

## Executive Summary

The three month period of March, April and May was among the warmest on record for the Great Basin. However, large swings in precipitation from April to May and large spatial difference in precipitation distribution have stratified the fire danger across the region. However, above normal precipitation in central and western Idaho and southern Utah did little to change the drought condition over the Great Basin since the first assessment for the year.

For Western Great Basin, **the mountains of central Nevada for elevations above 6500 feet, most of the California/Nevada border, and part of southeastern Nevada north of Las Vegas have been identified with above normal fire potential** because they exhibit existing tree and shrub mortality due to long-term drought and insect infestations, localized areas of standing dead fine fuels, or heavy timber fuel loading (eastern Sierra). **A large portion of the rangelands in western and southern Nevada from just east of Reno southeast along the western border to Las Vegas have below normal fire potential** because of a lack of fine fuels due to long term drought in this area. The remainder of Nevada will exhibit normal fire potential.

For Eastern Great Basin, mortality in timber fuels continues to be a significant problem. Regardless of the outcome of spring conditions, forested areas are at risk for significant fire occurrence this season. Above normal warmth in March led to an early but stunted emergence (2"-3") of fine fuels. Above normal precipitation at the end of May and early June produced a second emergence (4"-6") and led to better continuity of fine fuels across southwestern Idaho and parts of northern Utah. These were added to the above normal area. As a result, **most of the forested lands in southwest Idaho, central and western Idaho north of the Snake River Plain, the Bridger-Teton of Wyoming, and most of eastern and southern Utah and the higher elevations of northern Utah will have above normal fire potential in 2004.** Additionally, uncompacted carryover fine fuels and drought-related die-back in shrub fuels will result in **above normal fire potential in the rangelands of eastern and southern Utah and the Arizona Strip.** The remainder of Eastern Great Basin, including the Snake River Plain and the western Utah rangelands will have normal fire potential.

The main factors that contributed to our conclusions are:

- Long-term drought conditions;
- Early green-up and snowmelt but with later curing expected (normal onset of fire season);
- A repeat of 2003's extreme NFDRS outputs;
- Significant mortality in both timber and shrub fuels.

**Current Conditions**

**Weather and Climate.** Long-term precipitation deficits remain a key factor in shaping the fire season for the Great Basin. While precipitation amounts have been near normal over the region during the last 12 months, six years of deficits have taken a toll on fuel conditions across the Great Basin.

Eastern Great Basin. Temperatures for the Eastern Great Basin for the period March through May, 2004, were among the warmest on record, despite the wet April. This greatly affected by the record warmth of March (4<sup>th</sup> warmest for Utah, Wyoming; 6<sup>th</sup> warmest for Idaho).

Precipitation for April and May showed dramatic swings from one month to the next. April was generally wetter than normal for much of southern Utah and western and central Idaho with normal to below normal precipitation in central and northern Utah and eastern Idaho. For May, It remained wet in Idaho but precipitation for Utah and western Wyoming was below normal, and in some areas much below normal. However, this had little impact on the long-term deficits which are still among the worst in the area for the past 48-months (Figure 1). Despite the seemingly wet period for portions of the region, drought conditions have changed very little in the past 3 months. (Figure 2).

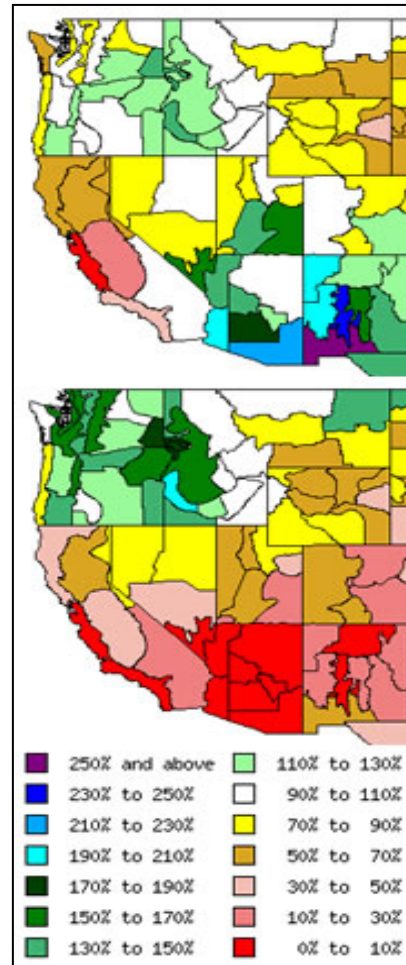


Figure 1. Departure from average precipitation for (a) April-May, 2004, and (b) May, 2004 (from Western Region Climate Center)

