Barry Point Fire

Fuels Effectiveness Review

Observations • Recommendations • Commendations

Fremont-Winema and Modoc National Forests

February 4, 2013

The purpose of this review is to evaluate whether past fuels treatments had any discernible effect on the Barry Point Fire's behavior and fire management opportunities. In addition, this review aims to discover what lessons, if any, we can learn about the effectiveness of fuels treatments of different types and different ages.

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1. Background

The Barry Point Fire was started by lightning on August 5, 2012 on the Fremont-Winema National Forest in south central Oregon (Figure 1, Table 1). This portion of Oregon is typically warm and dry in the summer, and wildfire has historically been a frequent agent of disturbance in this area. Early August is the height of the fire season in southeastern Oregon.

The Barry Point fire burned actively for 16 days before it was contained by suppression actions aided by moderating weather. The fire burned approximately 93,000 acres, and suppression costs exceeded $23 million.

Fremont NF	43,133 acres
Oregon Non-Federal	11,438 acres
Modoc NF	16,586 acres
California Non-Federal	21,688 acres
Total Burned	**92,845 acres**

Table 1 – Burned Area by Land Status

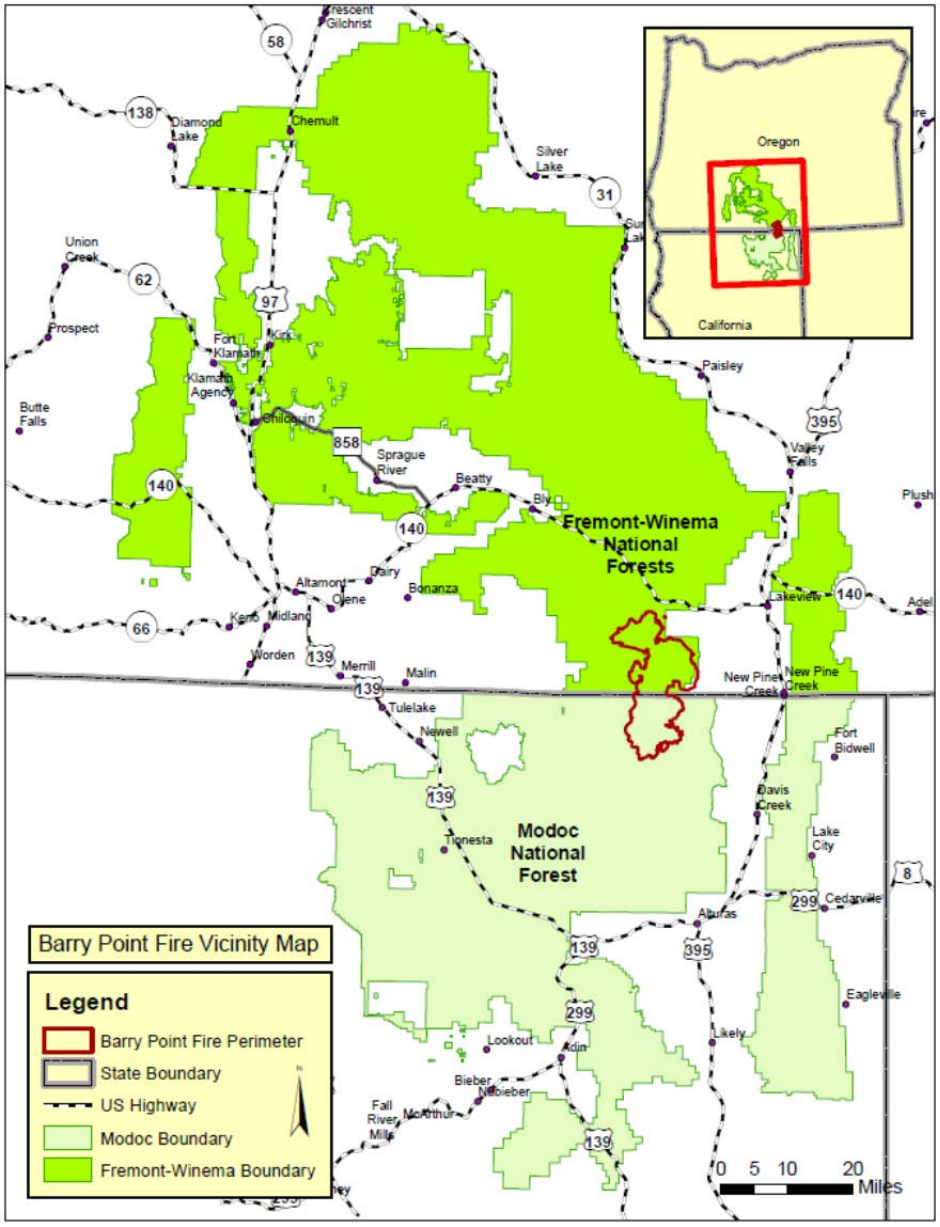

Figure 1 – Vicinity map of the 2012 Barry Point Fire.

