29 July 2006

Spur Peak Complex and Tripod Fires
Assessment Team Report
29 July 2006

Prepared by:

Louisa Evers, State-Regional Fire Ecologist, Oregon BLM and Pacific Northwest Region

Tim Rich, Regional Fuels Specialist, Pacific Northwest Region

Rick Lind, Fuels Specialist, Tonasket Ranger Distict, Okanogan-Wenatchee National Forests

With assistance from:

Mark Finney, Research Forester, Missoula Fire Sciences Laboratory, Missoula, Montana

Gary Reed, GIS Specialist, Methow Ranger District, Okanogan-Wenatchee National Forests

Introduction

On 24 July 2006, the Forest Supervisor for the Okanogan-Wenatchee National Forests chartered a 3-person assessment team to complete a long-term assessment and prepare recommended actions for management of the Tripod Fire. The assessment was to focus on WFSA alternative A and to include management options for the Agency Administrator to consider in meeting this alternative's objectives. The team convened at the Methow Ranger District Office on July 27 to begin work. About 1500 that day, the Spur Peak Fire reactivated and the charter was adjusted to focus the assessment on Spur Peak and the north and west flanks of Tripod. The final product was scheduled for completion and presentation on July 29.

This document contains the results of this long-term assessment using various computer models to predict fire behavior and movement and climatological analysis to evaluate current and projected seasonal severity. These fires have the potential for season-long commitment of resources, with lengthy exposure of people to fireline hazards, and accessibility issues. Long-term impacts of smoke to nearby by communities of Winthrop, Conconully, Twisp, and Loomis may be an issue as the fires grow. Off-Forest values at risk include:

- Conconully, Washington to the east with approximately 289 housing clusters worth an estimated $13.6 million in replacement costs,
- Private lands to the east and west with numerous residences and outbuildings,
- Loomis State Forest to the northeast with timber, wildlife, and recreational values,
- Washington Department of Fish and Wildlife Management lands to both the east and west with wildlife, fisheries and recreational values, and
- BLM-managed lands to the east with grazing, timber, wildlife, recreational and mining values.

On-Forest values at risk include:

- Habitat for endangered, threatened and sensitive wildlife species such as lynx, grizzly bear and bull trout,
- Established tree plantations,
- Merchantable timber,
- Several historic and prehistoric cultural sites
- Several developed campgrounds,
- Loup Loup Power Transmission Line, and
- Loup Loup Ski Area

Fires Assessed

Tripod Fire

Lightning started the Tripod Fire at about 1400 on July 24 near Blue Buck Mountain. Smokejumpers were quickly dispatched from the North Cascades Smokejumper Base, only 11 miles south of the fire start. At the time, the jumper plane reached the fire area it was ¼ acre; by the time the jumpers had landed, it was already 10 acres and growing rapidly. The jumpers soon disengaged from the fire due to extreme fire behavior. The fire has continued to grow rapidly with active crowning, flame lengths 100 ft and greater and spotting with the predominant spread direction of east and north. On Thursday, July 26,

fire behavior became plume-dominated in the late afternoon. On Friday, July 27, the fire crossed the divide between the Methow River and the Okanogan River, spreading predominantly east. Since the fire began, it has burned actively much of the night as well as during the day.

A type II team (LaFave) was assigned to the fire on July 26, but was unable to take any effective action due to fire behavior. Given the continued spread to the east and the resulting threat to Conconully, the Forest ordered a type I team to replace the type II team. At about 1500 on July 27, the Spur Peak Fire, approximately seven miles north of Tripod, escaped containment and began spreading rapidly with similar behavior as seen on Tripod. The Southeast Red Team (Custer) assumed command of the north and east portions of Tripod and all of Spur Peak on the evening of July 28. The type II team retained command of the south and west flanks of Tripod.

Spur Peak Complex

Spur Peak Fire was reported at 2130 of July 3, the result of lightning activity. Initial attack by smokejumpers on July 4, supported by SEAT retardant drops, was unsuccessful in controlling the fire. A Type 3 IC managed the fire through the night July 4 and morning of July 5. A Type 2 IMT, Washington Area Team 1, assumed command on July 5 at 1200 hrs. A new start (Incident 268) was reported at 1226 on July 5, 2½ miles north of Spur Peak and another (Incident 288) was reported at 1830 on July 5, 3½ miles north of Spur Peak. These three fires were formed into a complex an assigned to the Type 2 IMT.

By July 14, Spur Peak Complex was contained and incident management returned to the District. Infrared flights showed continued burning out in the interior and in a green stringer on the northwest side of the fire. On the afternoon of July 27, the fire spotted outside the containment line of Spur Peak Fire, quickly established and began spreading rapidly with torching, active crowning, spotting up to ½ mile and flame lengths in excess of 100 feet. Management actions were concentrated on evacuating recreational users to the east and north of the fire.

