

## **Springs Monitoring Protocol Implementation Plan for the Park Units in the Southern Colorado Plateau Network**

### **Standard Operating Procedure (SOP) # 11**

#### **Data Management**

#### **Version SCPN\_Springs\_SOP11\_20180930**

##### **Revision History Log:**

| Prev.<br>Version # | Revision<br>Date | Author | Changes Made | Reason for Change | New<br>Version<br># |
|--------------------|------------------|--------|--------------|-------------------|---------------------|
|                    |                  |        |              |                   |                     |
|                    |                  |        |              |                   |                     |
|                    |                  |        |              |                   |                     |
|                    |                  |        |              |                   |                     |
|                    |                  |        |              |                   |                     |

This SOP is adopted from the Northern Colorado Plateau Network's SOP #9 Data Management, Version 1.00 (June 2016) in Weissinger, R., M. Moran, S. Monroe, and H. Thomas. 2017. Springs and seeps monitoring protocol for park units in the Northern Colorado Plateau Network, Version 1.00. Natural Resource Report NPS/NCPN/NRR—2017/1439. National Park Service, Fort Collins, Colorado.

This Standard Operating Procedure (SOP) describes data management procedures for all data derived from springs monitoring in Southern Colorado Plateau Network (SCPN) park units. This SOP is part of a Protocol Implementation Plan based on the Northern Colorado Plateau Network (NCPN) Springs protocol. SCPN plans to use the existing NCPN database and quality control and quality assurance procedures.

### **1 Definitions and Acronyms**

|                |                                                                                                                                                             |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>NPS</i>     | National Park Service                                                                                                                                       |
| <i>NCPN</i>    | Northern Colorado Plateau Network                                                                                                                           |
| <i>SCPN</i>    | Southern Colorado Plateau Network                                                                                                                           |
| <i>I&amp;M</i> | Inventory & Monitoring Program of the National Park Service                                                                                                 |
| <i>IRMA</i>    | Integrated Resource Management Applications                                                                                                                 |
| <i>SOP</i>     | Standard Operating Procedure                                                                                                                                |
| <i>GIS</i>     | Geographic Information Systems                                                                                                                              |
| <i>GPS</i>     | Global Positioning System                                                                                                                                   |
| <i>PDF</i>     | Portable Document Format                                                                                                                                    |
| <i>TIFF</i>    | Tagged Image File Format                                                                                                                                    |
| <i>JPG</i>     | Joint Photographic Experts Group File Format                                                                                                                |
| <i>FGDC</i>    | Federal Geographic Data Committee. The interagency committee that promotes the coordinated development, use, sharing, and dissemination of geographic data. |

|                                          |                                                                                                                                                                                                                                                                                                       |
|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Tabular dataset</i>                   | A dataset organized in a table or group of tables where each column and row has a specific interpretation; often produced by Microsoft (MS) Excel, MS Access, database, or statistical software, and managed as text, spreadsheet, or relational databases.                                           |
| <i>Spatial dataset</i>                   | A dataset that is natively read by mapping software; often produced by mapping software, such as ESRI ArcMap and ArcInfo; also includes georeferenced imagery, geodatabases, as well as hardcopy aerial photographs, satellite imagery and maps.                                                      |
| <i>Primary dataset</i>                   | The dataset that is the most comprehensive and representative of the data associated with a project. This dataset can normally be used independently of other project datasets and is often distributed to external users. The primary dataset can be tabular or spatial.                             |
| <i>Raw data</i>                          | Data that have not been subjected to either quality control or documentation procedures; includes data recorded by hand on hard-copy forms, digital files from handheld devices, GPS receivers, telemetry data loggers, etc.                                                                          |
| <i>Certified data</i>                    | Finalized project data, i.e., data that have undergone thorough quality assurance and screening as well as complete documentation.                                                                                                                                                                    |
| <i>Working database</i>                  | A project-specific database for entering and processing data for the current season (or other logical period of time). This might be the only database for short-term projects where there is no need to distinguish working data for the current season from the full set of validated project data. |
| <i>Master database</i>                   | Project-specific database for storing the full project data set, used for viewing, summarizing, and analysis. Only used to store certified data.                                                                                                                                                      |
| <i>Data products</i>                     | Information that is derived from certified project data.                                                                                                                                                                                                                                              |
| <i>Project level metadata</i>            | A metadata record associated with the primary project dataset that contains cross references to all project data products and is uploaded to the IRMA Data Store.                                                                                                                                     |
| <i>Quality assurance (QA) procedures</i> | Procedures used to maintain a defined level of quality throughout all stages of data development.                                                                                                                                                                                                     |
| <i>Quality control (QC) procedures</i>   | Procedures used to monitor or evaluate the quality of data products.                                                                                                                                                                                                                                  |

