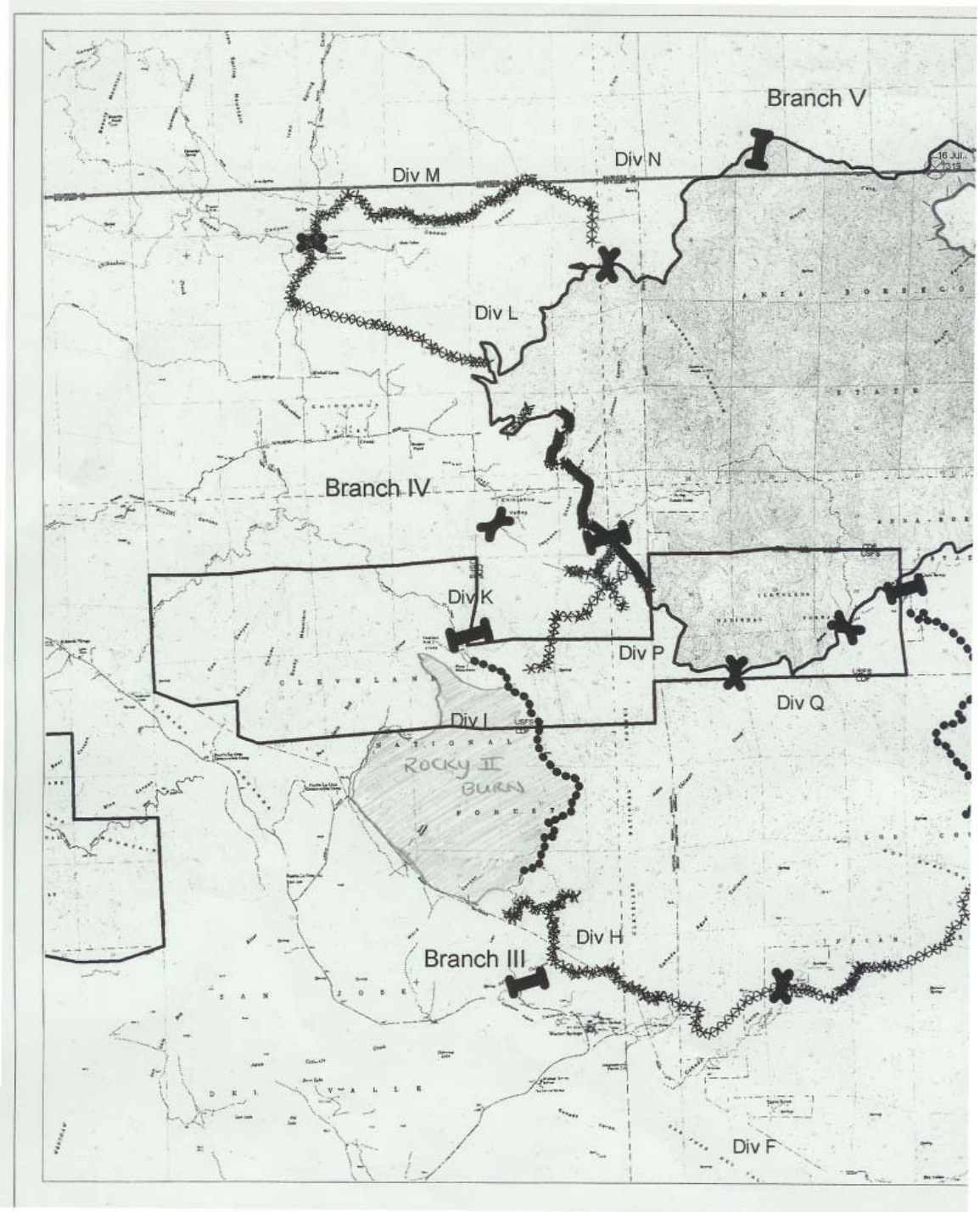
The Rocky I and II RX Burns served to break up the continuity of the fuels in the vicinity of Warner Springs, CA.

Rocky II Photo 5

Various old fire scars, RX burns and fuels treatments like the Palomar Divide Fuel Break (located on the farthest ridge in top center of photo), provide strategic opportunities as areas in which to fire out and/or anchor new control lines from.