A. Review Purpose: Evaluate Fuels Reduction Project Effectiveness

The purpose of this review is to evaluate whether past fuels treatments had any discernible effect on the Barry Point Fire's behavior and fire management opportunities. In addition, this review aims to discover what lessons, if any, we can learn about the effectiveness of fuels treatments of different types and different ages.

Because this portion of Oregon and northern California frequently sees fire, the Fremont-Winema and Modoc National Forests have been conducting fuels reduction projects on National Forest lands. Over the past 20 years, thousands of acres of fuels treatments occurred within the Barry Point Fire area.

In general, fuel reduction treatments in anticipation of an eventual fire have two broad purposes:

- Reduce fire intensity (for stand survival), and
- Facilitate safe suppression and containment of wildfire.

Fire intensity within a stand is generally lower when stands have been treated to remove surface fuels and ladder fuels, and/or reduce overstory canopy continuity. Stand treatments to facilitate containment include placing fuel breaks in places that are accessible to crews and equipment, as well as around highly valued resources (such as buildings and other improvements). This review focused on evaluating past fuels treatments within the fire area and determining whether these treatments had any effect on fire intensity and/or the ability of crews to contain the fire.

B. Fire Behavior

Figure 2 (next page) shows the fire progression map for the Barry Point Fire from August 7 through August 20. Fire spread was initially to the east-northeast as far as Dog Lake, then to the southeast, and eventually south. The dominant initial spread direction, driven by fuels and topography, was eventually stopped where lighter grass fuels and gentler, more roaded terrain assisted the suppression efforts. Fire managers also reported that the fire experienced a change in wind direction to a more southerly direction, moving the fire south into California. A review of the winds recorded at the Strawberry RAWS (Remote Automated Weather Station) tended to support this.

Although the Barry Point Fire was attacked aggressively from the start, for several days fire behavior frustrated control efforts. The observed fire behavior characteristics (rate of spread, spotting, transition of surface fire to crown fire, flame length) were higher than normally observed, even at the peak of fire season. Perhaps more importantly, the fire tended to burn actively late into the night, sometimes even through the night. Such fire activity is unusual; in this region, fires usually lie down at night. This observed active nighttime fire behavior is probably due to two primary factors:

1. **Low Fuel Moisture** – There are several pieces of evidence of very low fuel moisture within the Barry Point Fire area. The energy release component (ERC), a standard National Fire Danger Rating System (NFDRS) index of fire danger, reflects the cumulative effects of long-term drying of woody fuels. As a result of a poor winter snowpack in 2011-12, a dry spring and hot, dry summer, Southern Oregon and northern California were exhibiting unusually high ERC levels in July and August of 2012 (see Figure 3 on page 6). Live fuel moistures were being monitored and reported by the Modoc National Forest staff. These data indicated that the growing season had ended earlier than normal. By mid-July, live shrubs had stopped growing and were entering dormancy (see Figure 4 on page 6), thus becoming a heat source instead of a heat sink during fire.

2. **Low Humidity and Poor Humidity Recovery** – In the Pacific Northwest, active wildfire growth days are often associated with periods of low overnight humidity recovery. Low overnight