Western Great Basin. Drought and Precipitation: April was generally dry and warm across Nevada with normal to slightly below normal precipitation in May. The only except was much above normal precipitation

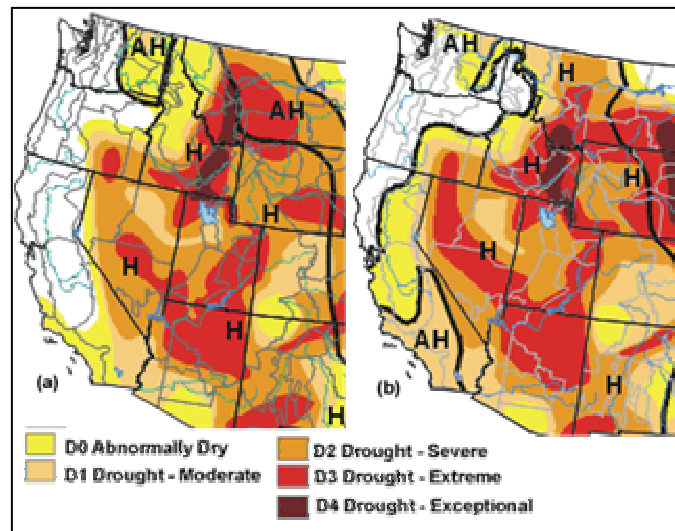


Figure 2. Comparison of drought conditions between (a) 6 April 2004 and (b) 15 June 2004. (from National Drought Mitigation Center, USDA)

in the extreme part of the state around Las Vegas. Overall, as with the Eastern Great Basin, drought conditions changed very little since early April.

### Fuels Analysis

Eastern Great Basin. Fuel conditions vary across the region, driven by the normal south to north progression of rising temperatures and precipitation. Southern and central Utah experienced an early green-up as warm weather and rapid snowmelt allowed early germination and quick growth of annuals. April rains allowed some surge in growth but hot conditions in May and early June cured fine fuels quickly. In northern Utah and southern Idaho, wetter conditions delayed curing, with elevations below 7000 feet progressing well. Higher elevations were just beginning to dry but mid-June precipitation and cool weather slowed the process some. Central Idaho and western Wyoming remain green but warmer temperatures in the mid to late part of June should begin the curing process on a more typical schedule.

On-going drought conditions since 1999 have created progressively drier fuels each fire season. Snowpack levels this winter, though higher than the preceding drought winters, have remained normal to below normal for the Great Basin. Brush and timber fuels remain drought stressed and are experiencing drought related mortality, exacerbated by insect infestations.

### Western Great Basin.

### Drought and Insect Mortality.

Eastern Great Basin. Prolonged drought conditions throughout the Great Basin have left fuels susceptible to opportunistic insects and disease. Tree mortality (Figure 3) from these causes is becoming evident in the following areas: southwestern Utah and northern Arizona forests and rangeland (up to 20%), eastern Utah forests, and northern Idaho forests (2-3%). These areas currently have the highest potential for large fire growth, with dead aerial and horizontal fuels causing problems under any scenario.