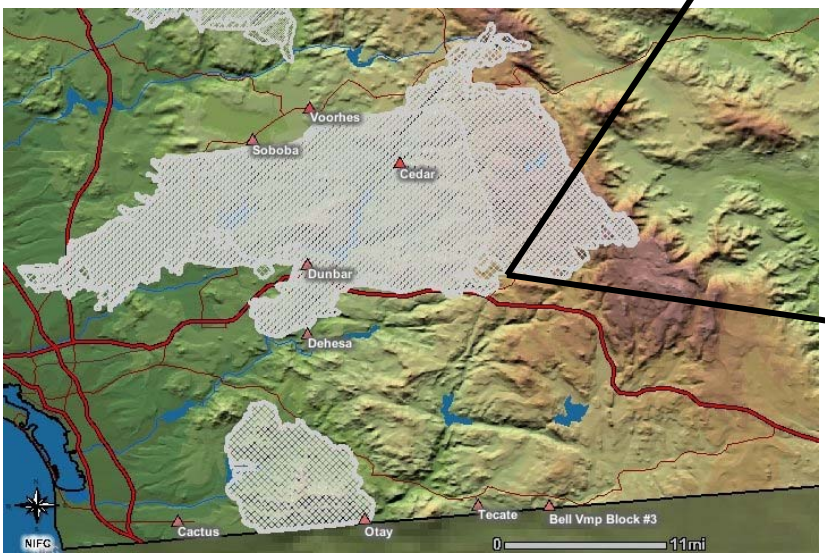
Rocky II Photo 5

It should be noted that in the spring of 1999 the 2,700 acre Rocky I Prescribed Fire was completed just west of the Rocky II Burn. In 1993 the Warner Springs Fire burned 350 acres north of State Hwy 79. During the Coyote Fire, firefighters used each historic burn in the area, whether it is a prescribed fire or a wildfire, as an island of opportunity in which to connect planned dozer lines. From RX burn to road, from road to old cat line, from old cat line out to additional 5 year old burn scars, through the National Forest to fuel breaks on the Los Coyotes Indian Reservation, fire managers took advantage of existing opportunities to successfully control the Coyote Fire.