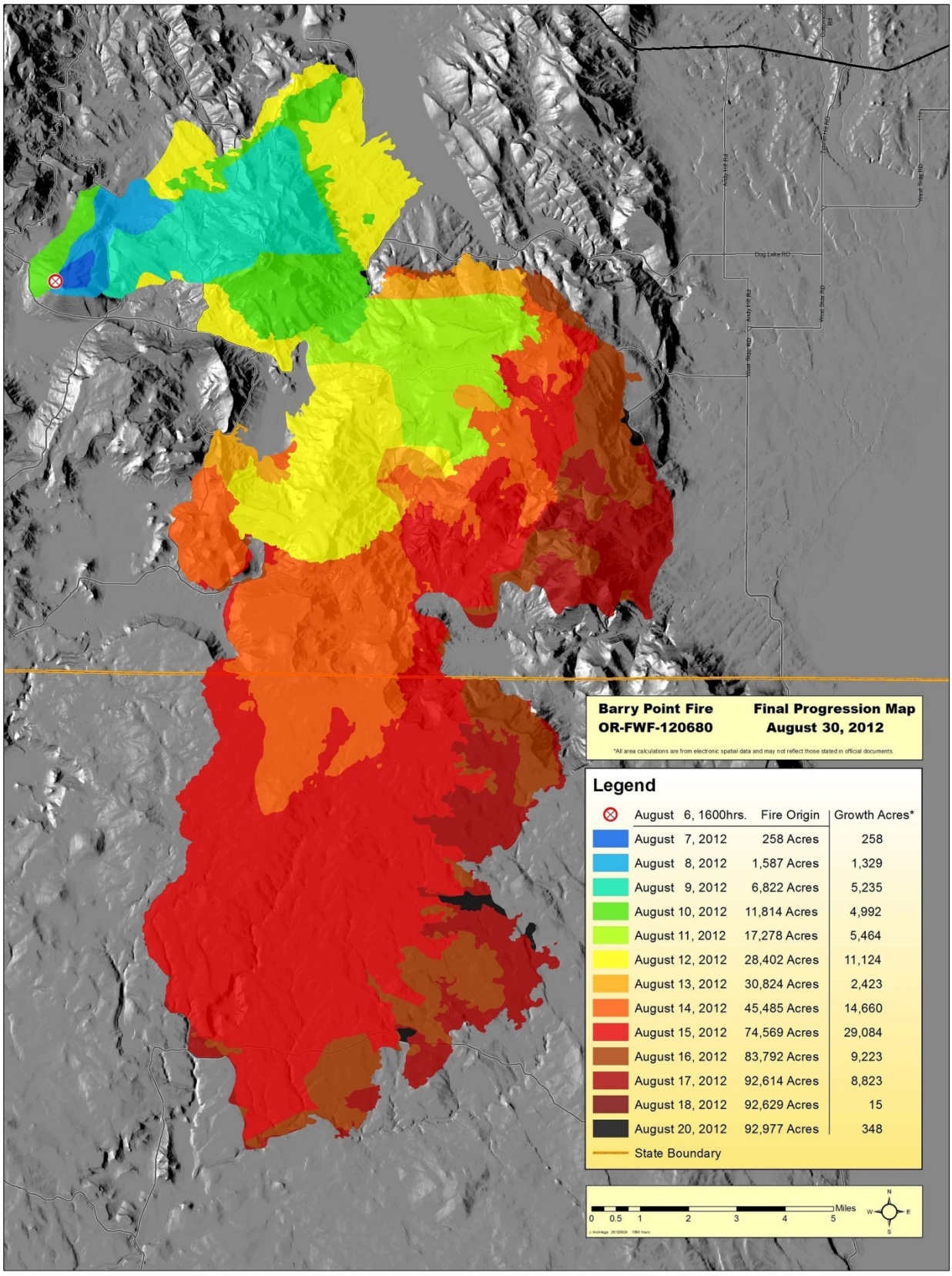

Figure 2 – Fire Progression Map, Barry Point Fire

Initial fire spread was to east, then turning to the south as the fire encountered lighter grassy fuels and gentler, more roaded terrain. During August 10-18, the fire made its largest growth. Note also that improving overnight humidity recovery on August 18-19 coincides with success in containing the fire.

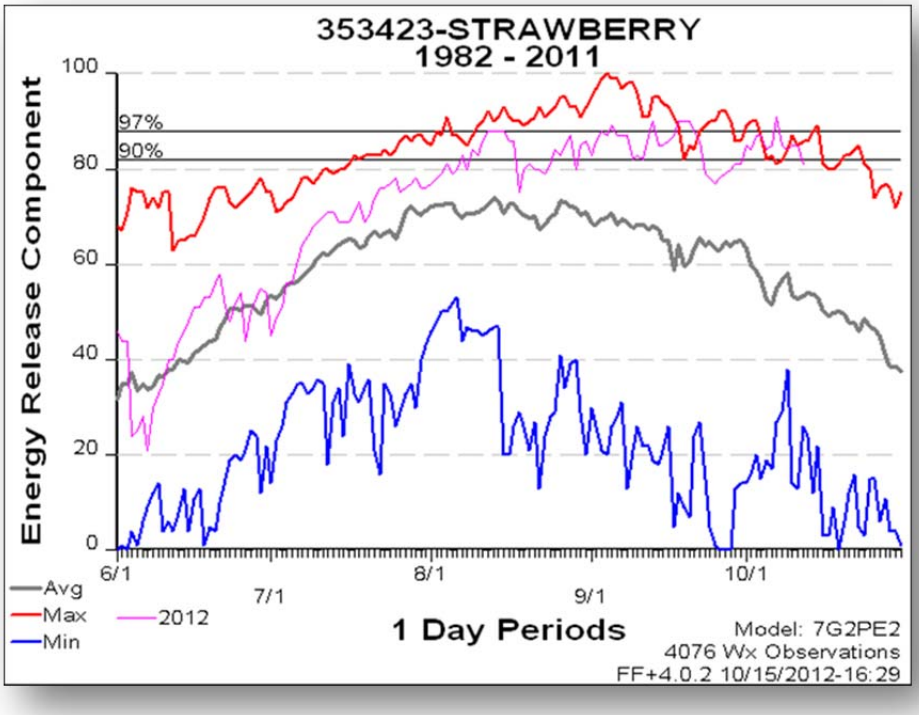

Figure 3

NFDRS ERC chart for the Strawberry RAWS site (located 6 miles NNW of the Barry Point Fire origin), highlighting 2012 as well as daily high, average, and low ERC values from 1982 to 2011. 2012 ERC values reached the 90th percentile in early August, and generally stayed above the 90th percentile until mid-September.