## 2 Overview of Springs Data Management

Springs monitoring data are acquired as specified in the protocol SOPs using two different methods: 1) digitally recorded by a GPS (spatial data) or data-logger (water quality) and, 2) manually recorded on paper data sheets (hydrology, vegetation and site characterization). Springs data are stored in a Microsoft Access database designed to accommodate all data on the various field forms (see Section 3) and some of the logging equipment. This database is populated via a combination of data import and data entry. Digital data recorded during data collection using digital equipment are imported when

the complete file is required, or a single summary or point value is manually entered. Data recorded on paper data sheets are manually entered into the database (see Section 4). Continuous data files (temperature, water level, atmospheric pressure) are stored in a working directory sub-folder and entered into Aquarius. Once all data have been entered and imported, the data are verified and validated (see section 5). Data are subsequently documented (see Section 8) and archived (see Section 7). Hydrologic data stored in the SCPN database are exported to the NPStoret format so that they can be shared with the NPS Water Resources Division.

### 3 Database Design

The primary dataset associated with the SCPN springs monitoring project is a tabular dataset stored in a Microsoft (MS) Access database, referred to subsequently as the springs database. This database is in Access and has a frontend/backend file structure:

- *Springs\_FE\_<Version>.accdb*: This frontend file contains all queries, forms, reports, and associated Visual Basic (VB) application code.
- *Springs\_BE\_<Version>.accdb*: This backend file contains the database tables.

The frontend/backend file structure allows multiple users to enter data in a network environment, and allows for easy backup and transfer of the data tables. Users typically launch the frontend file, and a utility will prompt them to establish a link to the backend file.

The springs database conforms to Natural Resource Database Template standards established by the national Inventory and Monitoring program. The design includes standardized core tables for elements, such as Locations and Events, that are common to most monitoring datasets, as well as field data tables that can be customized to meet project data requirements. Field data tables are organized largely by SOP and are linked in time and space to enable integrated data analysis. Species, contacts, and attribute look-up tables provide standardized values for many data fields, and metadata tables track database revisions and data edits.

An overview of the database design is provided below. Each springs monitoring site has a location record, which stores basic location information as well as other site characteristics that are recorded during site establishment. Each spring can have many site visits. During each site visit, several different types of observations are recorded. The main types of monitoring observations recorded are described briefly below:

- Flow is recorded at most sentinel sites at Canyon de Chelly National Monument (CACH), Chaco Culture National Historical Park (CHCU), and Glen Canyon National Recreation Area (GLCA).
- Depth to water is recorded in two shallow piezometers at one sentinel site in Yucca House National Monument (YUHO).

- Core water quality measurements (pH, specific conductance, and water temperature,) are recorded at all sentinel monitoring sites. Optional water quality measurements (dissolved oxygen) may also be recorded at sentinel monitoring sites.
- Weather conditions (e.g., air temperature, cloud cover) are recorded at all sentinel monitoring sites.
- Endemic plant counts are recorded at all hanging garden sites.
- Repeat photos are taken at all sites.
- Soil erosion is estimated for each geomorphic surface at all sites.
- Disturbance impacts are estimated for each geomorphic surface at all sites.
- Qualitative descriptions of site disturbances are recorded at all sites.
- Exotic species observed during timed plant and animal walks are recorded at all sites.

#### **4 Populating the Springs Database**

Prior to each field season, the working database for the springs monitoring protocol is prepared for the upcoming field season's data entry. The working database is initially an "empty" database, i.e., it contains no observation data, just populated lookup tables and certain "static" site information (e.g., location information). The working database is used for data entry, verification, and validation for a given field season. After the dataset in the working database is certified, it is merged into the master springs database.

For the remainder of this document, the term "springs database" refers to the working database. The springs database is populated via a combination of data import and data entry.