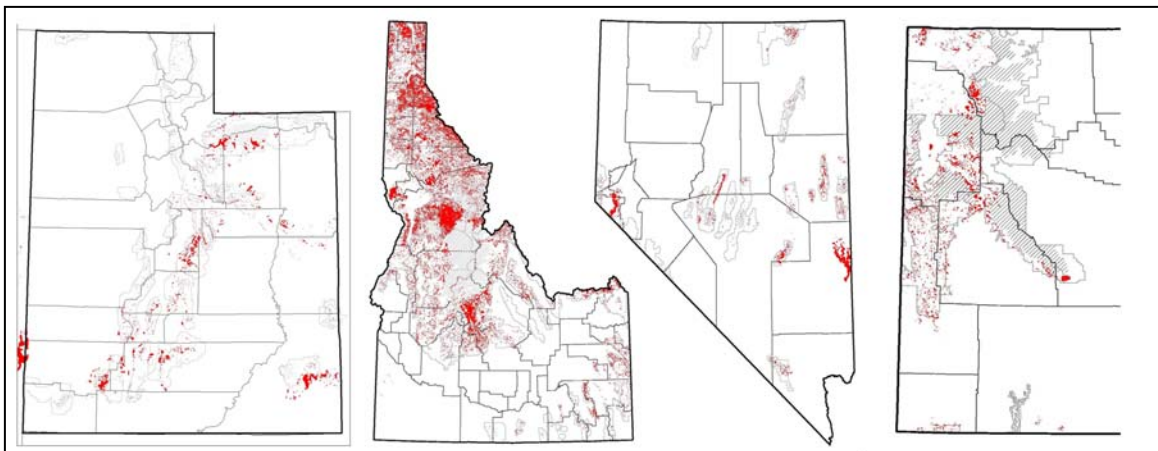


Figure 3. Insect and disease tree mortality, 1999-2003 for Utah, Idaho, Nevada, and western Wyoming. (Forest Health Protection Intermountain Region, USDA Forest Service)

In southern Utah and northern Arizona, drought induced mortality in non-grass fuel types is beginning to show across the fuels profile, with up to 25% mortality in pinyon-juniper and brush fuels. On the Arizona Strip, up to 30% mortality has occurred in ponderosa pine occupying shallow soil sites. In southern Utah, ponderosa pine fuels, browning of needles indicate early signs of stress and present an opportunity for beetle infestation. Mortality is continuing in these fuels, but at a decreased rate from previous years.

In the past year, the Utah Department of Wildlife Resources completed flights of sagebrush areas in the Colorado Plateau of Utah to determine sagebrush mortality. UDWR found over 600,000 acres of sagebrush that have significant mortality (>50%) due to drought. UDWR reports additional areas of drought-induced sagebrush mortality in the Great Basin and mapping will continue throughout the summer (2004). (From a fuels perspective, dead sagebrush isn't really a problem since the leaves are generally absent – less fine fuels. However, if large areas of sagebrush burn, undesirable fire effects (i.e., cheatgrass establishment) are likely.)

Western Great Basin. Prolonged drought conditions throughout the Great Basin have left fuels susceptible to opportunistic insects and disease. Significant mortality, especially in Pinyon pines (*Pinus monophylla*) is being seen in the upper elevations east of Caliente and Pioche in Lincoln County, the Grant and Quinn Canyon Ranges of eastern Nye county, and the Pine Nut Range in western Nevada. Less significant die-off has also been noted in the Schell and Egan Mountain Ranges in White Pine County, the Toiyabe Range in central Nevada, the Virginia Range in Storey County and the Jarbidge Mountains in Elko County.

Significant summer rainfall last year and sufficient precipitation this past winter should allow for some improvement in live fuel moistures across the woodlands, especially the Pinyon pine trees (*Pinus monophylla*) and Utah Juniper species.

Through mid March 2004, fire danger conditions have rapidly increased across the lower elevations as snowmelt and near record warmth have combined to produce an early green-up and a rapid drying of the dead fuels. This pattern of rapid increases in fire danger was common in 2002 and 2003 and is a typical response of the fuels to the long-term drought gripping much of the Western US. Even though ERC values are near record highs for this time of year (figure 9), they are still well below critical levels and that trend is expected to continue through late spring/early summer.

## Climate and Weather Outlooks

Forecasts for the Great Basin summer season (July-September) indicate a high probability of above normal temperatures. There is a 55-60% chance that most of Nevada, Idaho and northwestern Utah will have above normal precipitation. The values on the charts indicate the probability of occurrence of above or below normal conditions for temperature and precipitation. More simply, higher probabilities suggest a higher confidence in the forecast.