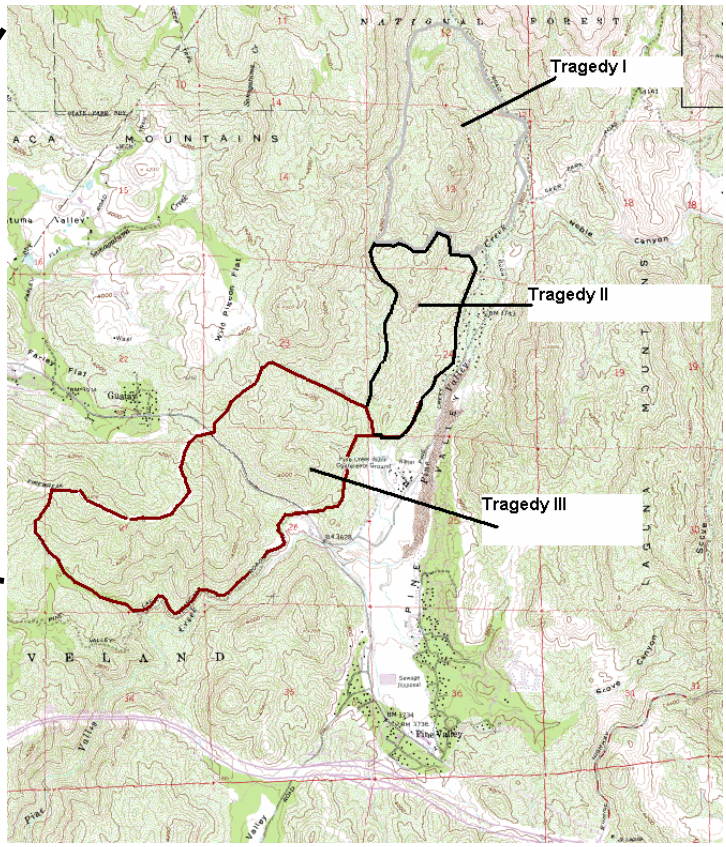


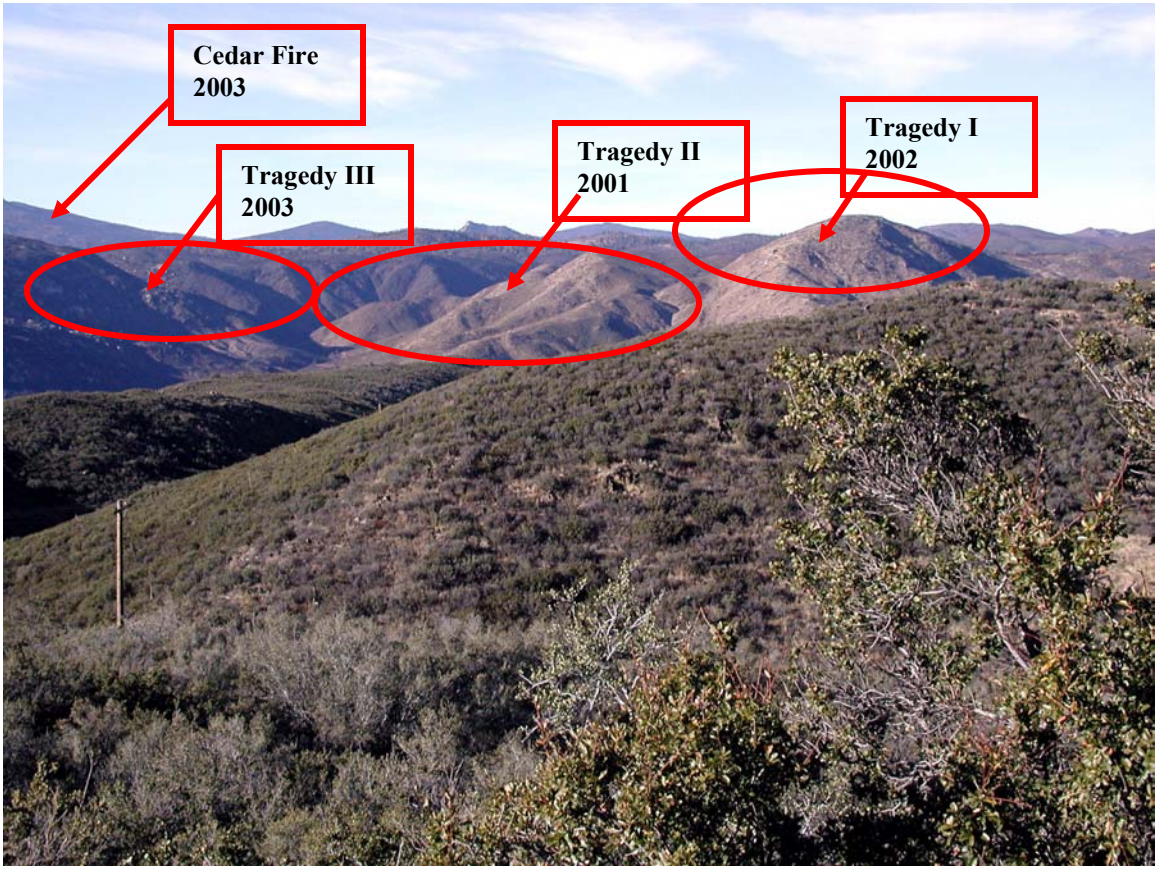
Coyote Fire Map showing contingency lines and the Rocky II RX Burn.

The Tragedy Prescribed Burns



Perimeter of the 2003 Cedar Fire





The Tragedy RX Burns served to steer the Cedar Fire away from the community of Pine Creek (just outside of photo in major canyon on left)

Tragedy
Photo 1

The

Tragedy Prescribed Burns

By the time the Cedar Fire had reached the top of Guatay Mountain it had grown to over 260,000 acres. Below was the community of Pine Creek and between the two were the Tragedy fuels treatment projects that had finally been completed in 3 stages after 5 years of planning and implementation. As the fire came over Guatay Mountain, firefighters anchored into the Tragedy II Prescribed Burn, and proceeded to fire out Pine Creek just above the town of the same name. The objective was to keep the Cedar Fire out of the town and Noble Canyon. Noble Canyon was the key to protecting the valuable resources on the top of Laguna Mountain. If the Cedar Fire had established itself in the bottom of Noble Canyon it would have swept southeast through the 30-50 year old chaparral at the 4,000 foot elevation. By the time the fire had roared through the bug-killed timber at the 6,000 foot elevation, it would have wiped out over 300 special use cabins, and several critical communications towers serving a multitude of agencies from the FAA to NASA, before it would have finally crashed into the desert and died.