##### **4.1 Data Entry**

The majority of data in the springs database will be populated via data entry. Data entry should occur as soon as possible after data collection is completed, before the next observation occurs, and by the person who collected the data or someone who is familiar with the project and data. The primary goal of data entry is *to record data in digital form with 100% accuracy*.

Detailed data entry instructions are provided in the Springs Database User's Guide (to be developed). The user's guide will be available as a standalone document in the same folder location as the working copy of the springs database:

Z:\Active\_Projects\IM\Monitoring\Water\_Resources\spring\_ecosystems\data\databases

The project manager makes certain that persons performing data entry are familiar with the user's guide and understand how to enter data and follow the protocols. Data entry technicians are responsible for becoming familiar with the field data forms, database software, database structure, and any standard codes for data entry. The data manager, in conjunction with the project manager, will ensure that the user's guide is kept current as new features are implemented in the database and/or as data entry procedures change. Location and elevation data are expected to be relatively static over time. Thus, GPS data will normally only be entered when a site is initially established.

QA/QC measures for data entry are built into the database forms as constraints to automatically validate data where possible. Data entry forms maximize the use of range limits, pick lists, and spelling checks. Error messages alert the operator to correct mistakes. Any errors or omissions that become apparent during data entry should be resolved as soon as possible. In such cases, the data entry technician should contact the person who collected the data for clarification. The appropriate modifications should then be made to the field sheets or documented in a log according to the instructions provided in Section 5.

#### 4.2 Data Import

Some information for springs monitoring sites come from continuously monitoring equipment used only for the duration of the sampling trip (temperature, core parameters). This information is either summarized external to the database and a single value is entered or all of the data is imported into the database. When all data is imported into the database, the database will have the file source information as well.

### **5 Data Verification and Validation**

To ensure that springs monitoring data are of the highest possible quality, verification and validation of springs monitoring data will be performed according to the procedures described in Chapter 6 and Chapter 7 of the Data Management Plan for the Southern Colorado Plateau Network (SCPN 2006). *Data verification* checks that data entered into a secondary (i.e., electronic) format match the source data, while *data validation* checks that the data make sense.

#### 5.1 Data Verification

Data verification occurs both during and immediately follows data entry and involves checking the accuracy and completeness of the computerized records against the hard copy field records and identifying and correcting any errors. The following verification methods will be used to verify springs data:

1. **Visual review at data entry.** The person doing data entry verifies each and every record after input and immediately corrects any errors.
2. **Visual review after data entry.** All records are compared to the original data source. Each data field on the corresponding electronic data entry form is compared with the original values from the hard copy, preferably by a second person who did not perform the data entry. Any errors that are discovered are corrected in the database as soon after data entry as possible.
3. **Summary queries and tallies.** Queries are run that detect broad errors such as duplicate or omitted records. Examples of such queries are given below:
  - a. Listing and count of the monitoring springs established by park by year.
  - b. Listing and count of the monitoring springs visited by park by year.

- c. For each year/park/spring combination, a count of the number of photo points recorded.
4. **Visual review of spatial data.** Using GIS, springs monitoring location data are visually inspected for accuracy. This review will take place at the end of the field season.

## 5.2 Data Validation

While many errors are prevented by including constraints and validation routines that function during data entry, additional review of the data by the project manager is needed to detect generic and specific errors that fall outside the scope of automated validation.

Invalid data commonly consist of slightly misspelled names, the wrong date, or out-of-range errors in parameters with well-defined limits (e.g., elevation). Other errors consist of unreasonable metrics or associations. For example, suppose a species was dominant at a spring during the current year's visit, but there was no observation recorded during the previous year's visit. Such data seem questionable and might indicate a species identification error. These types of logic errors (or potential errors) can be challenging to resolve, and in some cases it may not be possible to resolve them during the current year. Such questionable data will be flagged for future resolution.

Validation queries are of two types: one type presents tabular data in ways that allow records to be reviewed for content and context; the other type performs specific calculations or routines to detect logic or range errors. Corrections to errors detected during validation require notations in the *original paper field records* about how and why the data were changed. Modifications to the field records, whether made during data collection or subsequently, should be clear and concise while preserving the original data entries or notes. The original data entries should be crossed out with a single line and initialed - they should **not** be erased. Validation efforts should also include a check for the completeness of a data set since field sheets or other sources of data could easily be overlooked.

