

# Grassland & Fire Ecology

## Collaborative Monitoring

*Southern Plains Fire Group*

*Southern Plains Inventory & Monitoring Network*

## Introduction and Background

Grassland vegetation is the most widespread vegetation type occurring in the Southern Plains Network (SOPN). Exotic species invasions, expanding row-crop agriculture, overgrazing, mineral exploration and establishment of woodlots and shelterbelts have all contributed to grassland degradation and loss of genetic diversity. Monitoring grassland vegetation communities will help SOPN park managers better understand the dynamic nature of these ecosystems and the processes that control them. Monitoring will also provide an early warning of abnormal conditions, which will allow managers to make effective decisions for mitigation. This effort should also be a source of information contributing to the planning of any prairie restoration efforts.

Fire is a critically important natural process that serves as one of the primary influences on the plant and wildlife communities of our national parks and throughout the Great Plains ecosystems. Fire, along with climate, are also the biggest determinants of whether grasslands preclude forests in the Great Plains region (Axelrod 1985, Anderson 1990). Monitoring the effects of fire on park ecosystems is an important part of the Wildland Fire Program. Fire managers need to accurately predict fire behavior under varying weather conditions, and predict how fuel loads will affect fire behavior, plant populations, and tree regeneration. From the perspective of both fire management and ecological health, it is important to understand the effects of fire as a process that shapes our grassland communities. Given the high overlap in our respective programmatic goals in monitoring these ecosystems, it only makes sense for a collaborative effort between the Fire Effects Monitoring Program and the Inventory and Monitoring Program. This project represents the first step toward establishing that collaboration

## Proposed Cooperative Framework

### Goals and Objectives

The overall goal of monitoring grassland communities is to help park managers better understand the dynamic nature of

## 2008 PROJECT SUMMARY



NPS PHOTO

Prescribed fire at Bent's Old Fort National Historic Site

these ecosystems and the processes that influence them. The specific monitoring objectives are:

### *Objective 1. Species composition and community structure:*

To determine status and trends in plant species composition (richness and diversity) and community structure (relative abundance, frequency, distribution, ground cover) of remnant, disturbed and/or restored grasslands.

### *Objective 2. Successional effects of fire or other management treatments on grassland habitats.*

To document the location, extent, and timing of wildland and prescribed fires or other management treatments in SOPN parks. The sampling for this objective will combine the program goals of the I&M Program for ecosystem health with the

Table 1. Primary roles and contributions of the Fire and Inventory and Monitoring Programs toward the collaborative effort.

| Contribution                                                        | Description                          | Lead Group |
|---------------------------------------------------------------------|--------------------------------------|------------|
| Field Crew                                                          | Oversight                            | Fire       |
| Field Crew                                                          | Day to Day                           | Fire*      |
| Data Analysis                                                       | As per Fire & I&M Needs              | I & M      |
| Data Management                                                     | Maintain Database with Shared Access | I & M      |
| Reporting                                                           | see Table 2                          | I & M      |
| * I & M will contribute to the cost of one or two field technicians |                                      |            |



goals of the Fire Program for using fire and other treatments to manage grassland systems.

*Objective 3. Soil structure and chemistry:*

Determine status and trends in soil structure (erosion potential, infiltration rate, compaction, texture, stability) and soil chemistry (bulk soil C:N ratios).

**Collaborative Model**

The collaboration between the fire and monitoring programs is intended to gain efficiency from our respective strengths, programmatic goals, and legacy (Table 1). The Inventory and Monitoring Program approaches grassland monitoring with an emphasis on long-term ecosystem health. In contrast, but not mutually exclusive, the Fire Program approaches monitoring with an emphasis on understanding the effects of wildland or prescribed fire as a management or “natural” treatment on the ecosystem. Not surprising, the parameters that would be monitored from each of these perspectives overlap considerably. Furthermore, most of the park lands are subject to fire or other treatments at some point in time. Consequently, there is no inherent difference between lands being managed with fire or other treatments and the lands for which ecosystem health is being assessed. It also follows that there is considerable efficiency to be gained from a combined effort whereas complimentary types of sampling can add value to the sampling designs that might otherwise occur independently.

**Methods & Results**

During 2008 crews from both the Fire and Inventory and Monitoring Programs worked in cooperation to pilot field efforts to explore opportunities for a collaborative effort. Areas where our respective methodologies differed were sampled simultaneously to determine the relative effectiveness and efficiency of alternative methods for achieving our respective goals and objectives.

Two methodologies in particular that differed between our programs were sampling for species composition and/or cover using point-line intercept vs nested quadrat approaches. Preliminary analysis indicates that nested quadrats probably gain efficiency of time per sample as well as a tendency to detect a greater number of species; however, the trade-offs of one verses another depends very highly on the specific objectives and information needs, particularly whether one is more concerned with general community-level changes or detection of rare species. Further discussion with SOPN parks to refine our objectives will facilitate the methodological determination.

Based on the refinement of objectives, we anticipate a sampling design that will combine an overall probabilistic approach with a more treatment targeted approach (possible paired) (Fig. 1). We emphasize however, considerations regarding the objectives will determine the final spatial and temporal design.

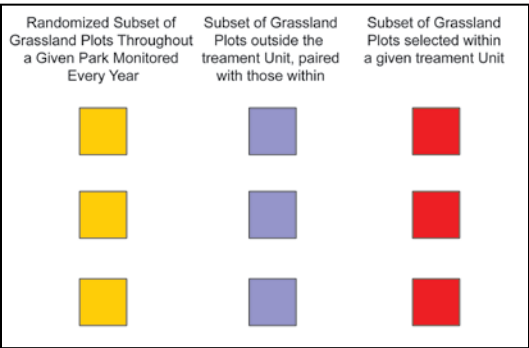


Figure 1. A hypothetical set of sample types to illustrate combining an overall probabilistic design with a more treatment targeted design.

**Analysis & Reporting**

The annual analysis and reporting will be part of the Learning Center for the American Southwest hierarchical approach to products (Table 2); although there may be complimentary and/or mirrored pieces that are reported on NPS Fire websites.

| Table 2. Hierarchy of primary products produced for the Learning Center of the American Southwest. |                                                                                                             |                                      |                                    |            |               |
|----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|--------------------------------------|------------------------------------|------------|---------------|
| Product                                                                                            | Primary Purpose/Scope                                                                                       | Primary Target Audience(s)           | Scale                              | Length     | Frequency     |
| Resource Brief                                                                                     | Status and Trend of Grassland Habitat                                                                       | Superintendents/ Resource Managers   | Park                               | 1 Page     | Annual        |
| Project Summary                                                                                    | Summary of Project Accomplishments and Results for a given year. Extracted from Annual Report               | Resource Managers                    | Park                               | 2 Pages    | Annual        |
| Annual Report                                                                                      | Project Accomplishments and Results for a given year.                                                       | Resource Managers                    | SOPN with individual Park Sections | 5-20 Pages | Annual        |
| Synthesis Report                                                                                   | In depth synthesis of data and supporting evidence. Primary focus on Trends and Influences on those trends. | Resource Managers/ Science Community | SOPN with individual Park Sections | Variable   | Every 5 Years |