Instead the three prescribed fires (4,000 acres total) had served to deflect the spread, while taking the flaming front out of the Cedar Fire. This interruption in the fire behavior allowed firefighters to be freed up to deploy in other critical areas along the fireline. The Tragedy II Prescribed Fire had burned clean during its implementation, which greatly improved the odds of holding this flank.

Tragedy
Photo 2

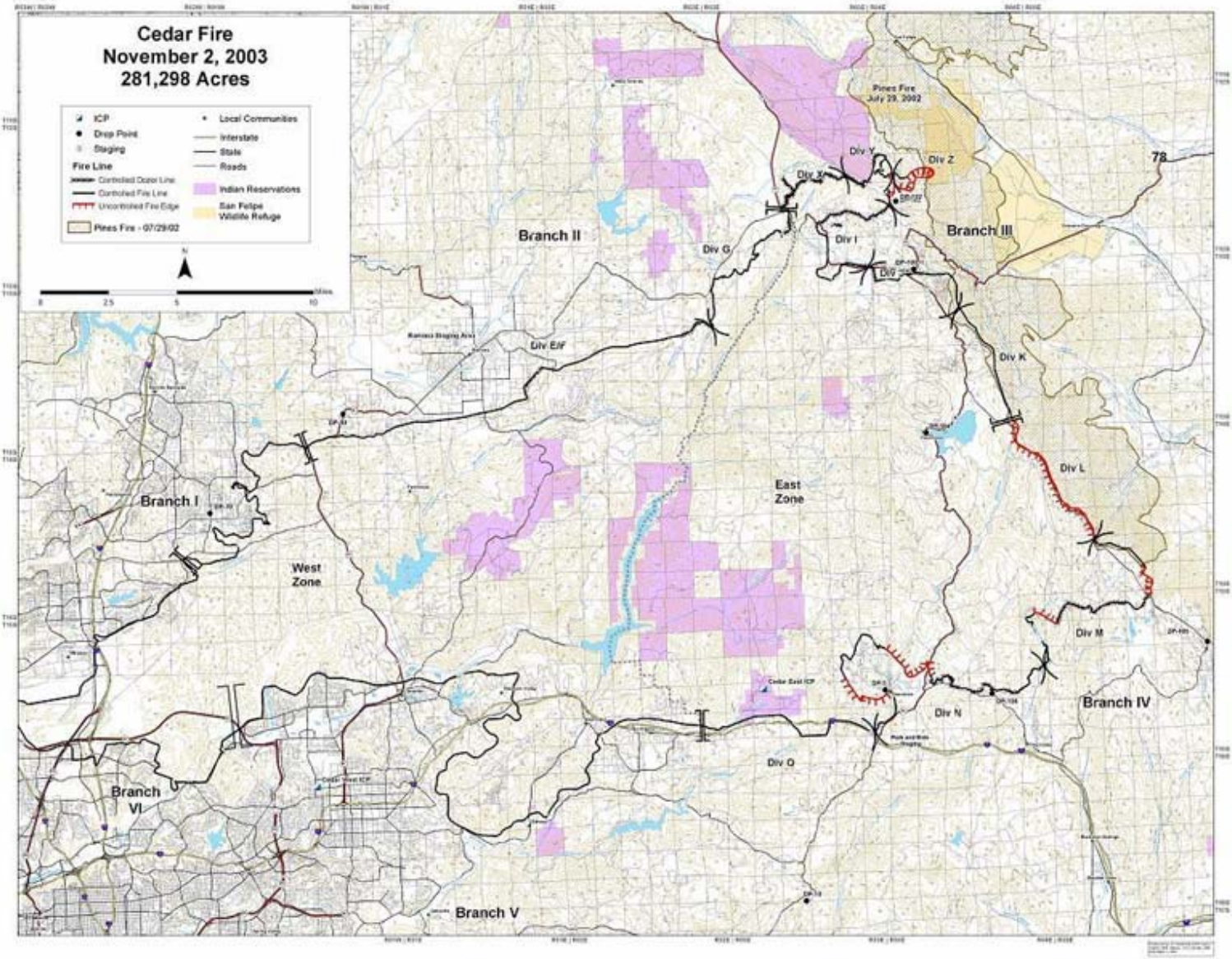
Arrows show two phases of the Tragedy Prescribed Fire Project (Photo taken from Pine Creek Rd.).