## 5.3 Data Quality Review and Communication

The project manager and any personnel involved in data collection or entry will meet several times during the field season to discuss data quality problems and issues. Procedures may need revision if verification and validation processes reveal an unacceptable level of data quality. Quality checks may also reveal the need to modify field or computer forms if data transcription or entry errors are frequent.

Once validation has been completed, the validation level of each record in the database will be indicated in a validation column.

Validation levels include:

- Valid: This record is valid and usable
- Issue: This record contains an unresolvable issue but may be usable for some purposes

- **Replaced:** This record reflects the original data as recorded on the datasheet but a new corrected record has been created and should be used for reporting and analysis
- **Correct:** This record contains the corrected information that should be used for reporting and analysis
- **Error:** This record contains an unresolvable issue that renders it unusable for reporting or analysis

In addition, each record will indicate the version of the SOP used in collecting the record.

## 6 Version Control

Version control is the process of managing copies of changing files over the course of a project. Change includes any alteration to the structure or content of the files, which should not be made without the ability to fully recover a dataset as it existed before changes were made. SCPN uses several techniques to help ensure proper version control: data archiving (refer to Section 7 for data archiving details), directory structure conventions, backup procedures (refer to the Appendix B of the Data Management Plan for the Southern Colorado Plateau Network (SCPN 2006), and database versioning.

### 6.1 Directory Structure Conventions

SCPN has adopted directory structure conventions for I&M project folders, which are detailed in the Data Management Plan for the Southern Colorado Plateau Network (SCPN 2006). Based on these conventions, each project has an active folder for storing all current or working project files and an archive folder for storing archived project files. In general, the active project folder stores only the most recent project files (e.g., data and reports from current year, current protocol version). All active project folders are stored on the SCPN Common Files (Z:). The active springs project folder is in the following location:

Z:\Active\_Projects\IM\Monitoring\Water\_Resources\spring\_ecosystems

The structure of the active project folder is as follows (all folders are not shown):

- **Data:**
  - **Database** (Springs database):
    - **Backups:** Contains one or more backup copies of database files made during data entry (not retained permanently).
    - **Current:** Contains the working database (current year data) and user's guide.
    - **Master:** Contains a copy of the master database (complete data record) to be used for analysis and reporting (the master database is stored in the springs archive folder).
  - **Field\_Forms:** Contains scanned field forms for current year.
  - **GPS\_Downloads:** Contains corrected data downloaded from GPS units.
  - **Spatial:** Contains GIS files related to site selection.
- **Field\_Crews:** Contains files used by field crews, such as plant lists and trip reports.

- **SCPN\_Working\_Files:** Contains miscellaneous files used internally, such as database requirements documentation.
- **Project\_Life\_Cycle:** Contains files related to project data life cycle tracking for current year, e.g., data certification form, data quality documentation (refer to Section 8 for more details on the project data life cycle).

## 6.2 Database Versioning

Database versioning refers to the process of tracking modifications to the database structure or application code, which can occur independently of modifications to the data. SCPN uses a version numbering scheme to track database modifications, in which modifications are grouped into software releases. Major releases are those involving significant changes to the database and are designated with the next whole number (e.g., version 2.0, 3.0, 4.0 ...). For releases with only minor database changes (e.g., bug fixes), version numbers increase incrementally by hundredths (e.g., version 1.01, version 1.02, etc).

## 7 Data Archiving

Archiving is a critical step in ensuring the long-term preservation of data. Springs data will be archived on an annual basis, after the current year data have been certified and annual reporting completed. Archiving of certain data may occur more frequently, e.g., if a protocol version change occurs. Archiving will be done for both digital and hard copy data.

### 7.1 Digital Data Archiving

All digital springs data will be archived on the SCPN read-only shared drive in the springs archive folder (Z:\Archive\Monitoring\_Archive\Spring\_Ecosystems). Table 1 lists the springs monitoring digital data files that require archiving, along with their respective archive folder locations. The digital files listed in Table 1 will also be burned onto an archival-standard CD or DVD and sent to the Western Archeological and Conservation Center (WACC) according to the procedures outlined in the NCPN Archiving Guidance Document (NCPN-NPS 2010). WACC is the official archival repository for all SCPN data. This facility provides temperature and humidity-controlled storage conditions and a professional archives staff, and it meets all NPS museum standards.

