

The Essence of Fire Regime—Condition Class Assessment

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Abstract—The interagency-Fire Regime / Condition Class - assessment process (FRCC) represents a contemporary and effective means of estimating the relative degree of difference or “departure” a subject landscape condition is currently in, as compared to the historic or reference ecological conditions. This process generally applied to fire adapted systems is science-based and adaptive as are the very ecosystems that are being studied. FRCC is also approachable and understandable by citizens participating in an interdisciplinary approach to assessing current ecological conditions.

Statement

Uncharacteristic catastrophic wildfires that destroy valuable public resources and private property are not beneficial to the citizens of the United States.

Observations

- A. There has been an increase in the number and severity of wildfires occurring in the United States.
- B. Concerned citizens and our governing bodies are requesting that the potential for uncharacteristic catastrophic wildfires be reduced.
- C. It has been, to date, rather difficult to precisely gauge the relative potential of a landscape to support and experience uncharacteristic fire occurrence PRIOR TO a catastrophic fire occurring within a given landscape.

A measure of the relative “combustible condition” or “fire resiliency” a fire adapted landscape of Forest, Shrub or Grassland was in depends upon the degree of deviation the area is experiencing from a combination of ecological factors:

- 1. Natural or reference fire occurrence (fire frequency)
- 2. Potential of key ecosystem components to be affected (fire severity)
- 3. Presence of historic ecosystem components across the landscape (successional presence)
- 4. Species present within a given landscape (compositional makeup)

These four characteristics, viewed in combination with one another, show a degree of ecological imbalance which can be interpreted as the current “state of health” of a subject landscape.

In: Gottfried, Gerald J.; Shaw, John D.; Ford, Paulette L., compilers. 2008. Ecology, management, and restoration of piñon-juniper and ponderosa pine ecosystems: combined proceedings of the 2005 St. George, Utah and 2006 Albuquerque, New Mexico workshops. Proceedings RMRS-P-51. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

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Similar interagency assessment protocols are applied to other vegetative types:

1. The Proper Functioning Condition assessment process (PFC) is applied in riparian habitat types.
2. The Indicators of Rangeland Health assessment process (IRH) is applied in Grass/Shrub habitat types.

When considering a larger vegetated landscape, all three assessment protocols can assist the general public and land manager to understand the relative difference or departure to historic conditions that is currently exhibited across the whole subject landscape.

Here are the basic steps to FRCC

1. Select a landscape to evaluate.
2. Determine the Biophysical Settings (Bps) within the selected landscape.
3. Review the historic or reference conditions for each Bps.
4. Ascertain the current fire interval and severity for each Bps.
5. Ascertain the current ecological conditions for each Bps.
6. Compare the “reference” to “current” conditions for each Bps.
7. Assemble the determinations into a landscape result.

The four (4) assessment characteristics—explained:

1. “Natural”/“Reference” fire intervals (occurrence):

There are THREE (3) basic categories of fire intervals.

Forest/Woodland/Shrub/Grassland ecosystems that ignite and support self-sustaining combustion can be placed in one of these three (3) fire return intervals.

1. 0- to 35-year fire return interval (fire frequency)
2. 36- to 199-year fire return interval (fire frequency)
3. 200- + year fire return interval (fire frequency)

2. “Natural” / “Reference” fire severity:

There are THREE (3) basic categories of fire severity (the degree to which the aboveground surface vegetation is burned and consumed by fire.)

1. Low severity: surface fires most common, less than 25% of the dominant overstory vegetation replaced.
2. Mixed severity: surface fires quite common, more than 5% but less than 75% of the dominant overstory vegetation replaced.
3. High severity: stand replacement, crown fires are common, greater than 75% of the dominant overstory vegetation replaced.

When combining these two parameters—fire occurrence interval and fire combustion severity—one can categorize vegetated ecosystems into five (5) fire regimes:

- I. 0- to 35-year frequency and low to mixed severity (surface fires most common) less than 75% of the dominant overstory vegetation replaced.
- II. 0- to 35-year frequency and high severity (stand replacement) greater than 75% of the dominant overstory vegetation replaced.
- III. 36- to 199-year frequency and mixed severity (less than 75% of the dominant overstory vegetation replaced).