The Tragedy Prescribed Burns

Tragedy
Photo 3

The Cedar Fire did eventually get into the top of Noble Canyon after it spotted through riparian vegetation.

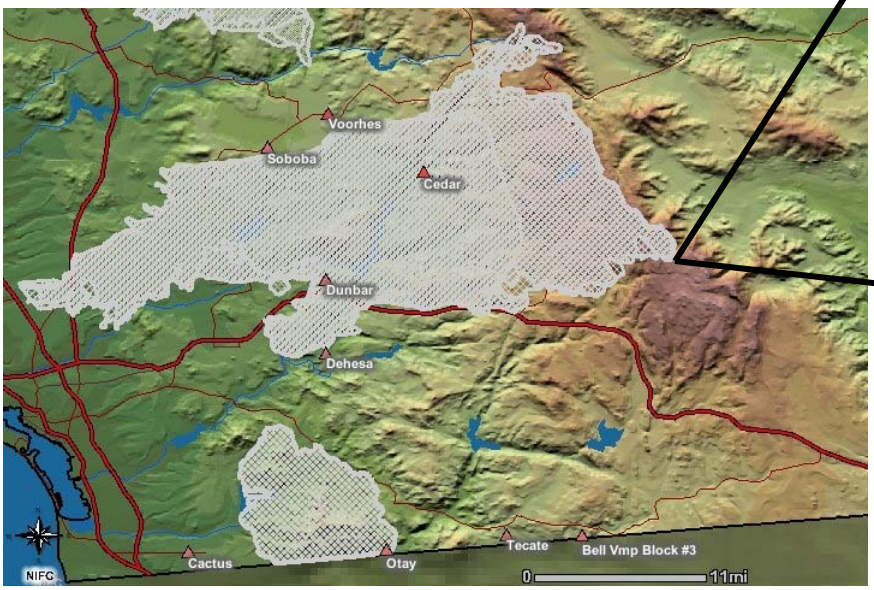
Due to resource constraints, fuels treatments including prescribed burning are often restricted from riparian areas. During the Cedar Fire, in one such area where fuels treatment was omitted because of concern for the critical habitat of the Arroyo Toad, the fire spotted into the untreated riparian vegetation and moved up Indian Creek towards the top of Laguna Mountain. Fortunately by the time the fire had made its run, other options were made available because of the strategic placement of two additional fuels treatments towards the top of Laguna Mountain.

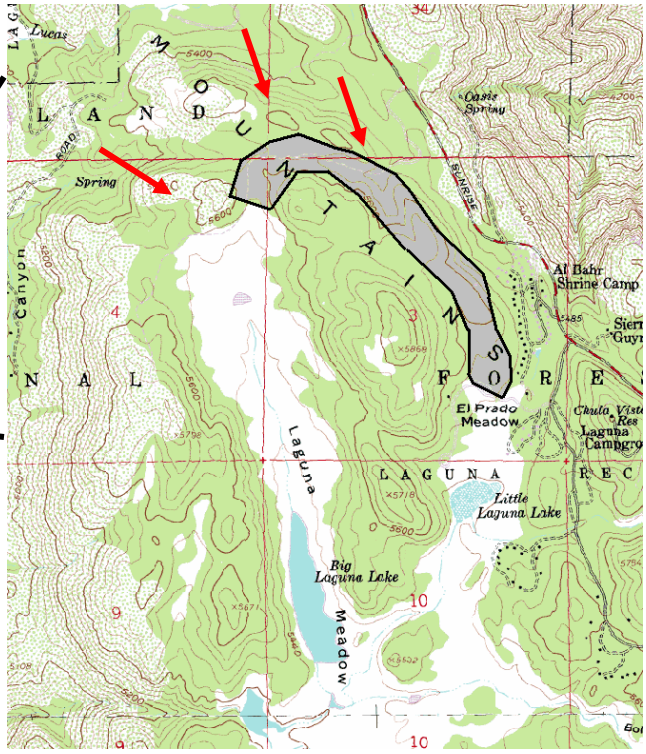


The Cedar Fire near its containment.