**Table 1.** Springs Digital Data Archiving Summary

| Data Product(s)/ File(s) | Archive Location <sup>1</sup>       | Comments                                                                                                                                          |
|--------------------------|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Database                 | Data\<year <sup>2</sup> >\Database\ | <ul style="list-style-type: none"> <li>Contains certified springs database files for a given year, master database files, and metadata</li> </ul> |
| Field forms              | Data\<year>\Field_Forms\            | <ul style="list-style-type: none"> <li>Contains digital field forms (PDF) for a</li> </ul>                                                        |

<sup>1</sup> Archive location is relative to R:\Archive\Monitoring\_Archive\Springs\ unless stated otherwise.

<sup>2</sup> <year> indicates year in yyyy format.

| <b>Data Product(s)/ File(s)</b> | <b>Archive Location<sup>1</sup></b>                                             | <b>Comments</b>                                                                                                                                                                                                                                               |
|---------------------------------|---------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                 |                                                                                 | given year                                                                                                                                                                                                                                                    |
| GPS data                        | Data\<year>\GIS_Data\GPS_Data\                                                  | <ul style="list-style-type: none"> <li>Contains both uncorrected and corrected GPS data files for a given year</li> </ul>                                                                                                                                     |
| Project data life cycle files   | Project_Life_Cycle\<year>\                                                      | <ul style="list-style-type: none"> <li>Contains archived files related to project data life cycle tracking for a given year</li> </ul>                                                                                                                        |
| Protocol                        | Protocol\<version <sup>3</sup> >\                                               | <ul style="list-style-type: none"> <li>Contains archived protocol files (PDF and source files) for a given version</li> </ul>                                                                                                                                 |
| Protocol review                 | Protocol_Review\<year>\                                                         | <ul style="list-style-type: none"> <li>Contains archived protocol review documents for a given year</li> </ul>                                                                                                                                                |
| Reports                         | Reports\<year>\                                                                 | <ul style="list-style-type: none"> <li>Contains archived report files (PDF and source files) for a given year</li> </ul>                                                                                                                                      |
| Sampling design files           | Sampling_Design\<year>\                                                         | <ul style="list-style-type: none"> <li>Contains archived files related to sampling design for a given year</li> </ul>                                                                                                                                         |
| Photos                          | Z:\Archive\SCPN_Photos_Archive\SCPN_Photos\Springs                              | <ul style="list-style-type: none"> <li>Archive location is an absolute path</li> <li>Renamed photo files archived as part of NCPN photo database processing - refer to <u>NCPN Photo Management Guidance Document</u> (NCPN-NPS 2008b) for details</li> </ul> |
| Original photos                 | R:\Archive\SCPN_Photos_Archive\Raw_Photo_Data_Archive\Monitoring\Springs\<year> | <ul style="list-style-type: none"> <li>Archive location is an absolute path</li> <li>Contains original, unedited (e.g., not rotated) photo files</li> <li>Archived as part of photo database processing</li> </ul>                                            |

## 7.2 Hard Copy Data Archiving

All hard copy springs data sheets are scanned and the hard copies archived locally. We have found it necessary to have direct access to these hard copies during the process of standardizing the data and transferring databases to SQL Server. When the data has been standardized and transferred to SQL Server, these datasheets will be archived at WACC according to the procedures outlined in the NCPN Archiving Guidance Document (NCPN-NPS 2010). Table 2 lists the springs monitoring hard copy data files that require archiving, along with a summary of archiving procedures. Digital copies of applicable items in Table 2 are also provided to parks for their working files.

