



Data Quality Standards for Grassland Monitoring Protocol for the Southern Plains I&M Network and Fire Group

Natural Resource Report NPS/SOPN/NRR—2019/1880



ON THE COVER

Grasslands monitoring plant in Washita Battlefield NHS. NPS Photo

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Abstract

The purpose of this Data Quality Standards (DQS) report is to document the standards, policies, and procedures used by the Southern Plains Network (SOPN) for activities related to the collection, processing, storage, analysis, and publication of monitoring data as described Grassland Monitoring Protocol for the Southern Plains I&M Network and Fire Group (Folts-Zettner et al. 2017a). The policies and procedures documented or referenced in this quality-assurance plan complement the quality-assurance plans for other monitoring activities conducted by the Southern Plains and supplements the quality management plan for the network (Sosinski 2008). The DQS also serves as a guide for all Southern Plains Network personnel who are involved in protocol/program activities and as a resource for identifying memoranda, publications, and other literature that describe associated techniques and requirements in more detail.

Version 1.00

Revision History Log

Previous version#	Revision date	Author	Changes made	Reason for change	New version #
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Introduction

The National Park Service (NPS) Inventory and Monitoring (I&M) Program was established by an act of Congress in 1999 to provide more than 270 national park system units a core suite of baseline minimum scientific information (inventories) and to identify and implement long-term monitoring of high-priority measurements of resource condition in those units (Fancy et al. 2009). The overarching purpose of natural resource monitoring in parks is to develop scientifically sound information on the current status and long-term trends in the composition, structure, and function of park ecosystems, and determine how well current management practices are sustaining those ecosystems.

The purpose of this Data Quality Standards (DQS) report is to document the standards, policies, and

procedures used by the Southern Plains Network (SOPN) for activities related to the collection, processing, storage, analysis, and publication of monitoring data as described in Grassland Monitoring Protocol for the Southern Plains I&M Network and Fire Group (Folts-Zettner et al. 2017a). The policies and procedures documented or referenced in this quality-assurance plan complement the quality-assurance plans for other monitoring activities conducted by the Southern Plains Network and supplement the quality management plan for the network (Sosinski 2008). The DQS also serves as a guide for all Southern Plains Network personnel who are involved in protocol/program activities and as a resource for identifying memoranda, publications, and other literature that describe associated techniques and requirements in more detail.

Protocol Overview

The Grassland Monitoring Protocol for the Southern Plains I&M Network and Fire Group (Folts-Zettner et al. 2017a) describes the background, goals and objectives, sampling design, field methods, data management, reporting and analysis, personnel requirements, and operational requirements for monitoring grasslands in Bent's Old Fort National Historic Site (NHS), Sand Creek Massacre NHS, Fort Larned NHS, Capulin Volcano National Monument (NM), Fort Union NM, Pecos National Historical Park (NHP), Chickasaw National Recreation Area (NRA), Washita Battlefield NHS, Alibates Flint Quarries NM, Lake Meredith NRA and Lyndon B. Johnson NHP.

The primary goal of the grassland monitoring program is to monitor changes in grassland habitats and structure while providing critical information to park managers for implementing appropriate management techniques.

The objectives of the grassland monitoring protocol are 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.
- Determine relationship between status and trends of species composition and community structure and environmental variables including such things as long-term management actions, climate, and atmospheric deposition.

Data and information are shared with parks, NPS staff, and the public through a variety of reports and products. Network staff prepare data summaries that summarize observations. Every six years, each network produces park-specific status and trend reports. Additional products will be derived from the published reports.

Protocol Activities

Data about the dominance, cover, structure, fuels, and taxa are collected using the grassland monitoring protocol (Table 1) (Folts-Zettner et al. 2017a).

Sampling Design

Information regarding the sampling design is provided in Table 2. The methodology is designed to provide insight into the overall resilience of grasslands and the future trajectory of plant communities. The protocol utilizes permanent

transects visits that are repeated biennially so that trends over time can be estimated using a categorical data analysis approach. The results can also be represented spatially, and quickly communicated to park management.

Data Quality Objectives

Data quality values and standards for implementation are provided in Table 3 through Table 6.

For activities that involve quantitative measurements taken by field personnel, requisite Measurement Quality Objectives (MQOs) are defined in Table 4. Taxonomic standards are listed in Table 5, and Table 6 defines data protection standards.

Table 1. Protocol activity matrix for Multi-Network Exotic Plant Monitoring Protocol (Folts-Zettner et al. 2017).