- IV. 36- to 199-year frequency and high severity (stand replacement) greater than 75% of the dominant overstory vegetation replaced.
- V. 200 + year frequency and high severity (stand replacement) greater than 75% of the dominant overstory vegetation replaced.

A “natural” or “reference” fire regime is a general classification of the role fire would play across a landscape in the absence of modern human mechanical intervention, but including the influence of aboriginal ignitions.

So... the “FR” in FR/CC is an assessment of the amount of departure from the natural or reference regime.

The four (4) assessment characteristics—continued:

3. Successional presence

All vegetated ecosystems have a centralized tendency to grow in a specific or unique successional pattern. Simply put, each plant must begin life as a seed/spore or immature plant and progress over time—long or short—to an adult mature plant. Then with more time, it progresses to a point where self-sustained respiration ceases and the plant returns to elements from which it was created.

Within a given landscape—some very large, some very small—there is a central tendency to have a specific combination of age groups (structural stages) present at any given time. Obviously, no ecosystem is fixed; therefore natural variability will allow for more or less of this age or that age. This is where the concept of “central tendency” or “expected for this site” applies.

4. Compositional makeup

This attribute describes the “Reference” and/or “Current” ecological components including: species composition, stand age, canopy closure, and size class.

The “current” characteristic is also viewed and interpreted as:

“what is expected for the site.”

The data (variables) collected during the FRCC assessment process characterizes the size of the area, geographic location, biophysical conditions, and the fire regime characteristics. This will provide the ecological information that can be used to classify the landscape fire regime and determine the similarity, departure, ecological sustainability risks, abundance of vegetation, fuel classes and the fire regime / condition class.

Ecosystems can occur at any scale, from site to landscape to region. The emphasis in FR/CC is on mid-scale landscapes, because this is broad enough to display the characteristic patterns of a fire regime—the mix of fire frequency, severity and patterns. If the area is too small, a false picture of fire regime and/or condition class is likely. If the area is too broad, we lose the ability to discern meaningful changes in FR/CC.

Effective suggested landscape delineations would be a 5th or 6th code Hydrologic Unit Code (HUC).

In terms of size, a 6th code HUC is generally from 10 to 50 thousand acres, 5th from 25 to 100 thousand acres.

The landscape is then stratified into biophysical settings, project or treatment strata.

The FR/CC Assessment Classes defined:

Condition Class I:

Fire regimes are within the natural or historical range (+ 33%) and the risk of losing key ecosystem components is considered low.

Vegetative attributes such as composition and structure, are generally intact and, most importantly, functioning.

Condition Class 2:

Fire regimes have been moderately altered (+ 34 to 66%) and the risk of losing key ecosystem components is considered moderate.

(Indicators: Fire frequencies may have departed by one or more return intervals, either increased or decreased. This generally results in moderate changes in fire and vegetative attributes.)

Condition Class 3:

Fire regimes have been substantially altered (+ 67 to 100%) and the risk of losing key ecosystem components is considered high.

(Indicators: Fire frequencies may have departed by multiple return intervals, either increased or decreased. This generally results in dramatic/severe changes in fire size, intensity, severity and landscape patterns. Vegetative attributes have been substantially altered.)

Glossary

Biophysical setting: Biophysical settings are the primary landscape delineations for determination of the natural fire regime and condition class. These units are based on geographic area, physical setting and vegetative community that can occupy the setting. Physical characteristics include climate, geology, geomorphology and soils. Vegetation includes native species and successional stages found under our best understanding of the historic range of variation, including disturbances.

Reference conditions: An estimate of the central tendency of natural or historical (or historic) vegetation-fuel class composition, fire frequency and fire severity for a biophysical unit or landscape area. Reference conditions are the basis for calculating the ecological departure used to determine the Fire Regime/Condition Class.

Similarity: The FRCC methodology compares conditions across a landscape to a central tendency estimate for the natural or historical reference conditions of the potential natural vegetation (PNV).

Abundance: The abundance class is the amount of current vegetation/fuel class compared to the reference condition amount. Classified into Trace, Under-represented, Similar, Over-represented, Abundant.

Fire resilience: “Fire resilience can be defined as a forest stand’s ability to survive fires without permanent loss of functional or structural elements. The upper canopy with the oldest and largest trees represents such a structural element. A stand can be considered fire resilient if the probability of a complete loss of the upper canopy is reasonably low.