

CHAPTER 2 – OVERVIEW

Background

Definitions of fire regime and FRCC came from Hardy et al. (2001), Hann and Bunnell (2001), and Schmidt et al. (2002). Most fields in the FRCC methods were identified from project and watershed scale fire regime and condition class mapping tests and demonstration projects. However, substantial modifications have been incorporated based on subsequent informal workshops and field tests. Version 1.0.5 Western U.S. natural fire regime reference conditions have been developed for vegetation-fuel class composition, fire frequency, and fire severity for the coarse-scale Potential Natural Vegetation Groups (PNVGs). These values were developed through Vegetation Dynamics Development Tool (VDDT) modeling, literature review, field visits, and communication with regional experts. These values are in a review and refinement process. To make sure you have the most recent values, users with internet access should check the FRCC website (www.frcc.gov) or contact the help desk (helpdesk@frcc.gov). Users without web access should contact their federal, state, TNC or private agency coordinator (a list is provided on the training CD). The preferred method for developing the reference conditions is local expert or interdisciplinary team (IDT) estimates based on a local VDDT modeling workshops with literature review, ground reconnaissance, historic and current photo comparisons, and field assessment. Second to the preferred method would be region and state developed default reference conditions based on a similar process. However, because of the recent nature of development of FRCC methods these preferred methods have not been implemented. In the absence of reference values from these preferred methods the coarse-scale reference conditions for the western U.S. may be used. Beta-test reference values for the eastern U.S. and Alaska will be available by August of 2004.

Fire Regime and Fire Regime Condition Class Definition

A natural 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 burning (Agee 1993, Brown 1995). Coarse-scale definitions for natural (historical) fire regimes have been developed by Hardy et al. (2001) and Schmidt et al. (2002) and interpreted for fire and fuels management by Hann and Bunnell (2001). The five natural (historical) fire regimes are classified based on average number of years between fires (fire frequency) combined with the severity (amount of replacement) of the fire on the dominant overstory vegetation. These five regimes include:

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

III – 35-100+ year frequency and mixed severity (less than 75% of the dominant overstory vegetation replaced);

IV – 35-100+ year frequency and high (stand replacement) severity (greater than 75% of the dominant overstory vegetation replaced);

V – 200+ year frequency and high (stand replacement) severity.

As scale of application becomes finer these five classes may be defined with more detail, or any one class may be split into finer classes, but hierarchy to coarse scale definitions will be retained.

FRCC is a classification of the amount of departure from the natural regime (Hann and Bunnell 2001). Coarse-scale FRCC classes have been defined and mapped by Hardy et al. (2001) and Schmidt et al. (2001). They defined coarse-scale fire regime current condition classes as *“the degree of departure from historical fire regimes, possibly resulting in alterations of key ecosystem components such as species composition, structural stage, stand age, canopy closure, and fuel loadings. One or more of the following activities may have caused this departure: fire suppression, timber harvesting, livestock grazing, introduction and establishment of exotic plant species, introduced insects and disease, or other management activities.”* They include three condition classes for each fire regime. The classification is based on a relative measure describing the degree of departure from the historical natural fire regime. This departure results in changes to one (or more) of the following ecological components: vegetation characteristics (species composition, structural stages, stand age, canopy closure, and mosaic pattern); fuel composition; fire frequency, severity, and pattern; and other associated disturbances (e.g. insect and diseased mortality, grazing, and drought). There are no wildland vegetation and fuel conditions or wildland fire situations that do not fit within one of the three classes.

The three classes are based on low (FRCC 1), moderate (FRCC 2), and high (FRCC 3) departure from the central tendency of the natural (historical) regime (Hann and Bunnell 2001, Hardy et al. 2001, Schmidt et al. 2002). The central tendency is a composite estimate of vegetation characteristics (species composition, structural stages, stand age, canopy closure, and mosaic pattern); fuel composition; fire frequency, severity, and pattern; and other associated natural disturbances. Low departure is considered to be within the natural (historical) range of variability, while moderate and high departures are outside.

Characteristic vegetation and fuel conditions are considered to be those that occurred within the natural (historical) fire regime. Uncharacteristic conditions are considered to be those that did not occur within the natural (historical) fire regime, such as invasive species (e.g. weeds, insects, and diseases), “high graded” forest composition and structure (e.g. large fire tolerant trees removed

and small fire intolerant trees left in a frequent surface fire regime), or repeated annual grazing that reduces grassy fuels across relatively large areas to levels that will not carry a surface fire. Determination of amount of departure is based on comparison of a composite measure of fire regime attributes (vegetation-fuel composition; fire frequency, and fire severity) to the central tendency of the natural (historical) fire regime. Amount of departure is classified to determine the FRCC.