Category	Activity Number	Activity	Description
Site Recon, Establishment, and Maintenance	1	Site Recon	Investigate suitability of sites to be used as sampling location. Data collected and retained (descriptions, photos) for reference when being considered for future work or work to be conducted as a part of other monitoring efforts
	2	Site Establishment	Construction of station infrastructure and surveying of permanent sampling locations
	3	Site Maintenance	Log of damage and replacement, modification, and upgrade history to permanent sampling locations
Field Observations	4	Vegetation Quadrat Measurements	Percent cover of species and/or exposed substrate within 2m x 1m quadrats placed every 5m along transects
	5	Vegetation Transect Measurements - Point-Line Intercept Sampling	Taxa, height, and substrate of site every 30cm along a 30m transect. Used for measuring species dominance in the associated plant community (see SOP 3)
	6	Shrub Density Measurements	Shrub density in a circle with center point at 25m mark on the transect and with a 10m radius. Data recorded by species, age class, whether it is living or dead, and number of individuals of that species (see SOP #7)
	7	Fuels Transect Measurements	Fine fuel loading estimates measured by clipping all vegetative matter and litter within a given quadrat along the transect. Sample then placed in paper bags where it is dried and weighed (see SOP #8)
Sensor Data	8	Photopoint data	Photo-documentation of all transects at each visit provides a visible interpretation of change over time. Two photos at each transects sampled are taken – one from 0m down the transect and one from 50m up the transect. Photos also aid in rebar location (see SOP #3)
Field Sample & Specimen Collection and Processing	9	Fine Fuel Load Sampling	Fine fuel loading estimates measured by clipping all vegetative matter and litter within five 50cm x 50cm quadrats. Quadrats are placed at every 10m along the transect. Sample then placed in paper bags where it is dried and weighed (see SOP #8)
	10	Collection of field grab samples of unknown plants	Collect field samples as necessary to aid in species identification. Samples are collected near (but outside of) the vector block, scanned at 600 dpi and then discarded (see SOP #10)
Laboratory Data	11	Fine Fuel Load	Collected as above (Activity 9). Dried in oven for at least 24 hours at 100 degree C. Dried sample is weighed on an electric balance and a formula applied to determine fine fuel loading (see SOP #8)
External Data	12	Climate	Analysis of nearby weather station and modeled data for temperature, precipitation, and potential evapotranspiration from variety of online sources. Used for synthesis reports, not in for annual reporting

Table 2. Activity-level sample design matrix for Multi-Network Exotic Plant Monitoring Protocol (Folts-Zettner et al. 2017).

Category	Activity Number	Activity	Sampling Design	Revisit Design
Site Recon, Establishment, and Maintenance	1-3	Site recon and establishment	Probability; randomized within grasslands strata throughout each park	One time at initial visit
Field Observations	4	Vegetation Quadrat Measurements	Probability; randomized within grasslands strata throughout each park	Revisit every 1 year
	5	Vegetation Transect Measurements - Point-Line Intercept Sampling	Probability; randomized within grasslands strata throughout each park	Revisit every 1 year
	6	Shrub Density	Probability; randomized within grasslands strata throughout each park	Revisit every 1 year
	7	Fuels Transect Measurements	Probability; randomized within grasslands strata throughout each park	Revisit every 1 year
Sensor Data	9	Photopoint data	Probability; randomized within grasslands strata throughout each park	Revisit every 1 year
Field Sample & Specimen Collection	10	Fine Fuel Load Sampling	Probability; randomized within grasslands strata throughout each park	Revisit every 1 year
	11	Collection of field grab samples of unknown plants	Probability; randomized within grasslands strata throughout each park	As needed
Laboratory Data	12	Fine Fuel Load	Probability; randomized within grasslands strata throughout each park	Revisit every 1 year

Table 3. Data Quality Values (DQVs) for Multi-Network Exotic Plant Monitoring Protocol (Folts-Zettner et al. 2017).