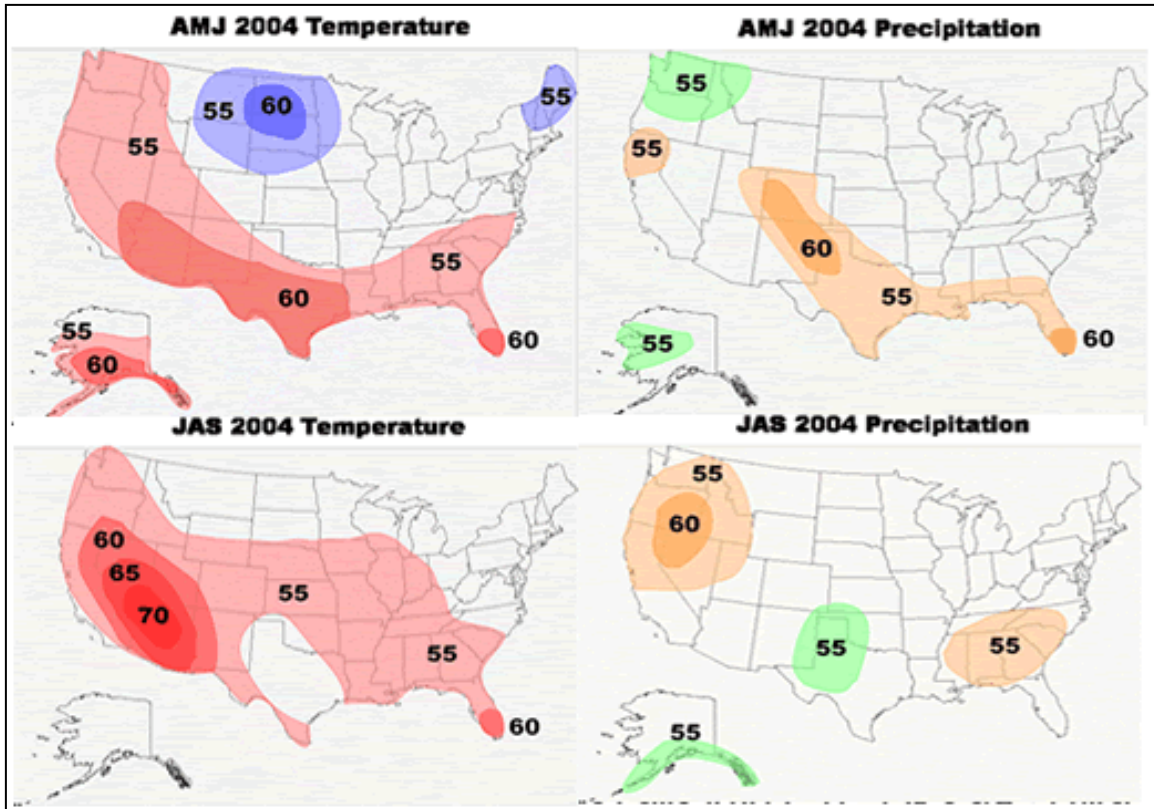


Figure 4. Consensus summer outlook for April-May-June (top) and July-August-September for temperature (left) and precipitation (right). (2003 Seasonal Assessment Workshop, Phoenix, AZ, 29 March – 2 April 2004)

Of note is the absence of any El Niño or La Niña signal in the global pattern. This situation makes it difficult to identify a trend for the upcoming fire season with any degree of certainty.

Eastern Great Basin. Normal precipitation is expected across the region this summer (July – September). This includes what may be termed a typical or normal monsoon during the latter half of the summer. Temperatures for July through September are expected to be several degrees cooler than the past couple of years, although still above the 30-year normal.

## Fuels Outlook

Eastern Great Basin. Fuels outlooks will be addressed in the scenarios below.

Western Great Basin. Most annuals have cured though perennials remain green, especially on north aspects. The only exception is in Elko County where a wet May and early June have helped keep fine fuels green and 1000-hour fuels wetter. Continuity in fine fuels is good, but growth is stunted.

The 1,000-hour fuel moisture component is below normal, indicative of continuing drought conditions and making these fuels available to any ignition throughout the summer.

Live fuel moisture values are anticipated to fall more slowly this summer due to adequate soil moisture. This will cause the shrubs and conifers to be greener and less available to burn through the early part of the summer.