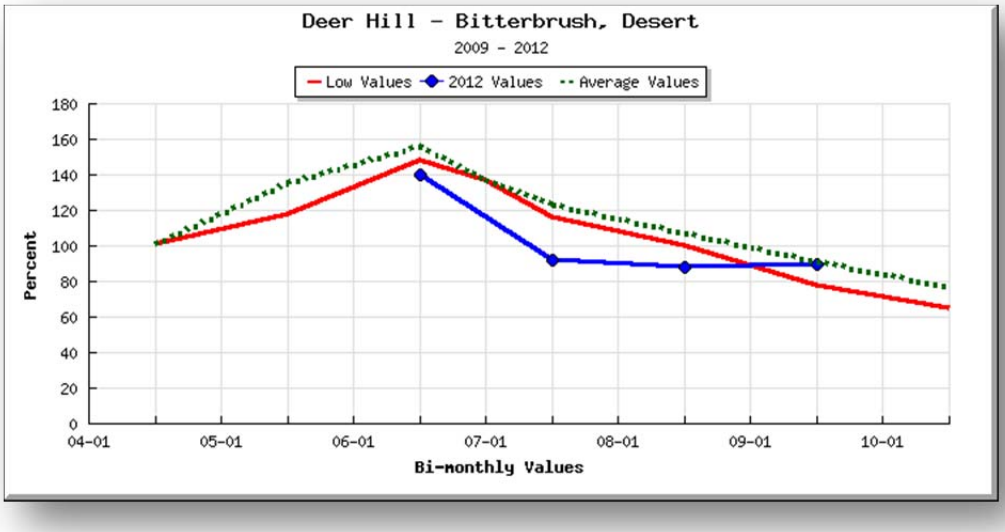

Figure 4

Live fuel moisture data for the Barry Point Fire area, comparing average daily values with 2012 values and minimum values during the past three years. By mid-July 2012, bitterbrush live fuel moisture had dropped below 100 percent, indicating that all new growth had been completed for the season earlier than normal. This is consistent with low moisture years.

The key message is that the Barry Point Fire burned in an area that was primed for a large fire—with a low snowpack; a warm and dry spring and summer; and then a hot, dry, and unstable weather pattern that persisted through mid-August.

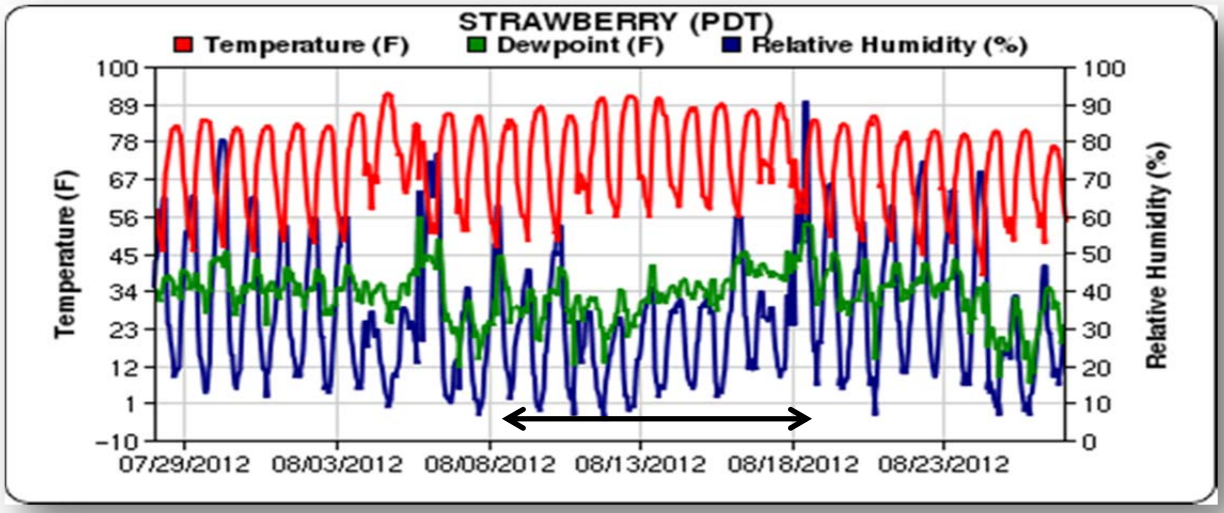

Figure 5 – Daily temperature and humidity records during the month of August, 2012 at the Strawberry RAWS site.
Note the highlighted period of poor overnight humidity recovery and high daytime temperatures during the extended period of fire growth.

humidity recovery results in lower daytime minimum humidity on subsequent days. Poor humidity recovery is also often associated with an increasingly warm, dry, and unstable atmosphere in this region. All of these conditions result in more dramatic fire behavior, longer daily burn periods, and an increase in daily acres burned.

Figure 5 (above) shows temperature and relative humidity during the period of active fire growth on the Barry Point Fire. Note the poor overnight humidity recovery during the period. Figure 6 (see next page) shows that south central and southeastern Oregon were in an extended drought during the summer of 2012, with much below average precipitation recorded.