Fire History

Large fires have been common in the general vicinity of Tripod and Spur Peak Fires during the 20th century. Many burn scars in the directions of the main fire spread (northeast and east) of both Tripod and Spur Peak are relatively small or are relatively old and we do not expect them to provide any large barriers to fire movement. The only recent fire in the probable path of Tripod is the 1970 Shrew Creek Burn, which the fire has reached. The Shrew Creek Burn may serve to steer Tripod, but is not large enough nor located strategically enough to stop it or to reduce the threat to Conconully. There are no large burn scars to the south and west of Tripod. The Thunder Mountain and the Thirtymile Burns, seven miles to the north of Spur Peak, do provide significant barriers to fire movement. The Isabel Burn 4 ½ miles to the east of Clark Peak will also provide an effective barrier to fire movement to Spur Peak.

Fuels

The vegetation and fuels in the area around both fires are very similar. At the higher elevations, lodgepole pine dominates on upper slopes and ridges, Engelmann spruce in the draws and north aspects, and subalpine fir and whitebark pine on the highest ridges. Understories tend to be low shrubs and forbs. In the middle elevations, mixed conifer forest dominates with grand fir, Douglas-fir and pines in the overstory and a mix of tall shrubs or little vegetation in the understory, depending on overstory canopy closure. Ponderosa pine and Douglas-fir with grassy understories dominate the lower slopes.

A combination of bark beetles and spruce budworm has been active throughout the potential fire area for many years. Although young stands of lodgepole pine (<70 yrs) are usually resistant to initiating crown fire, they can carry crown fire. Bark beetle activity has increased the risk carrying a crown fire through several younger stands. Elsewhere, extensive areas of heavy surface fuel loadings, standing dead and trees with red needles are present through much of the potential fire area. Fuel model 11 (light logging slash with overstory)best describes lodgepole pine stands with extensive mortality. These stands are prevalent throughout North Fork of Boulder Creek and up to Tiffany Springs Campground. Fuel model 8 best characterizes the lodgepole pine stands in the South Fork of Twentymile Creek drainage that lack obvious insect damage. Fuel model 10 best characterizes those areas where spruce budworm has been active for several years.

Tonasket Ranger District has been actively reducing fuels along the Forest boundary to the west of Conconully. Treatments have included thinning, piling and burning with the intent of creating stand structures that resist crowning and surface fuel loadings that limit potential flame length and allow for direct attack. These treatments serve to break fuel continuity and may serve to slow the Tripod Fire, but will not stop the fire in the absence of additional action.

Seasonal Severity

Drought Indicators

We examined several drought indicators to determine the influence of short- and long-term drought on fire potential. The latest Drought Monitor (figure 1) indicates no drought conditions are present and the latest drought assessment (August-October) indicates that drought is not expected to develop in the Pacific Northwest. The previous winter saw greater than average snowpack at the Salmon Meadows Sno-tel site (figure 2), although unusually warm conditions resulted in rapid melting. Regardless, the water year precipitation to date remains at 115% of average and river levels in the Okanogan and Similkameen Rivers remain near average. Departure from average greenness mapping for the week of July 19-25 indicates the area between the Chewack and Okanogan Rivers is about 80% of average greenness. We believe this map reflects a combination of recent large fires to the north of Tripod and Spur Peak, principally Thirtymile and Farewell, and insect-related mortality throughout the forested area.