## Fire Occurrence and Resource Outlooks

Eastern Great Basin. See individual scenarios (below) for fire occurrence discussions. It is too early to make estimates of expected resource needs.

Western Great Basin. Wildland fire activity in the Western Great Basin is highly dependent on lightning starts. The distribution of the lightning, both spatially and temporally, can be highly varied from year to year and from place to place. The prediction of fire occurrence and resource impacts for this year is based on the premise that the frequency of lightning activity will be normal.

Normal lightning occurrence, in combination with the expected conditions of the fuels, should result in localized areas of above normal fire occurrence, with much of the state near or below normal. Except for those localized areas with heavy fine fuel loading, initial attack efforts should be highly successful. However, additional factors such as Sage Grouse habitat protection will complicate suppression strategies.

## Future Scenarios

Eastern Great Basin. The most likely scenario from the preliminary assessment has essentially panned out so far. Despite periods of unusually wet weather, spring rainfall was about normal for most of the Eastern Great Basin. As we head into the summer, the scenario for a normal summer appears on track. There is little indication of evolving global weather patterns to suggest a swing one way or the other (i.e., no clear signals of moderate or greater El Niño or La Niña patterns).

**Mostly Likely Scenario: Normal Summer.** Normal summer conditions will result in above normal fire potential over the forests of Eastern Great Basin. This scenario would also result in above normal fire potential over the rangelands of the Arizona Strip and

southern and eastern Utah. Normal fire potential would be expected over the Snake River Plain and northwestern Utah.

Rangelands/Shrublands: In shrublands and grasslands, the availability of fine fuels is a primary contributor to fire potential. Several issues come to play in assessing fine fuel availability for the lower elevations including: 1) degree of compaction of carry-over fuels; 2) new fine fuel growth; 3) timing of curing of fine fuels and how this affects length of season; and 4) pinyon and juniper mortality.

Heavy winter snowfalls lead to compaction of carry-over fine fuels in the Snake River Plain and western/northwest Utah rangelands. Elsewhere, over southern and eastern Utah and the Arizona Strip lighter winter snowfall failed to compact fine fuels from last year.

Dry and hot March conditions and a wet April and late May to early June period produced continuous but stunted fine fuels over most of the rangelands in the Eastern Great Basin, especially the Arizona Strip and southern Utah where little additional spring-time precipitation occurred.

Curing of fine fuels commenced several weeks ahead of schedule but the cool, moist periods allowed for two to three emergences. The long-term drought has had dramatic impacts on pinyon and juniper with significant mortality in southern Utah. Elsewhere, drought stress has led to developing mortality in juniper and has exacerbated the invasion of beetles in the pinyon, but not to the levels seen in southern portions of the Great Basin.

Forests/Woodlands: Fire potential is expected to be above normal over the forests of Eastern Great Basin for the following reasons: 1) live and dead fuel moistures similar to 2002 and 2003, and 2) increased mortality caused by insects and disease resulting in higher dead fuel loading.

Despite near normal winter precipitation across the region, rapid snowmelt and above normal temperatures during March have led to poor moisture recovery in the heavy fuels. The 1,000-hour fuels reached below-normal to record low levels in 2002 and 2003. In central Idaho in 2003, record low dead fuel moistures led to severe fires and this trend is likely to continue under this scenario. Live fuel moistures will continue to be low this year due to the prolonged drought.

Annual aerial surveys indicate that prolonged drought conditions throughout Eastern Great Basin continue to leave trees and shrubs susceptible to opportunistic insects and disease. Subsequent mortality is adding significant fuel loading to the forests posing increased potential for fire activity. Significant tree mortality resulting in large areas of standing red slash is becoming evident in the following areas: Southeast Manti-LaSal mountains in southern Utah, the south slopes of the Uinta mountains, and the Stanley Basin of central Idaho.

Western Great Basin. Summer will continue the trend towards above normal temperatures, but without the record-breaking highs seen in 2003. Although some



precipitation is expected this summer, a return to a normal monsoonal pattern will bring an eastward shift in precipitation compared to last year and thus drier weather.