**Table 2.** Springs Hard Copy Data Archiving Summary

| <b>Data Product(s)/File(s)</b> | <b>Comments</b>                                                                                                                                                                                               |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Field forms                    | <ul style="list-style-type: none"> <li>Original field forms stored in SCPN archives at WACC.</li> <li>Digital copies retained in SCPN office.</li> </ul>                                                      |
| Reports                        | <ul style="list-style-type: none"> <li>Archival copies stored in SCPN archives at WACC.</li> <li>Hard copies retained in SCPN office and provided to parks included in springs monitoring project.</li> </ul> |
| Protocol                       | <ul style="list-style-type: none"> <li>Archival copies stored in SCPN archives at WACC.</li> </ul>                                                                                                            |

| <b>Data Product(s)/File(s)</b> | <b>Comments</b>                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                | <ul style="list-style-type: none"> <li>• Hard copies retained in SCPN office.</li> <li>• Digital copies provided to parks included in springs monitoring project.</li> </ul>                                                                                                                                                                                                                           |
| Protocol review                | <ul style="list-style-type: none"> <li>• Archival copies stored in SCPN archives at WACC.</li> <li>• Hard copies retained in SCPN office.</li> </ul>                                                                                                                                                                                                                                                   |
| Photos                         | <ul style="list-style-type: none"> <li>• Slides or selected prints stored in SCPN archives at WACC.</li> <li>• Digital copies retained in SCPN office.</li> </ul>                                                                                                                                                                                                                                      |
| Data/metadata Printouts        | <ul style="list-style-type: none"> <li>• Archival copies of project-level metadata stored in SCPN archives at WACC.</li> <li>• Hard copies retained in SCPN office.</li> <li>• Digital copies of relevant printouts provided to parks included in springs monitoring project.</li> <li>• Above applies to any other data/metadata printouts deemed critical to long-term springs monitoring</li> </ul> |
| Project data life cycle files  | <ul style="list-style-type: none"> <li>• Archival copies stored in SCPN archives at WACC.</li> <li>• Hard copies retained in SCPN office.</li> </ul>                                                                                                                                                                                                                                                   |

## 8 Metadata

Metadata, which is defined as structured information about the content, quality, condition, and other characteristics of data, is a critical step toward ensuring that data sets are usable for their intended purposes well into the future. Metadata can take many different forms, including formal FGDC-compliant metadata, IRMA Data Store records, and protocol version information.

To comply with NPS metadata requirements, metadata for springs datasets will be completed for each record within the dataset and will include the validation level, protocol used while collecting the data, and certification level (to be determine with further guidance from the central office). In addition an IRMA Data Store metadata record will be created for the springs project. The Data Store metadata record, also referred to as the project level metadata, will be updated annually and will include metadata for all of the component parts of the springs project including the databases, GIS data, photos, logger files, and reports.

## 9 Photo Management

Photos taken as part of springs monitoring are managed following SCPN photo management procedures, which are described in detail in the Data Management Plan for the Southern Colorado Plateau Network (SCPN 2006). This section will focus on digital photo management, since springs monitoring photos are taken with digital cameras.

Photos are uploaded to Z:\Active\_Projects\IM\Monitoring\Water\_Resources\field\_resources\images\ folder. Internal to this folder, the photos are placed in the correct <Park> folder and a <VisitDate> subfolder. The photo metadata is entered into ThumbsPlus. This drive is backed up regularly, with a backup rotation scheme that

includes off-site storage of backups. Refer to the Z:\SCPN\_Operation\Program\_Management\Program\_Documents\Risk\_Mnagement\2017\SCPN\_FY17\_Contingency\_Plan\_Updated.docx for detailed backup procedures. During the entry of metadata into ThumbsPlus, any photo issues are addressed (e.g. duplicate files).

Copies of the photos are burned onto archival-standard DVDs and sent to WACC, the official archival repository for SCPN data. This is in accordance with NPS Director's Order 11D: Records and Electronic Information Management (NPS 2012), which requires that all NPS natural resource records be retained permanently and receive archival care as soon as practical.

## **10 References**

- Beer, M., E. Nance, A. Wight, M. Powell, and R. DenBleyker. 2005. Northern Colorado Plateau Network, data management plan. National Park Service, Inventory and Monitoring Program, Northern Colorado Plateau Network, Moab, UT. 86 pp plus appendices.
- SCPN-NPS 2006. Data Management Plan for the Southern Colorado Plateau Network, Flagstaff, AZ.
- SCPN-NPS 2017. Component Information Technology Contingency Plan for the Southern Colorado Plateau Network, Flagstaff, AZ
- NCPN-NPS 2010. Archiving Guidance Document, Version 2.00. National Park Service, Inventory and Monitoring Program, Northern Colorado Plateau Network, Moab, UT.