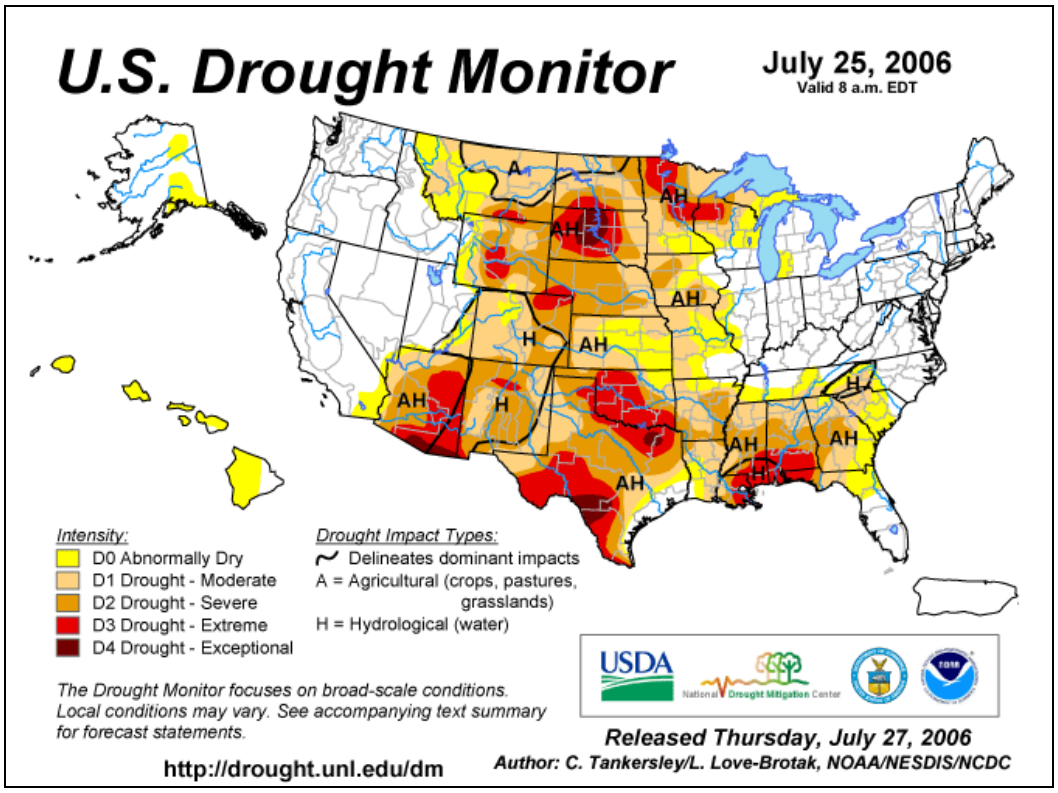

Figure 1. Washington remains free of short-term drought as of late July.

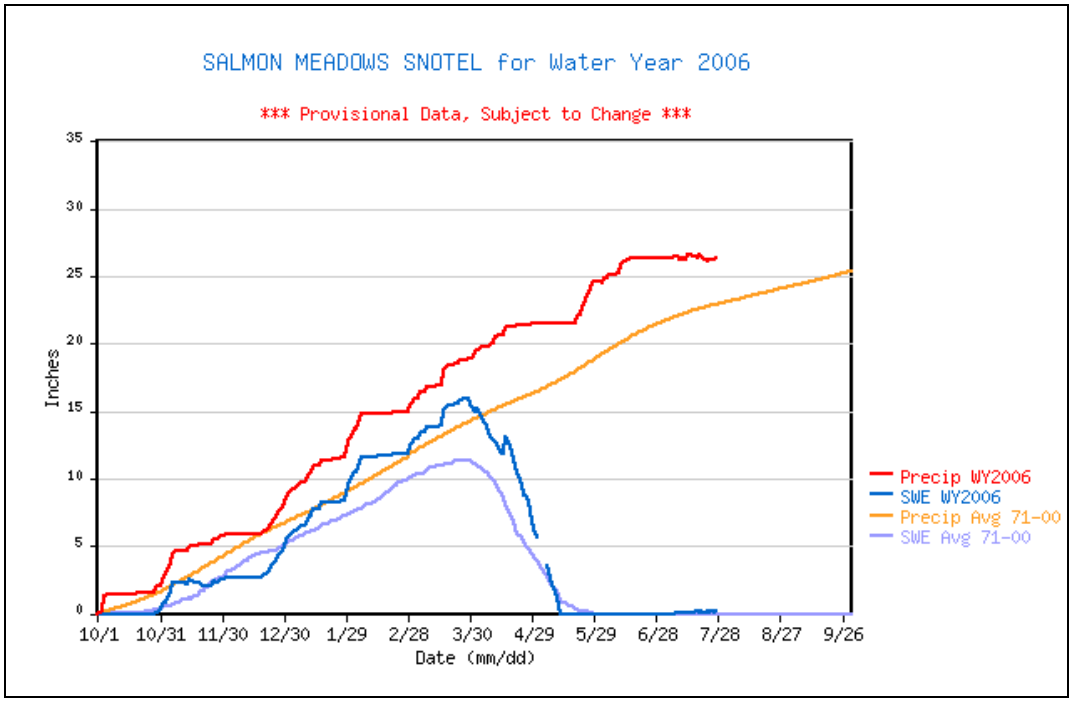

Figure 2. High temperatures in early May resulted in rapid melting of the snow.

Although the usual drought indicators provide a slightly mixed message, the fire behavior on these as well as other fires in north-central Washington suggest that fuel conditions are

much drier that we would typically expect for this time of year and related to the conditions prior to the start of fire season. May was unusually warm and dry, prompting rapid snowmelt and local flooding. Several Forest roads and bridges were damaged or destroyed in the flooding. Observed fire behavior suggests that snowmelt was rapid enough that significantly less of the resulting runoff soaked into large woody fuels and the duff than would have occurred if snowmelt had proceeded at a slower pace.

Insect activity this summer has also proceeded at a rapid pace suggesting two things. First, the snowmelt also failed to penetrate deep into the soil and the subsequent weather combined with stand densities to deplete water rapidly in the upper two inches of soil, where most fine roots grow. Second, insect populations were already high enough and the winter mild enough to allow high survival such that the resulting outbreak this spring overcame the more favorable moisture conditions, leading to continued high rates of defoliation and mortality. These two things could also have worked in combination. The net result between rapid snowmelt, warm and dry conditions in May and since mid-June and reduced canopy closure due to defoliation and mortality, is that both live and dead fuels are much drier than seasonal averages.