Category	Data Quality Value	Definition	Protocol Considerations
Intrinsic Data Quality	Accuracy	Measurements reflect the true value of the parameter being observed. This applies to measures (e.g., length, width, position, quality value) or classes (species, types, or categories). Includes components of precision and bias.	Crew members are selected and trained with species identification skills, use of protocol and GPS instruments (SOP#2). Permanent rebar ensures transect tape is properly aligned (SOP #4). Collection of field grab samples aids in the identification of unknown plants (SOP #10).
	Representativeness	Measurements represent conditions at the time of sampling. Combined with accuracy, leads to repeatable data collection.	Sites monitored are permanent transects within grassland habitats and will be compared to themselves and other transects in similar habitats over time.
Contextual Data Quality	Comparability	The degree to which data can be compared among sample locations, data sources, or periods of time.	Sites monitored permanent transects within grassland habitats and will be compared to themselves and other transects in similar habitats over time. Standard operating procedures are identical among transects.
	Timeliness / Currency	How recent the data need to be to be considered valid for their intended use. Data represents conditions and/or is available and in a format for use at the appropriate time in the decision-making process.	Data are collected annually. Annual data summaries are prepared and synthesis reports are prepared every 6 years. Data management is conducted in accordance with SOP 13.
	Completeness	All data/ measures required to evaluate accuracy representativeness are present; incomplete data sets (either at a location, across sampling locations, or over time) lose utility or relevance. Data records contain values as planned across the period of record.	Methods, sampling plans, and analyses are designed and implemented so that they result in a complete dataset across space and the planned period of record. However, logistical issues and safety issues may result in an incomplete record.
Representational Data Quality	Consistent Representation	Use of standard definitions when describing data quality or resource quality based on data	Provisional data are shared, but noted as not certified. Data certification takes place as described in Section 4.3 of Folts-Zettner et al. 2017a.
Data Accessibility	Secure	Access to data, products, and systems limited to appropriate audiences.	Protected data may be released in limited cases only with park Superintendent or Chief of Resources approval following park procedures. Networks also are developing sensitive information plans.

Table 4. Measurement Quality Objectives for Multi-Network Exotic Plant Monitoring Protocol (Folts-Zettner et al. 2017).

Category	Measure / Quality Indicator	Quality Objective
Site Establishment	Location Accuracy - Transect	Transect location permanently marked with rebar at 0m and 50m
	Location Description Detail	Description provided to drive to location and navigate to transect site. Transect photos included to assist in locating rebar at 0m and 50m. Use of metal detector to locate rebar where vegetation is thick.
Vegetation Quadrat Measurements	Distance Accuracy	± 3cm
	Taxonomic Resolution	Identifications made to the species level
	Identification Accuracy	95% accuracy
	Identification Completeness	95% of observations made to species level
	Vegetative Cover	85% accuracy
	Ground Cover	85% accuracy
Vegetation Transect Measurements	Distance Accuracy	± 3cm
	Taxonomic Resolution	Identifications made to the species level
	Identification Accuracy	95% accuracy
	Identification Completeness	95% of observations made to species level
	Vegetative Height Measurement Accuracy	± 3cm
	Ground Layer Condition	95% accuracy
Shrub Density Measurements	Distance Accuracy	± 3cm
	Taxonomic Resolution	Identifications made to the species level
	Identification Accuracy	95% accuracy
	Identification Completeness	95% of observations made to species level
	Plant Count	95% accuracy
	Age Class Identification	95% accuracy
Fuels Transect Measurements	Distance Accuracy	± 3cm
	Slope Measurement Accuracy	2 degrees
	Dead and Detached Woody Fuel Measurement Accuracy	95% accuracy
	Depth for Litter and Duff Measurement Accuracy	± 3cm
Fine Fuel Load Sampling	Distance Accuracy	± 3cm
	Lab & Field Tare Weights	± 2g
	Field (Wet) Sample Weight	± 2g
	Dry (Lab) Sample Weight	± 2g
Photo points	Image resolution	10 megapixel
	Image format	JPG w/ embedded metadata

Table 5. Taxonomic standards to be used in Multi-Network Exotic Plant Monitoring Protocol (Folts-Zettner et al. 2017).

Category	Activity	Standard to be Used	Reference / Authority
Collection of Observational Data	Vegetation transect measurements, vegetation quadrat measurements, shrub density measurements	Field Subject Matter Expert	Field crew lead w/ identification proficiency. Protocol lead helps with identification of unknown specimens via collection of field grab samples and scanning at 600 dpi.
Reporting of Observational Data	Vegetation transect measurements, vegetation quadrat measurements, shrub density measurements	Scientific Publication	Allred and DeWitt Ivey (2012), Diggs Jr. et al. (1999), DiTomaso and Healy (2007), University Press (1986), Shaw (2012), Powell (2000), Powell et al. (2008).

Table 6. Data Protection standards for Multi-Network Exotic Plant Monitoring Protocol (Folts-Zettner et al. 2017). With the exceptions noted, all data collected are to be made publicly available in a timely fashion.

Category	Type of Data	Level of Protection	Rules for Dissemination
Resource Data and Information	Vegetation Transect Measurements	No Protection	None
	Vegetation Quadrat Measurements	No Protection	None
	Shrub Density Measurements	No Protection	None
	Fuels Transect Measurements	No Protection	None
Personally Identifiable Information	Non-NPS staff information	Legally Protected	Release of data to the public does not contain names

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