***Most Likely Scenario: A warm and dry summer (85% Probability).***

Lower Elevations: Near to above normal winter precipitation and record spring warmth stimulated an early burst of fine fuel growth across the Great Basin. As expected, the lack of a significantly wet weather pattern continuing through the spring across most of Nevada has resulted in fine fuels with good horizontal continuity but generally stunted vertical development. As of early June 2004 most annual fuels have cured around the state though perennials continue to remain green, especially on north aspects. The only exception to this has been across Elko County where continuing moisture into May and early June has helped in keeping fine fuels green and 1000-hr fuels much wetter. Though fine fuels are more continuous this year, the stunting of the vertical growth will result in much of the state seeing normal to below normal fire activity.

In this scenario, we would expect more dependency on wind to carry fires through this lighter fine fuel bed. In the rangelands of north central Nevada and parts of the BLM's southern Ely District, carryover of fine fuels from last year will contribute to average to above average large fire potential.

Higher Elevations: The latent effects of long-term drought have driven 1000-hr fuels to quickly drop to near record low moistures across much of the state. However, in the mountains of northeastern Nevada sufficient spring rainfall has aided in maintaining large dead fuel moistures at more normal levels for this time of year. Thus across the mountains of central Nevada and along the Sierra Front where long-term dead fuel loading and tree mortality due to insect damage continues to be a problem, the area could see above normal fire potential. Across the mountains in northeastern Nevada the melting of the snow pack contributed to higher soil moistures, thus maintaining the live fuel moistures in timber fuel types at higher levels later in the season. This will result in a shortened fire season and more normal large fire potential.

## **Management Implications and Concerns**

A broad range of conditions during the late Spring has stratified fire potential across the Great Basin. Normal to above normal precipitation across Idaho, northern Utah and northern Nevada have kept green-up going into mid-June. Lower elevations are curing at about the normal rate but early germination of annual grasses and a late burst of growth into June have resulted in good horizontal continuity but stunted vertical development.

In the higher elevation timber fuels, spring precipitation and temperatures will have less impact. Although the 1,000-hr. fuels are expected to show a quick drop in moisture and become available to burn early in the season, the main factor here is the higher moisture values in the live fuels, which will continue later into the season as a result of the snow pack and high soil moistures, making them less susceptible to fire.



Other considerations such as protection of critical habitat (e.g., Sage Grouse), could pose challenges to fire suppression operations (strategies, resource commitments, etc.) that one would not normally expect to encounter under this most likely scenario.

Land managers should expect to see more large fires that exhibit extreme to advanced fire behavior, long-range spotting, and are more difficult to control. Higher intensity fires will create unusually high rehabilitation requirements.

Increased fire occurrence and severity in Eastern Great Basin will greatly tax firefighting resources. As the need for additional resources rises, fire managers must be cognizant of experience levels of crews and the number of individuals in new locations and positions. Fire managers and crew leaders should objectively and honestly monitor their crews' abilities and experience levels to emphasize safety and training through the season.

Daily crew briefings should include information on local fire weather and current fire behavior conditions. Specific information should include expected fire behavior, rates of spread, fuel conditions, burning index and/or energy release component, and appropriate firefighting tactics and strategies. Local pocket cards for representative fire danger rating stations should be available to firefighters.

## Summary and Recommendations

Long-term precipitation deficits will once again play a role in determining the character of the Great Basin fire season. Despite near normal precipitation in 2003 and normal to above normal snowpack for much of the winter, drought conditions remain at severe or worse over a large portion of Idaho, Utah, and parts of Nevada.

The outlook for the remainder of the 2004 season calls for normal to slightly warmer than normal summer (June-July-August) with normal precipitation.

In Eastern Great Basin, **most of the forested lands in southwest Idaho, central and western Idaho north of the Snake River Plain, the Bridger-Teton of Wyoming, and most of eastern and southern Utah and the higher elevations of northern Utah will have above normal fire potential in 2004.** Additionally, uncompacted carryover fine fuels and drought-related die-back in shrub fuels will result in **above normal fire potential in the rangelands of eastern and southern Utah and the Arizona Strip.** The remainder of Eastern Great Basin, including the Snake River Plain and the western Utah rangelands will have normal fire potential (Figure 5).