Energy Release Component

We then compared several elements to past years to evaluate how the rest of the season may unfold. We compared the 2006 ERC curve at First Butte RAWS (station 452006) to previous years between 1985 and 2005. Two years began with a similar pattern of a warm, dry May, a cool, moist June and a warm, dry July: 2000 and 2004. However, these two years followed different patterns for the remainder of the season (figure 3).

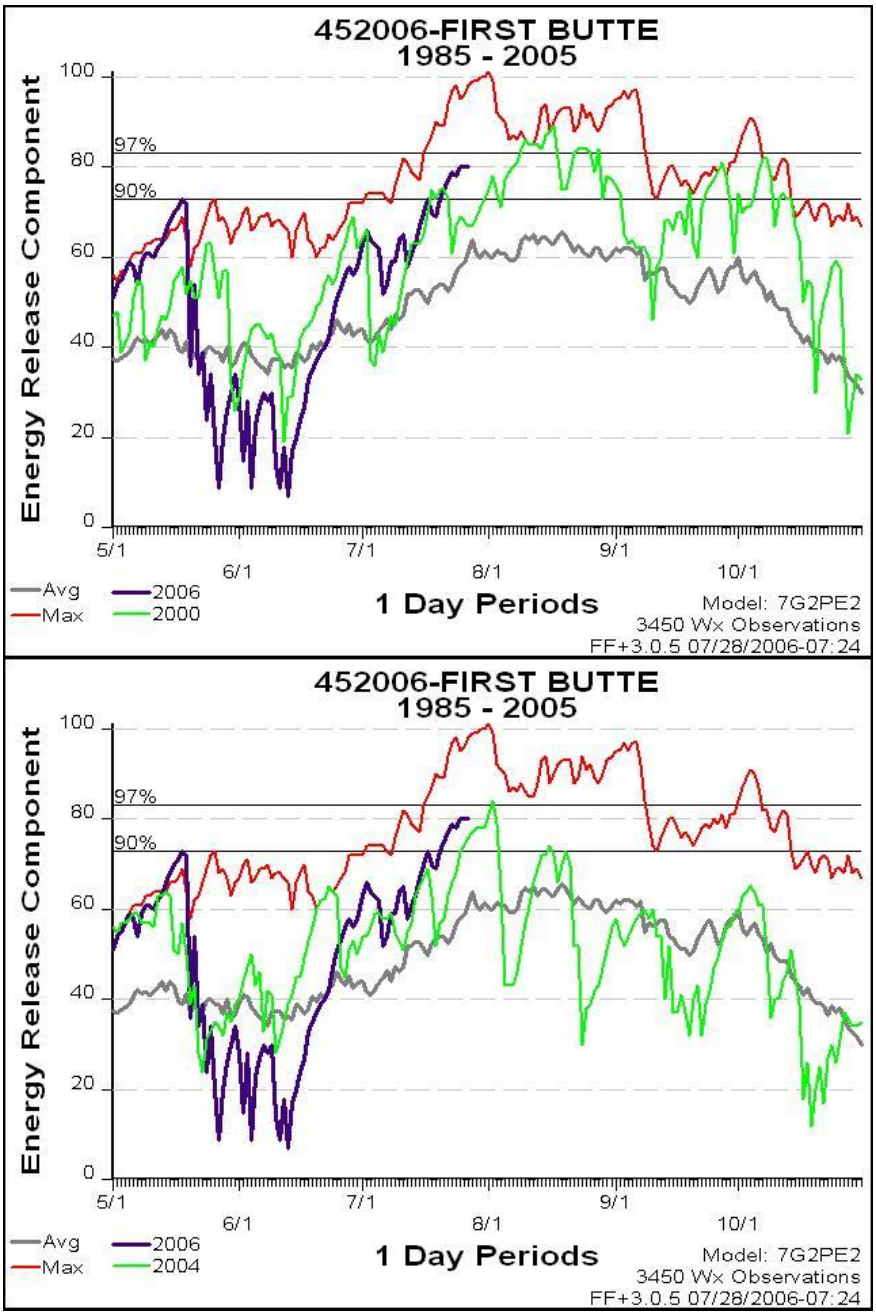

Figure 3. Although 2000 and 2004 started with similar patterns, the remainder of the season followed very different patterns.

In the case of 2000, the season continued warm and dry with temperatures near average, but minimum relative humidity largely below average and little precipitation. In 2004, a large rain event heralded a return to more typical conditions. Even though temperature remained generally above average, minimum relative humidity also was largely above average and rain events occurred about every 10 days through September.