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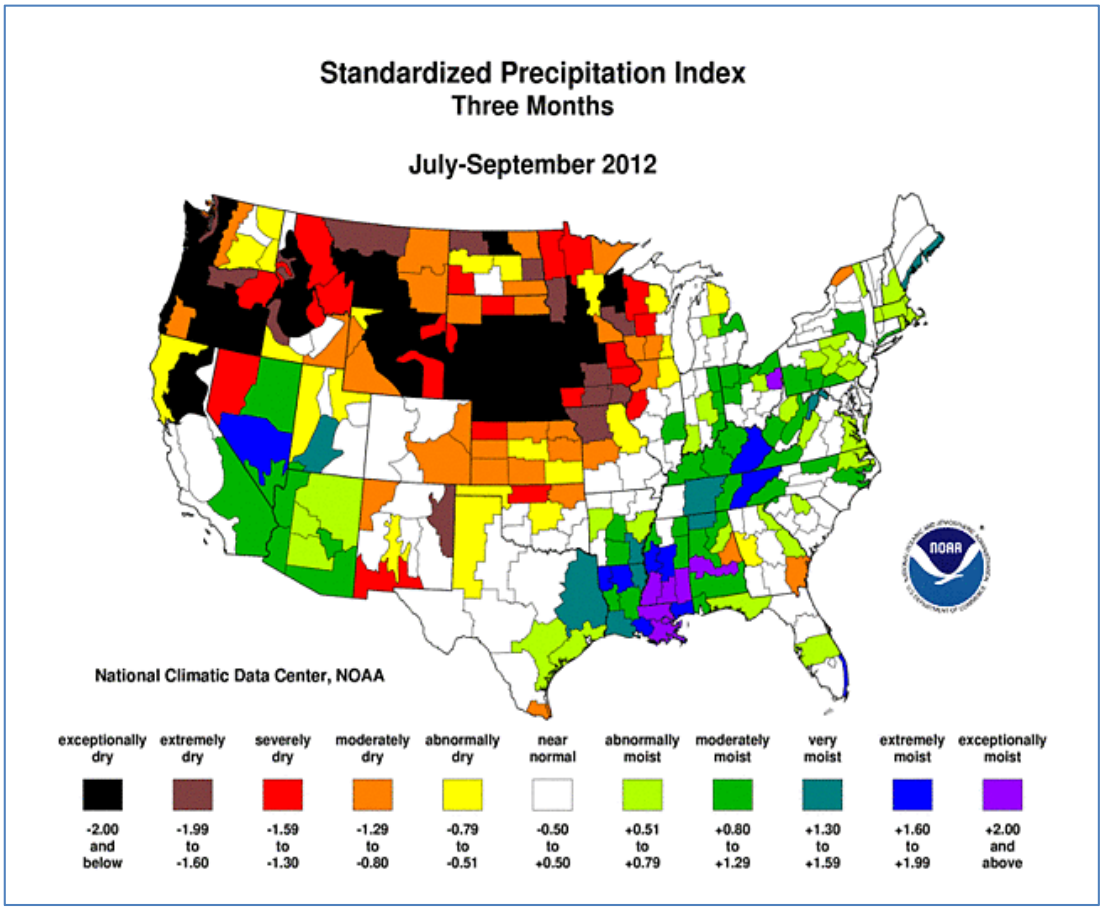