Scale Considerations

Fire regime and condition class are landscape scale variables. It is highly recommended that you put a lot of thought into how you classify your landscape. The inputs to the fire regime and condition class calculations and classification come from the sum of stand or patch scale conditions within a given biophysical land unit (BPLU) across a landscape of sufficient size to incorporate the natural variation of the fire regime. This sum area should include a larger area than just the treatment units that are to be assessed, generally equivalent to the Project Landscape. This can generally be equated to delineation of the hydrologic unit (watershed, subwatershed) that would surround the gross area that would be burned in a one day burning period under dry, windy large fire conditions, typical of when large fire runs occurred naturally (90th plus percentile). This assessment should be based on typical size of a one day burning period given the landscape contained natural fuel mosaic conditions and not necessarily current conditions.

Another general guideline that can be used is the Project Landscape containing multiple patches or stands, with more patches in regimes that naturally contain higher variation. Patches or stands are delineated by the combination of terrain (similar aspect, slope, BpLU) and vegetation-fuel (similar composition and structure). The combination of fire regime and terrain are the dominant factors that determine the typical patch or stand size within the natural mosaic. Patch or stand sizes in flat to rolling terrain with a surface or replacement regime typically range from 100 to 300 acres, while sizes in steep and dissected terrain range from 10 to 50 acres. Patch sizes in areas broken up with rocks, boulders, or other non-fuel producing conditions also typically range from 10 to 50 acres in both flat to rolling or steep and dissected. Mixed fire regimes tend to produce patch sizes ranging from 10 to 50 acres irrespective of type of terrain, but often the type of terrain (steep and dissected or mosaic of rocky areas) produces the mixed fire regime. Natural variation is generally highest in the mixed regime, second in the replacement regime, and lowest in the surface regime, so more patches or stands may be necessary for some regimes in order to contain the natural variation. Based on these typical conditions some general guidelines for a typical size of assessment area for projects based on dominant natural fire regime and terrain follow.

Table 2-1 – Guidelines for Typical Assessment Sizes

Natural Fire Regime	Terrain		
	Flat to Rolling	Steep and Dissected	Broken With Rocks
Surface	10,000 acres	1500 acres	1500 acres
Mixed	20,000 acres	3000 acres	3000 acres
Replacement	15,000 acres	2250 acres	2250 acres

In many cases because of management objectives, land use, or land ownership patterns the Project Area will be much smaller than a landscape, and in some cases may consist of just one patch or stand. For projects or treatment units such as these the fire regime and FRCC information should be determined for the project and surrounding stands that make up the landscape using the Standard Landscape or Landscape Scorecard fire regime and FRCC Methods. Following this a stand level FRCC can be determined using the Stand Scorecard FRCC Method. The Stand Scorecard FRCC results can then be used for NFPORS and other project submission and reporting for these small, single stand or patch projects or treatments. It is important to remember that the natural fire regime is the same as determined for the surrounding landscape.

Standard versus Scorecard Methods

This guidebook will address three methods for determining FRCC. The first two (Standard Landscape Method – Chapters 3 and Landscape Scorecard Method – Chapter 4) are both landscape scale assessments. The third (Stand Scorecard Method – Chapter 5) is a patch or stand scale assessment.

The Standard Landscape (quantitative) fire regime and FRCC Method provides the training, validation, and ground truth for the scorecard (qualitative) methods. The Landscape Scorecard and Stand Scorecard Method provide little supportive documentation of the inputs to determination of Fire Regime and FRCC, and have only moderate consistency between users, in comparison to the Standard Landscape Method. However the Landscape Scorecard and Stand Scorecard Method have much higher accuracy than a best guess (35-55%) based on the FRCC definitions and photos (table 2-2).

The Landscape Scorecard and Stand Scorecard Method provide a quick approach for field determination of fire regime and FRCC. However, the Landscape Scorecard and Stand Scorecard Method have only moderate accuracy (55-75%) in comparison to the relatively high accuracy (75-100%) that can be obtained using the Standard Landscape Method. This indicates that the Landscape Scorecard and Stand Scorecard will produce the correct Fire Regime and

FRCC 2 out of 3 times (conversely, in error 1 out of 3 times) if used by a person that has been trained and has calibrated their estimates by using the Standard Landscape Method in a similar landscape. In contrast the Standard Landscape Method will produce the correct Fire Regime and FRCC 4 to 5 out of 5 times (conversely, in error 1 or 0 out of 5 times) if used by a person that has been trained and has used the method in similar landscapes. If all polygons within the Standard Landscape Method assessment area are ground truthed to their correct cover, structure, potential vegetation, fire history, and potential fire severity 100% accuracy can be achieved.

Users should be trained first in the Standard Landscape Method to provide them with a ground truth understanding of inputs to fire regime and FRCC and then trained with the Landscape Scorecard Method. The most important perspective for use of the Stand Scorecard Method is that the fire regime and FRCC is a landscape determination first, not a point or patch or stand determination. To understand and rate stand scale relationships the user must first have the context of fire regime and FRCC at the landscape scale. The behavior and effects of fire as well as many other disturbances, within any one patch or stand, are equally dependent on the behavior and effects of fire in the adjacent patches or stands. Through time, natural fire regimes operate on landscape scales to create mosaics of vegetation-fuel patches. Altered fire regimes result in often unsustainable or undesirable mosaics. Hence, it is the condition of vegetation-fuel mosaics and fire regime characteristics as a whole across a landscape that determines FRCC, not necessarily the condition of a particular patch or stands in isolation.