Calculated Fuel Moistures

Lastly, the Spokane National Weather Service Fire Operating Plan identifies critical fuel moisture conditions as precursors to red flag weather conditions:

- 100-hour fuel moisture $\leq$10%
- 1000-hour fuel moisture $\leq$12%
- Live woody fuel moisture $\leq$120%

These are calculated values, not measured values. Research by the Predictive Services unit at the Northwest Coordination Center correlated 100-hour fuel moisture with fire season severity as measured by the amount of fire business. Thousand-hour fuel moisture has long been used as an indicator of burnout time and potential smoke production as well as potential fire effects. Live woody fuel moisture serves as an indicator of crowning potential. Fuel moisture monitoring has found that calculated values are frequently lower than actual values, in part because calculated values represent average worst conditions, instead of average conditions. Nonetheless, the calculated values do provide useful indications of the relative dryness of fuels and an easy method to compare one year to another.

As of July 26, the calculated fuel moistures at First Butte RAWS were 5% 100-hour fuel moistures (just above the 3rd percentile), 8% 1000-hour fuel moistures (just below the 10th percentile) and 61% live woody fuel moisture. We compared the calculated 100-hour, 1000-hour and live woody fuel moisture for 2006 with seasonal averages and with 2000 and 2004.

100-hour Fuel Moisture: On average, 100-hour fuel moistures fluctuate between 11% and 13% from May through about June 20, and then slowly drop to a minimum of 7-8% in early August. Fuel moisture then rises slowly through August and September and then more rapidly through October. In 2000, the 100-hour fuel moisture values were generally at or below seasonal averages with occasional spikes above average in June, early July and early September. Hundred-hour fuel moistures in 2004 fluctuated above and below seasonal averages in about equal proportions, although May began well below seasonal averages. The pattern in 2006 for 100-hour fuel moisture more closely resembles that seen in 2004, but the pattern in July more closely resembles that seen in 2000.

1000-hour Fuel Moisture: Thousand-hour fuel moisture typically begins May at about 16%, drops to about 14% in mid-May and then climbs back up to 16% and remains near that value through June. It decreases through July, reaching a minimum of around 10% in mid-August and then climbing very slowly through the remainder of August and September. In 2000, 1000-hour fuel moisture was generally at or below seasonal averages into mid-July, dropping to well below seasonal averages in late July and August, including a period at or below the 3rd percentile in the second half of August. In 2004, 1000-hour fuel moistures also began at or below seasonal averages until early August and then climbed above seasonal norms for the remainder of the season. In May 2006, 1000-hour fuel moistures were well below seasonal averages, climbing to well above in late May through much of June. They then dropped to below average in late June and are currently drier than in July 2000.

Live Woody Fuel Moistures: Fuel samples in mid-July indicated that conifer foliar moisture was about 150% while shrubs were 180% at the higher elevations. Greenup is set to begin in mid-May in the First Butte database used for this analysis. Live woody moisture rises from its dormant value of 60% to a maximum of 125% at the end of the month. Moisture values fall through June and July, reaching a minimum of around 76% in mid-August and slowing climbing to near 100% by mid-October. At that point, the freeze date brings live woody moistures back down to 60%. In 2000, live woody fuel moistures were mostly below seasonal averages until early July where they were at seasonal averages for about a week. Live woody reached dormancy values about August 8 and remained there until September 2, climbing above that value afterwards but fluctuating below seasonal norms until the freeze date in mid-October. Live woody moistures followed a similar pattern

in 2004 through July, then climbed to above seasonal averages beginning around August 2. After greenup in mid-May of 2006, live woody fuel moistures climbed to well above seasonal averages, topping out at 174% in mid-June. They dropped below seasonal norms on June 27 and have been running below those values calculated for July 2000 and 2004. Live woody fuel moistures are set to reach dormancy values by July 28, about 11 days earlier than in 2000.

Winds

The Western Regional Climate Center has a utility to create wind roses using the hourly observations from RAWS. We compared the 10-minute average winds for July 2006 to the averages from 1985-2005 at First Butte RAWS (figure 4). Generally, calm conditions, defined as winds $\leq$ 1.3 mph, prevail 27% of the time. Winds out of the north and northeast are rare with about equal probabilities of winds from all other directions. The strongest winds typically come from the northwest and southeast, reaching as high as 15-18 mph. August winds have a very similar pattern to July. Thus far in July 2006, winds have been calm 55% of the time. Winds have mostly been out of the northwest, south-southwest and south with winds out of the northeast and west rare. The strongest winds have been out of the northwest at 9-12 mph.