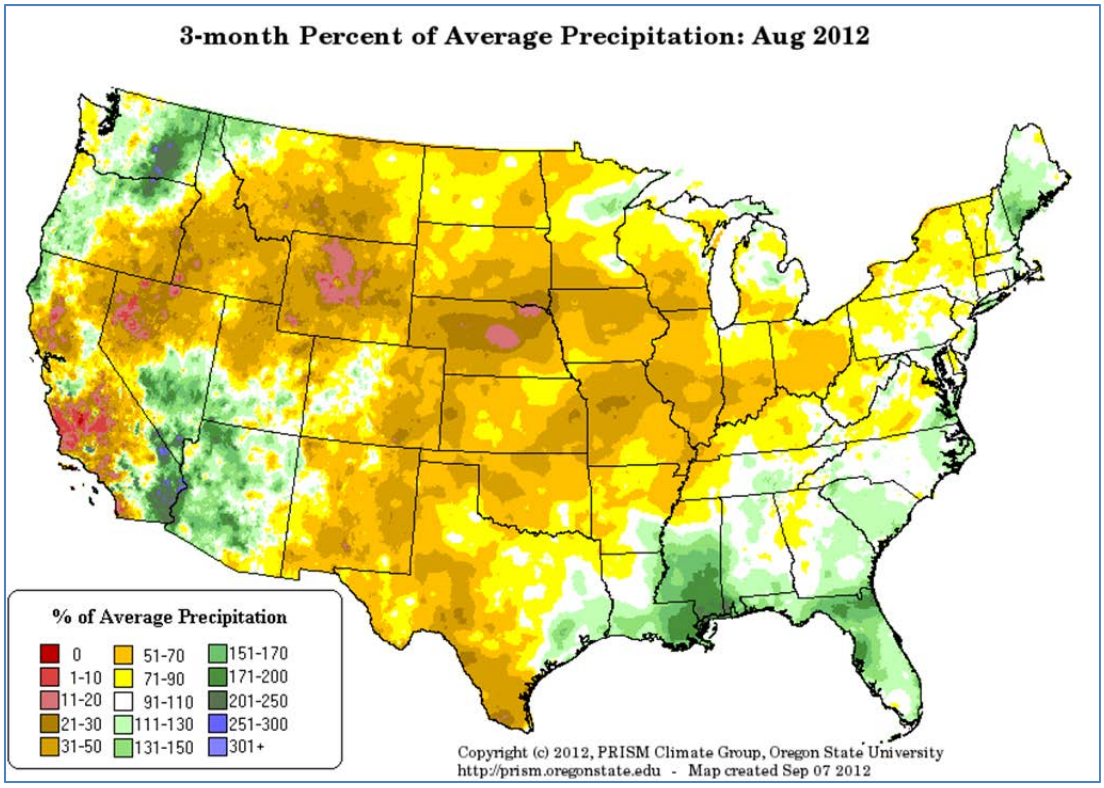


Figure 6 *– Maps of precipitation data for the contiguous United States through August 2012, showing south-central and southeast Oregon as abnormally dry.*

2. Observations

1. Past Treatments Did Appear to Reduce Fire Intensity

Fuels treatments (prescribed burns) that were as much as 13-years-old did appear to still have some effect on fire intensity. The Barry Prescribed Burn units on the west slope of Dog Mountain were last burned in 1999. These areas are detectable on the landscape, with appreciably more overstory intact compared to the adjacent, untreated areas (Figure 7). Unit 111 (located in the Fitzwater project area, NE corner of the Barry Point Fire area) also burned with lower intensity and appears to have good overstory survival compared to adjacent untreated stands. The Tournquist 6/7 units were more recent prescribed burns, with good stand survival (Figure 8). In all three of these cases, because of their location and position on the landscape, the stands were not used for containment.

Figure 7 (Top) *– Dog Mountain Prescribed Fire Unit 111 (slope in middle of photo). This unit was underburned more than 20 years ago, yet stood out in the post-Barry Point Fire landscape with substantial apparent overstory survival.*

J. Menakis Photo

Figure 8 (Left) *– Tournquist Unit 1, shows low-intensity fire effects in prescribed burn unit.*

2. Past Treatments Were Used to Aid Suppression

Roads located in the Fitzwater Prescribed Burn project area were used to contain the NE flank of the Barry Point Fire. The stands in this project area had multiple prescribed burn entries. (Unit 109 was burned in 1985 and 1996; Unit 121 burned in 1992.) The review team also saw good examples of the use of past treatments for containment and safe operations in the Tournquist project area (Figure 8), in particular, surrounding the Crowder Guard Station (Kellogg units 5, 8, 9; Figures 9 and 10).

Figure 9 *– Tournquist Prescribed Burn unit on the west side of the Barry Point Fire that was used to help contain the fire.* **J. Menakis Photo**

Figure 10 *– Crowder Flat Guard Station. Road passes through recent fuels treatments that were used as fireline in Barry Point Fire. (Wildfire was located on right side of photo.)*

3. Heavier Commercial Thinning Resulted Greater Stand Survival During Fire

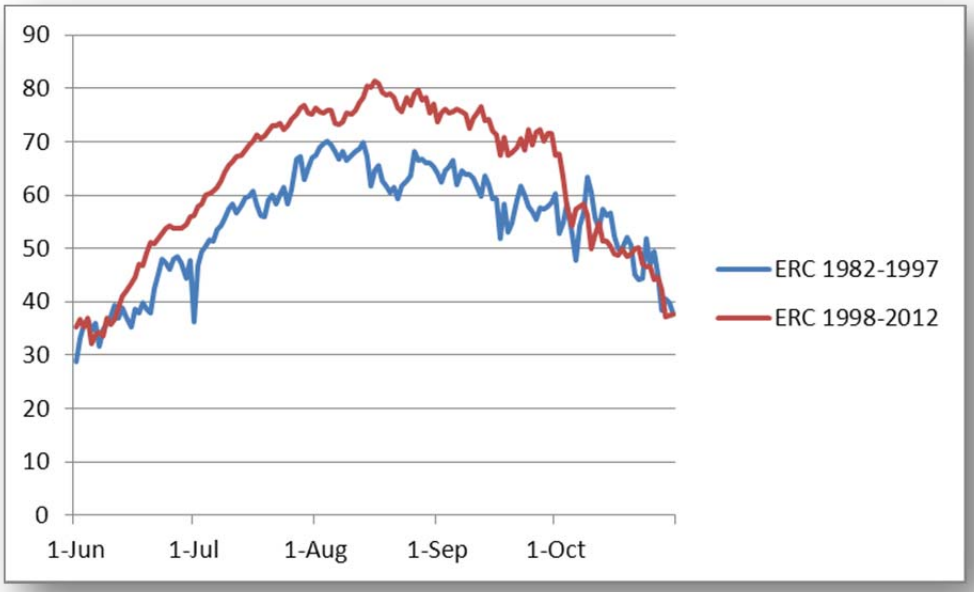
The review team noted that commercial thinning was often used as a mechanical treatment prior to prescribed burning. The more aggressive thinning that left a lower residual stocking density (40-60ft^2 per acre residual BA) resulted in more effective prescribed burns that had a greater effect on wildfire intensity than higher density thinning (80-120BA). Commercial thinning projects of the mid-1990s left higher stocking than current practices.