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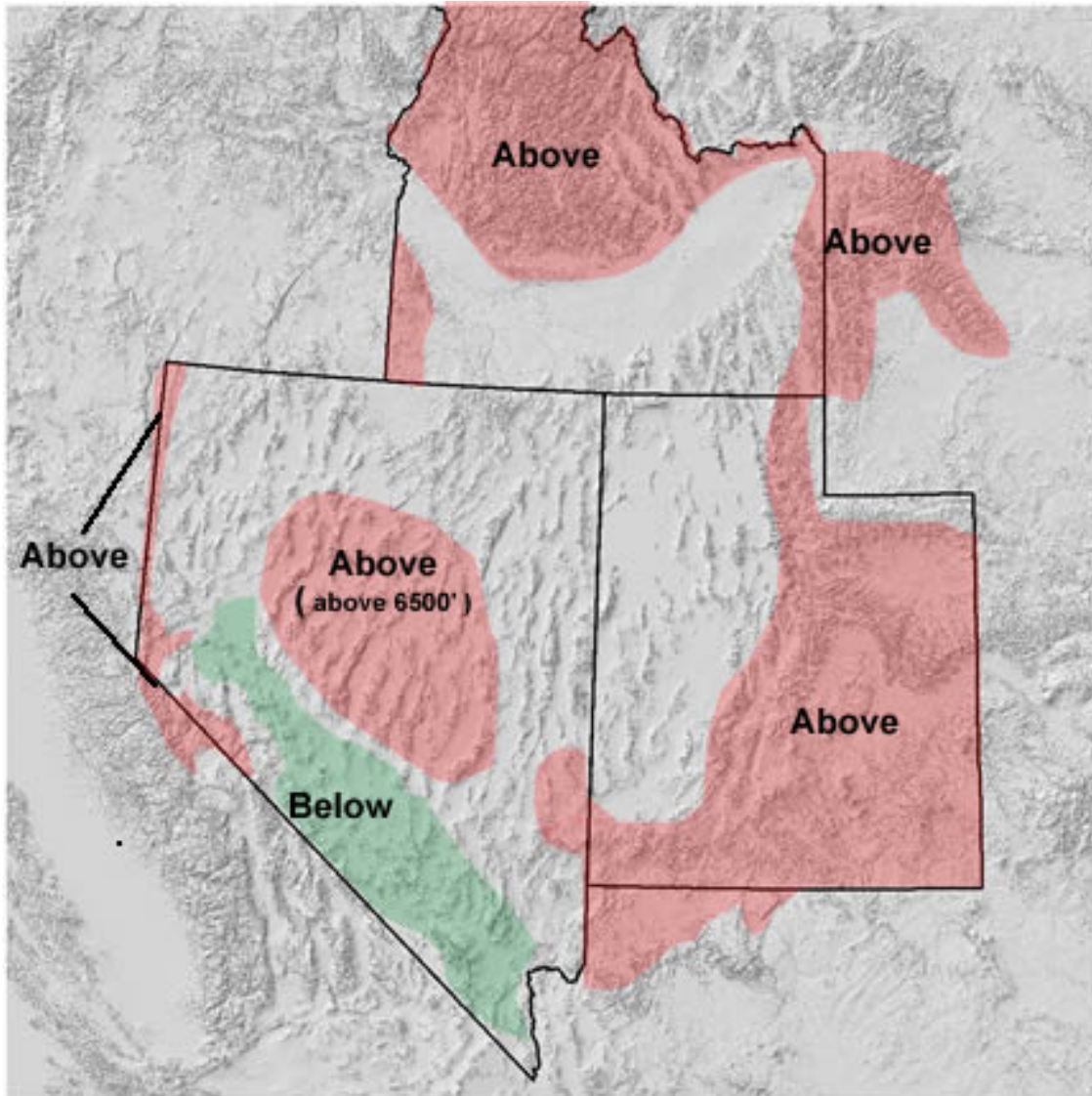


Figure 5. Updated 2004 fire potential for Eastern and Western Great Basins. (2004 Seasonal Assessment Workshop, Phoenix, AZ, 29 March – 2 April 2004, updated 22 June 2004)