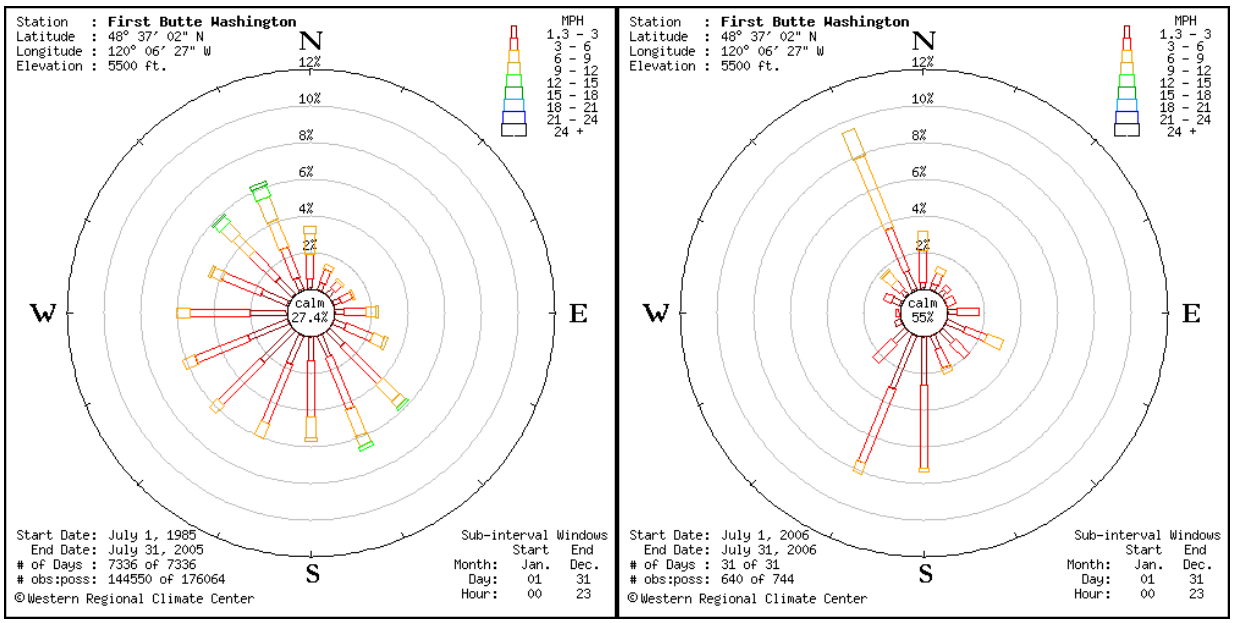

Figure 4. Winds in July 2006 have differed from historical averages, primarily in terms of direction.

The daily observations used in Fire Family Plus usually fail to capture significant wind events. In 1966, John Crosby and Craig Chandler, two research foresters, conducted an analysis of the gusts that can 'hide' within a 10-minute average wind speed – the wind speed stored as a part of both daily and hourly observations and in fire weather forecasts. The results of this research were reprinted in the Winter 2004 issue of Fire Management Today, a portion of which has been recreated in Table 1. Wind gustiness tends to affect fire spread more than average wind speeds, particularly at the lower average wind speeds. Gusts are usually the element that triggers torching and crowning and have a significant influence on spotting distance.

Table 1. Gusts associated with 10-minute average wind speeds of 5-10 mph.

10-minute Average Wind Speed	Probable Maximum 1-minute Wind Speed	Probable Momentary Gust	
		Average	Maximum
5	9	15	18
6	10	16	20
7	11	17	21
8	12	19	23
9	13	20	24
10	14	22	26

Outlook

Over the next 30 days, north-central Washington has equal chances for above, below, and average temperatures and precipitation (figure 5). Given that weather patterns in summer tend to be persistent, we believe than conditions will likely remain warmer than average. Given that little precipitation normally falls in August, a forecast of below-average precipitation is meaningless. However, weather pattern persistence would suggest that the probability of above-average precipitation is unlikely.

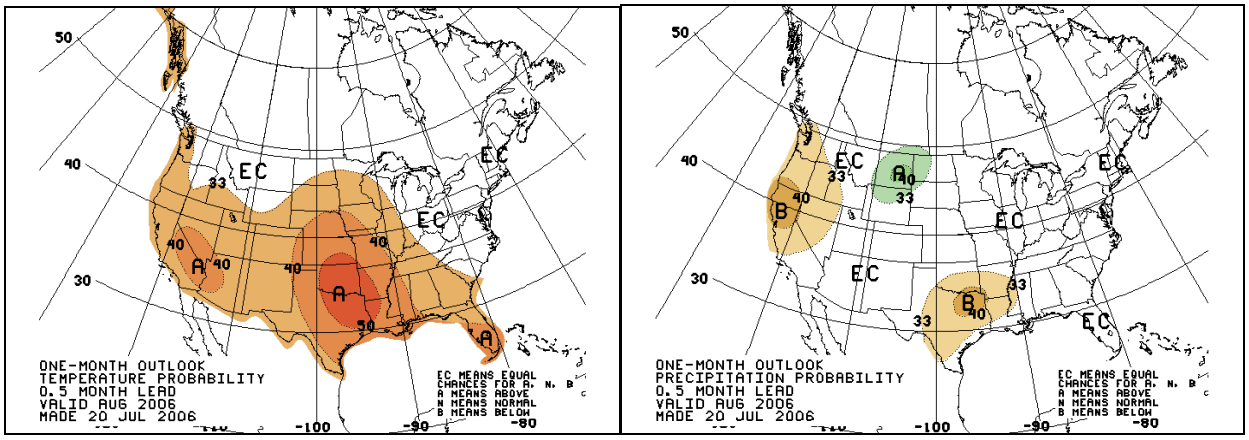

Figure 5. Forecast model results are either uncertain or contradictory so forecasters are unable to say what type of weather may prevail in August.