Some considerations for when to use field procedures or mapping procedures for determination of FRCC:

- 1) Most small area (stand-scale) projects will require a field visit and use of the stand-scale FRCC procedures (Stand Scorecard Method), with associated landscape FRCC inputs. Even the best of maps are only 80 to 90 percent accurate and managers of small projects may not want to take the risk of a 1 out of 5 chance of being in error for pre- and post-treatment descriptions of FRCC inputs and determination.
- 2) The larger the landscapes the more difficult it is to accurately determine FRCC using the field procedures. In addition, the larger the landscapes the lower the risk that inclusion of 10 to 20 percent or more error in inputs will cause an error in FRCC.

Table 2-2 – Summary Comparison of Methods and their Recommended Uses

Method	Scale	Recommended Uses	Accuracy
Standard Landscape Method (Chapter 3) (Quantitative)	Landscape	<ul style="list-style-type: none"> • Fire and Land Management Planning • Project Prioritization • Project Planning for areas not characterized by the Standard Method Before • Project Funding Requests • Reporting • Monitoring • Validation for the Scorecard Methods 	75-100%
Landscape Scorecard Method (Chapter 4) (Qualitative)	Landscape	<ul style="list-style-type: none"> • Wildland Fire Implementation Planning • Situation Analysis • Wildland Fire Reporting • Project Planning for areas that have been, or are similar to, areas that have been classified using the Standard Method • Project Funding Requests • Reporting • Monitoring 	55-75% if used by a person that has been trained and has calibrated their estimates by using the Standard Landscape Method in a similar landscape
Scale Scorecard Method (Chapter 5) (Qualitative)	Stand or Patch	<ul style="list-style-type: none"> • Reporting for small treatment areas 	Same as Landscape Scorecard Method

Web Versus Stand Alone Data Entry

Downloadable data entry and reporting software is currently available (<http://frcc.gov> or cd-rom – contact the help desk @ helpdesk@frcc.gov or contact your federal, state, TNC or private FRCC agency coordinator) for fire regime and FRCC Standard Landscape and Landscape Scorecard methods (version 1.0.5 March 1, 2004). We recommend that all users with computer capability use data entry and reporting software (requires MS Access 2000 or a subsequent version). Use of the software provides a much more efficient system for storage, filing, correcting data, sensitivity testing, and producing finished reports with graphics and photos.

A web version will be available to federal agency and TNC personnel with web access. Other personnel can be approved for web version access upon submitting a request through a federal agency or TNC sponsor. This web version will be much more sophisticated than the downloadable version and in the future will have the capability to export data to NFORS and LANDFIRE and the ability to share data. Your federal agency or TNC office may choose to make the web version mandatory when it is available.

Downloadable software for the Stand Scorecard method (version 1.0.5) will be available in 2004. The Stand Scorecard FRCC software will extract data inputs from the associated landscape FRCC database. In order to enter data for the Stand Scorecard Method there must be a corresponding landscape fire regime and FRCC strata record in your data base. This landscape strata record must have the same registration code, project code, project number, project characterization date, strata number, and strata characterization date.

If you do not have access to the web, but have computer capability, install the software from the training cd-rom (available April, 2004). To share data with the Interagency and TNC FRCC working group or other personnel you will need to put the data on a disk.

Quality Control

The examiner code used in FRCC methods is your email address (e.g. jsmith@blm.gov or jsmith@fs.fed.us). This code provides the linkage to the "Student Tracking Database". This database automatically contains information on each student that has participated in formal FRCC training sessions or on the interactive website training. The database also contains information on students participating in the cd-rom training or informal FRCC training that meet requirements. These students will need to assure they meet the training requirements by contacting the FRCC help desk (helpdesk@frcc.gov) or, for users without web access, contact your federal, state, TNC or private agency coordinator (a list is provided on the training CD). The database contains a FRCC "certification code" for those that have met the training requirements and these participants are identified as an FRCC "user" or "trainer" in the data. The database also records the last date of training, and the associated version of methods and software.

Web fire regime and FRCC data cannot be released for sharing with others, or automated export to NFPORS or LANDFIRE, unless they are from a "Certified Examiner." In the future some federal agencies may choose to require a certification code be entered into the NFPORS system for data entry. This would limit data entry capabilities to only certified FRCC examiners.

For FRCC Landscape or Stand Scorecard data records to be identified as "Calibrated" the examiner must have at least 1 FRCC Standard Landscape strata record that has the same Biophysical Land Unit (BPLU, coarse-scale PNVG) code in their web or downloadable software database, as the scorecard record they are entering.