Fuels Mastication Project

Red Arrows denote fire spread toward Mastication Unit





Perimeter of the 2003 Cedar Fire

In this fuels treatment unit brush was masticated with an articulated chipper. The unit was laid out so as to tie natural features such as meadows together.

Mastication Photo 1

Fuels Mastication Project

One week before the Cedar Fire broke out; work was completed on a fuels mastication project near the Al Bahr Shrine Camp in the Mt. Laguna Recreation area. The purpose of this fuels treatment was to create a treated buffer for community protection between Noble Canyon and the recreation areas on the top of Mount Laguna. The strategy was as simple as it was eerie in its foresight; connect old wildfire scars like those left by the Garnet and the Pines (2002) fires to meadows and a completed understory prescribed burn. If a wildfire was to originate from any where it would start down in Pine Creek. When the Cedar Fire arrived in late October, 2003 it came from that very location and followed the routes that fuels planners had envisioned. The brush mastication worked as planned.

Mastication Photo 2

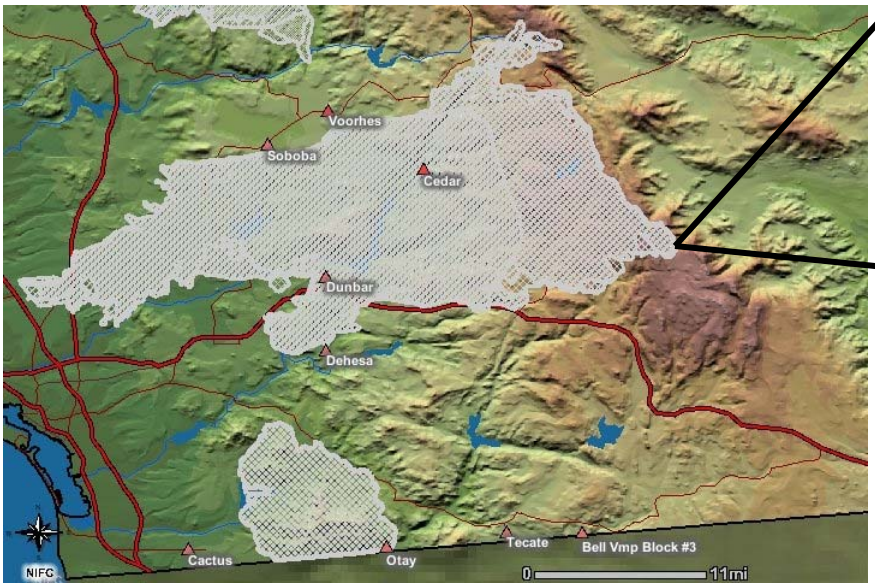
Brush after it has been masticated.

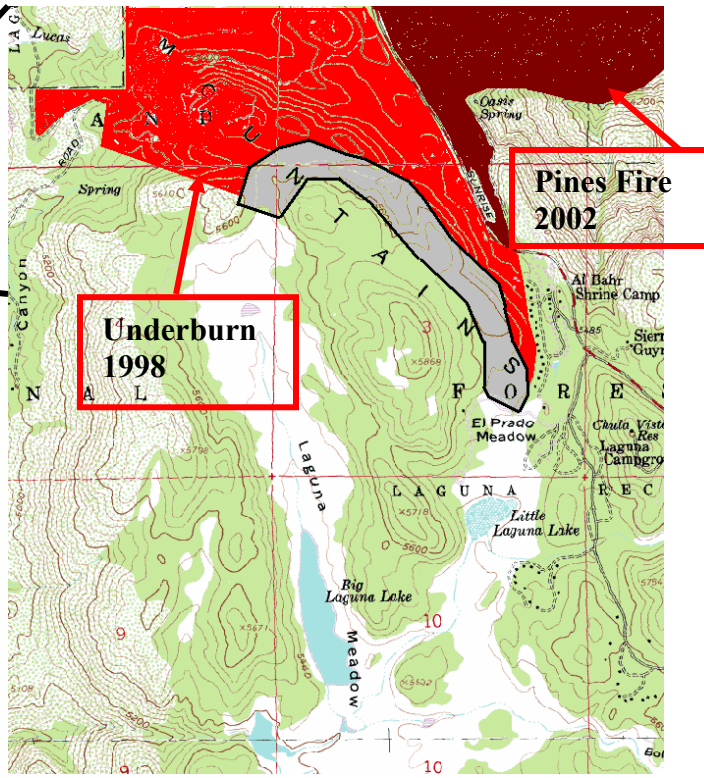
Fuels Mastication Project

Mastication Photo 3

Mastication Photo 4

Pine Creek Understory Burn





The Pine Creek Understory Burn protected the Al Bahr Shrine Camp during the Cedar Fire when it was used in conjunction with other fuel treatments and natural breaks like meadows.