Given weather pattern persistence and current calculated fuel moisture values, we believe that the remainder of the 2006 fire season will more closely match that of 2000. The District should expect to see a continuation of ERCs well above average and fuel moistures well below average. Burning conditions will readily support active and extreme fire behavior and new starts in similar fuels will likely establish early and grow quickly through August and into September.

FSPro Simulations

The Missoula Fire Sciences Laboratory has been testing an experimental product that estimates probability of fire spread based on a combination of 2 days of forecast weather and a statistical analysis of historical weather for the remainder of the simulation. Weather patterns are assumed to follow a persistence pattern and events that drive fire danger

indices below the 50th percentile are ignored. One hundred to 1000 FARSITE simulations are run, starting with an initial fire perimeter, and the resulting perimeters compared to develop the probability that an individual pixel will burn.

This analysis used weather from First Butte RAWS and separately projected Spur Peak and Tripod Fires (Figure 6). Modelers used estimated perimeters from infrared imagery to initiate the model. Due to the size of the area involved and the existing workload at the modeling center, the resolution was 200 m, which means the simulations do not "see" smaller features, such as Tiffany Mountain, that may stop portions of the fire or steer the fire spread direction. The following lists approximate geographic reference points for each fire at the 90% probability perimeter, assuming that some effective suppression action had been taken on the southern boundary of Tripod.

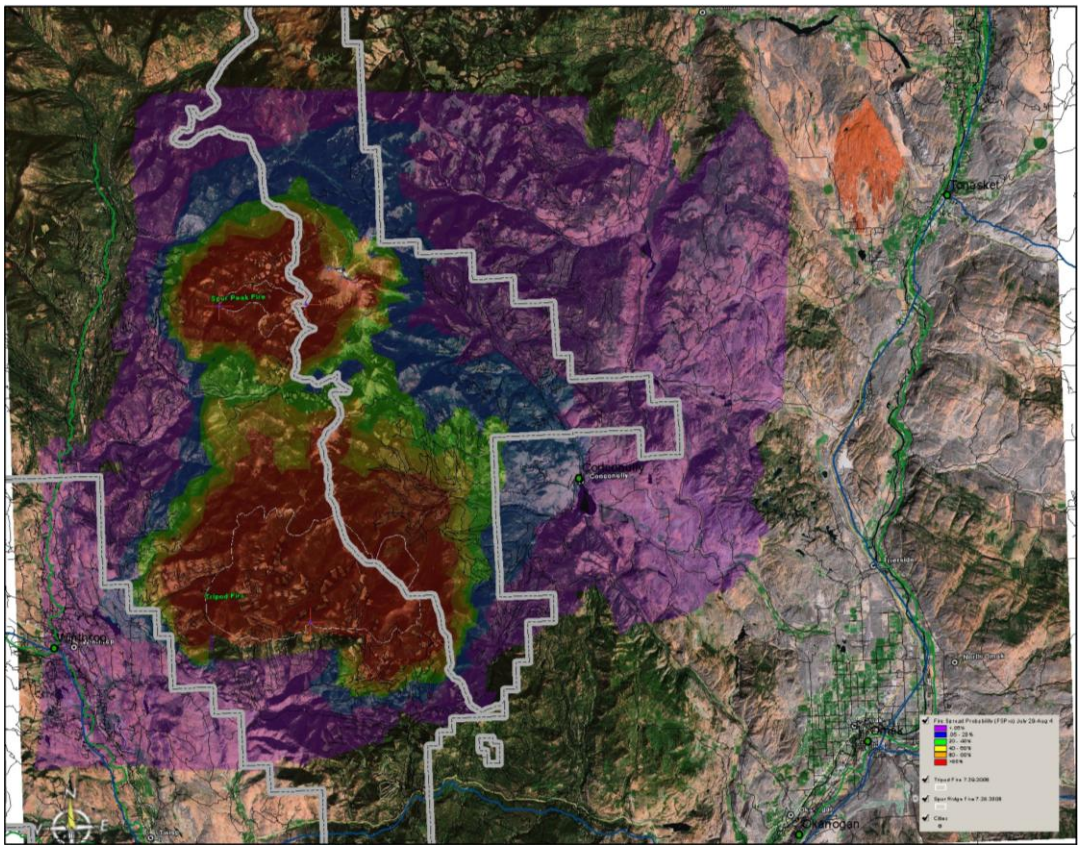

Figure 6. Using persistence weather, the fire has a low probability of reaching Conconully in the next 7 days, but a high probability of reaching the Loomis State Forest.