4. Fire Season Severity had Some Influence on Fuels Treatment Unit Effectiveness

The review team felt that the success of a given treatment in affecting fire behavior was determined, in part, by the severity of the fire season. As outlined in this review's introduction, the period of active fire growth was unusually severe in terms of fuel moisture, low humidity, and the extended daily burn period. Even so, the question that will remain unanswered: *Would suppression efforts using past fuels treatments have been more effective under more typical mid-season conditions?* (See Recommendation 1 on page 14.)

5. On Average, Annual Fire Danger Indices are Increasing

It is interesting to note that fire danger indices are climbing over time. Figure 11 (below) shows the Strawberry RAWS ERC data for two different time periods, 1982-1997 and 1998-2011. ERC for the more recent era is about 7-10 points higher for any given calendar day. What was the 97th is now the 90th percentile. This means that the fire danger levels of the 3 percent "worst days" in 1982-1997 now occur on 10 percent of the days during fire season—more than three times as frequently.



Time period	90th Percentile	97th Percentile	Peak Value
1982-1997	80	85	100
1998-2012	85	89	95

Figure 11

Average daily ERC value for the Strawberry RAWS for two time periods, 1982-1997 and 1998-2012. Daily average ERC has increased about 10 points in general, but the end of the season date appears to be unchanged.

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6. There are Places Where "Fence Line Contrasts" are Evident

Past treatments on private land focused on removing crop trees and leaving the residual to grow into future crop trees. This practice results in stands that are denser, of smaller diameter, with closer crowns and lower crown base height, and with greater surface fuel accumulations. On public lands, recent past treatments tended to focus on leaving the overstory and thinning from below—then following-up with fuels treatment to reduce canopy base height and surface fuel accumulations. As a result, Barry Point fire intensity caused greater overstory mortality on private lands than on public lands (Figures 12 and 13, see next page).

Figure 12 (Top) *– Crowder Flat Guard Station interface.*

Figure 13 (Bottom) *– Private timberlands adjacent to Crowder Flat Guard Station. Because of differences in post-treatment stand structure and surface fuel loading, the younger stands on private land experienced much higher mortality than the older, more widely spaced stands on lands adjacent to the Guard Station.*

7. Small Scattered Openings Did Not Seem to Affect Fire Intensity

On satellite photos, the review team could see small, regularly spaced openings on private timberlands that bore resemblance to a "Finney Brick" pattern of openings. The team wanted to evaluate these openings for any apparent effect on fire intensity or behavior. Upon investigation, it was discovered that these openings are old timber harvest landings, approximately one acre in size. The team could not detect any appreciable difference in fire intensity or severity on the "back side" of these openings. They are potentially too small to be effective; and/or burning conditions may have been too intense to allow them to be effective. The areas of "matrix" around these openings were not treated other than by the removal of saw timber, leaving dense stocking of small diameter trees and accumulated surface fuels. However, without direct observation, is it difficult to conclude what role these fuels conditions played in fire behavior and severity.

8. Reduced Fire Intensity May Be in Part Due to Flatter Terrain

South of the Oregon-California border, the terrain is considerably flatter than in Oregon. The Barry Point Fire was driven more by air flow (N->S) and fuels and less by topography. If winds had been stronger, the review team suspects that fire intensity would have been greater, even

in treated areas—perhaps to the point of "overpowering" the effect of these treatments on fire intensity.

9. Treatments that Were Done Specifically to Protect Structures Appear to Have Been Effective

The review team evaluated the effectiveness of fuels treatments around the Crowder Flat Guard Station, located on the southwestern edge of the Barry Point Fire on the Modoc National Forest. This area has had multiple past treatments, both mechanical thinning and repeated prescribed burns. The intent of these treatments was twofold: 1) To protect these structures from wildland fire starting elsewhere; and 2) To reduce the likelihood that a fire starting at this site spreads to the wildlands. The treatments appear to be highly effective. The fire had very little effect on wildland vegetation near the Crowder Flat Guard Station in these treated areas, while the adjacent untreated (private) lands burned intensely.