The Pine Creek Understory Burn (350 Acres.)

Underburn Photo 1

Prescribed understory burns reduce ground fuels and reduce the development of torching and crown fires.

Conclusion

Fuel treatments on the forests of Southern California have proven to be valuable assets to firefighters engaged in tactical operations. Whenever fuel continuity is broken up, the behavior of wildfires is modified. While extreme weather conditions often out weigh the value of many of the counter measures that fire and fuels personnel may use to successfully deal with wildfires; reduced fuel loadings and fuel modification are fundamentally important for dealing with wildfires over the long run.

It was revealed time and again during the wildfires of October, 2003 that firefighters required a place to anchor their firelines. Overall fuels treatments gave firefighters the opportunity to engage the wildfires directly. On one occasion air support alone used a fuel break to knock down a fire front until ground forces were available to respond. Openings in the vegetation offered opportunities to successfully and safely pick up spot fires. This was especially true during the later stages of these fires when conditions allowed for better deployment of resources. Fuels treatments, old wildfire scars and road systems can be used together to "steer" wildfires into areas that are more conducive to wildfire containment.

It was also demonstrated that if fuels are reduced or manipulated, then firefighters are freed up to redeploy where they are needed. This concept suggests that the time spent creating fuel breaks before a fire starts, is time that is freed up during situations when time is in critically short supply. Fuel manipulation also reduces the amount of time and water that is required for mopup. This can be especially critical in drought years when reliable sources of water are often hard to find.

One of the most promising aspects of fuels treatment lies in the emerging collaborative efforts being undertaken by multi-agency and private-public partnerships like MAST (Mountain Area Safety Taskforce) on the San Bernardino NF and surrounding lands. Based upon my personal observation, the people of the mountain communities of Southern California are responding to the local fuels crisis as though they are being pursued by a monster. The wildfires of October instilled fear into much of the local populace. There seems to be a strong realization that while they may have dodged the bullet this time, the people of the mountain communities may not be as lucky next time- and the next time could arrive in a matter of months. Everywhere one looks, one can see people cutting brush and dead trees. Truck loads of branches and other biomass are being hauled to air curtain burners and other destinations. Utility companies are busy clearing dead trees away from power lines even from the main power drops to individual residences. Loaded log trucks are even showing up on the freeways of Southern California. Prioritization is critical when the mission is as immense as the fuels crisis of Southern California. Early public involvement is critical to the success of fuels treatment projects. The public needs to be educated as to the methods and objectives of different treatments. Agency personnel need to be educated on the need to understand local values and politics before they design fuels treatments.

It should be pointed out that contracting officers are in short supply on the forests of Southern California. This shortage of contracting specialists is slowing down the fuels treatment contracting process when the time to act is critical. The use of agency and interagency personnel should also be increased. Many federal land management agencies in Region 5 and elsewhere have qualified individuals who would be willing to detail to the South Zone to work during their off season.

Overall I was impressed with the fire and fuels managers that I met while on this assignment. While I did not get the opportunity to visit the Angeles or the Los Padres NFs, I have come away with the notion that even though fuels management is complex in Southern California, the potential to expand the number of acres treated exists; if projects are focused in their objectives, collaborated with the public and prioritized internally.

Southern California Fuels Treatment Effectiveness Review

I would like to thank the following individuals for their assistance during this review.

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Mr. Mike Dietrich -Fire Management Officer, San Bernardino NF
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Ms. Cheryl Johnson -Fire Prevention Technician, San Bernardino NF
Mr. Rich Hawkins - Fire Management Officer, Cleveland NF
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Mr. John Truett -Fuels Battalion Chief, Descanso RD, Cleveland NF

Interior Flames -Rocky II Prescribed Fire, Descanso RD, Cleveland NF