Tripod Fire

- North – west finger to southwest portion of the headwaters of South Fork Boulder Creek to the north of Beaver Meadow and east finger to the vicinity of Old Baldy.
- Northeast – the West Fork Salmon Creek area
- East – just east of Starvation Mountain and the ridge to the south into the headwaters of Granite and Shrew Creeks
- Southeast – just north of Middle Ridge
- Southwest – to approximately 1-2 miles east of the Forest boundary in Bear and Pearrygin Creeks

- Northwest – well into the headwaters of Pebble Creek

Spur Peak Fire

- North – headwaters of Timber Creek
- Northeast – area of Parachute Meadows and Three Buttes
- East-Northeast – vicinity of Middle Tiffany Mountain in the headwaters of North Fork Salmon Creek and the Forest boundary
- Southeast – vicinity of Bernhardt Mine and Clark Peak
- South – just north of the confluence of Bernhardt Creek and South Fork Boulder Creek
- Southwest – down North Fork Boulder Creek to approximately 2 miles north of the confluence with Bromas Creek
- West – headwaters of Bromas Creek
- Northwest – headwaters of Claw Creek

Over the next seven days, there is a 75% chance that Tripod Fire will reach Reed Ranch and a 50% chance it will reach Meyer Ranch. There is a 10% chance the fire will reach Conconully in the same period. Conconully is sheltered from southwesterly winds, the predominant wind direction in the afternoon, such that the fire would tend to back in that direction. Spur Peak Fire has a 25% chance of crossing Twentymile Creek in the area of Timber and Yarrow Creeks. It also has a 75% chance of crossing onto the Loomis State Forest in the next 7 days.

Management Options

Situation

A national and regional management situation perspective is necessary to understand and develop future management options. National Preparedness Level 5 was reached today, July 29. The Pacific Northwest is currently in Preparedness Level 4 and expected to remain there for the next 30 days. Competition for scarce resources such as IHC crews and Type I helicopters is intense.

Locally, two other fires are in competition for resources, Tinpan WFU and Flick Creek, and are expected to remain in competition for the foreseeable future. An Area Command was ordered to aid in allocating resources between the three fires (Tripod Complex, Tinpan and Flick Creek). With little lightning expected in the near term, initial attack should not increase the resource competition locally; however, at least one more lightning episode can be expected during the life of the fires. Given weather and fuel conditions, initial attack responses will need to be more intense, and could pose significant at least some short-term competition for aerial resources.

Within the fire area, the WFSA identified multiple values at risk (summarized in the Introduction). Even though the fire does not have a high probability of reaching a significant number of homes within the next seven days, it likely will within the next 14 days. If resources remain scarce, point protection of these values will require resources that could otherwise be used for limiting fire spread. The fire does have a high probability of reaching Loomis State Forest within the next seven days. Keeping it off the Loomis State Forest will require a significant number of resources over at least a week.

Containment Considerations

Given the fire spread potential, resource availability, and multiple resources at risk, we offer the following thoughts on strategic containment considerations:

1. Agency administrators will need to set clear priorities, so teams will make the best use of scarce resources.
2. There are few natural containment boundaries, and as the fires get larger, more fireline will be needed, requiring many resources over a long period.
3. There will be a tendency to want to use aerial resources to slow fire spread. This can be a viable tactic when a significant fire-slowing event is forecasted, or when an adequate number of resources are available to follow up, but not viable otherwise.
4. Successfully stopping fire spread in the dead spruce/subalpine fir type will require a change in weather and fire behavior. Rarely are suppression efforts successful when the fire is crowning and spotting. Direct attack under cool conditions using water can be successful, but for safety considerations, lines should be located in younger stands where snag density is low for crew safety.
5. Locating indirect fireline in lighter fuels (i.e. grass understories) will increase line building production rates significantly and facilitate more successful burnout operations. This approach requires patience and careful attention to daily fire spread but has a much higher probability of success than attempting to stop the fire in heavy surface loadings on steep slopes.
6. A previous team developed a contingency plan for the northeast portion of the Spur Peak Fire. This plan is the best chance of keeping the fire from spreading to the Loomis Forest, however will take considerable ground effort backed up with aerial resources that may not be available. This plan will not work unless fire behavior moderates.
7. The Farewell, 30 Mile and Thunder fires to the north of the fire will stop fire spread. However, there is a high probability of the fire getting into the Twentymile drainage, which will threaten homes in the Chewack River corridor as the fire will move down the drainage. There are no containment opportunities in Twentymile drainage.

Safety Considerations

- Shallow rooted spruce and lodgepole pine easily fall after burning.
- Fire behavior in this type is slow to build, but once the transition to crown fire is achieved, fire spread can be rapid with long-range spotting.
- There are limited escape routes for burnout and holding crews.
- Escape routs and safety zones need to be identified. Old burns such as Bottle and Thunder Mountain might need to be prepared (snagged).