Figure 14 (Top) *– **Kellogg Unit 5.** Shows effect of understory thinning and prescribed burning in center and left side of photo. The private lands across fence line—on right side—experienced much higher stand mortality. Kellogg Unit 5 was also used as a roadside fuel break to contain the west side of the fire on the Modoc National Forest (see Figure 10).*

Figure 15 (Left) *– Kellogg Unit 5 Prescribed Burn Unit used as roadside fire line to contain Barry Point Fire.*

Region 5 Photo

3. Recommendations

1. Repeated Fuels Treatments Can Be of Value, Even on Some of the Worst Fire Danger Days

Fuels treatments improve the chances of protecting values, reduce the mortality of forest stands, and give firefighting crews a place to work from when they contain a fire. Conventional wisdom is that on the worst fire danger days, even the best treatments and the most aggressive firefighting tactics are likely to be ineffective. During August 12-15, the Barry Point Fire burned 57,000 acres—despite the fact that the terrain was gentler than the areas in which the fire was previously burning. This was also the period when the ERC values were at the highest—at the 97th percentile value. Fire narratives indicate that the fire was outpacing control efforts during this period, causing crews to take a defensive approach that focused on protecting structures west of Goose Lake and at the Crowder Flat Guard Station. These efforts were successful, indicating that—even on the "worst days"—intensive, repeated fuels treatments around structures in this ponderosa pine forest type can be valuable.

Crews were more successful *containing* the fire when the ERC began to drop on August 17 and 18. On August 17, the ERC dropped below the 90th percentile. In this case, it appears that fire containment was successful when ERC dropped into the 90- 95th percentile, but not at the 97th percentile.

It is most important to note, however, that strong winds were not generally a factor on the highest ERC days. ERC does not consider wind speed in its calculation. In fact, in this area, the highest ERCs are often associated with very little wind (under a warm, dry, and unstable atmosphere).

As a starting point, the review team recommends that local fuels planners continue to plan treatments that will be effective at a minimum under 90th-95th percentile days with typical winds.

…2. Future Management of the 93,000-Acre Barry Point Fire Footprint

The Barry Point Fire has left a landscape-scale footprint. Much of this area has been "reset," with early successional vegetation soon to follow the disturbance. Land managers should consider what specific future opportunities exist for managing this fire area with follow-up prescribed burns and mechanical treatments to encourage a vegetation mosaic with fuel discontinuities. Tree planting, future wildfire and prescribed fires, mechanical treatments, etc., should encourage this mosaic of stand ages and densities. Because new ignitions will be burning at low intensity and easy to control, the temptation will be to suppress these new fire starts at the smallest possible size. Rather, the review team recommends that fire management planning allows each new fire ignition to be considered as an opportunity to develop a mosaic—thereby reducing future fire risk and costs.

3. To Be Effective, the Combination of Mechanical Treatment and Prescribed Burning is Necessary in these Forest Types

The review team saw numerous examples of prescribed burns that were made effective because of the commercial thinning that had occurred prior to the prescribed burn. These thinnings create a larger prescribed burn "window" within which a fire can be used to treat forest vegetation in a way that will have longer-term effects on the fire behavior of eventual wildfires.

4. Commendations

1. Modoc National Forest Fuels Treatment Effectiveness Reporting

The Modoc National Forest staff has done a remarkable job of fuels treatment effectiveness reporting in the online database. This Forest's FTE reporting was of top quality, timely, and thorough. The Forest's staff did note a couple of potential problems with the database, in terms of being able to edit records. They have communicated this information to Jim Menakis (National U.S. Forest Service Fire Ecologist) for follow-up with developers.

2. Cooperation Between Fremont-Winema and Modoc National Forest Staffs

The cooperation between the Fremont-Winema and Modoc National Forest staffs was notable. These two Forests have been working much better together since the 2007 Fletcher Fire, as a result of a deliberate, successful attempt to improve coordination and communication.

5. Review Team

W.C. "Bill" Aney
Regional Fuels Specialist, Region 6

Dierdre "Dee Dee" Cherry
Acting Regional Fuels Manager, Operations, Region 5

Craig Goodell
Interagency BLM/Forest Service Fire Ecologist, Oregon State Office/Region 6

Neil Sugihara
Regional Fire Ecologist, Region 5

James Menakis
Fire Ecologist, Washington Office – Fire and Aviation Management

Barry Shullanberger
Acting Interagency Fire Staff, Fremont-Winema National Forest/Lakeview District BLM, Region 6

Brian Cross
Acting Fire Staff Officer, Modoc National Forest, Region 5

Mark DePerro
District Fire Management Officer, Devils' Garden Ranger District, Modoc National Forest, Region 5

Kenneth Heald
Fuels Specialist, Modoc National Forest, Region 5

James Arciniega
Fire Ecologist, Fremont-Winema National Forest, Region 6

Chaylon Shuffield
Fire Ecologist, Fremont-Winema National Forest, Region 6

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