

# Northern Great Plains Network

National Park Service



## Data Management

### *Stream Channel Monitoring*

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## Summary

This standard operating procedure (SOP) describes data management for NGPN Stream Channel Monitoring (Thornbrugh et al. 2019). The procedures are adapted from the Plant Community Composition and Structure Monitoring Protocol for the Northern Great Plains I&M Network - Standard Operating Procedures (Symstad et al. 2012) and the Integrated Aquatic Community and Water Quality Monitoring of Wadeable Streams in the Klamath Network: Narrative and Standard Operating Procedures (Dinger et al. 2013).

## Revision Log

| Previous Version | Revision Date | Author      | Changes Made                                                                  | Reason for Change                                                                                                                                                            | New Version |
|------------------|---------------|-------------|-------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| 1.0              | 12/21/22      | Anine Rosse | Updates to specify how to enter data from each form into a reporting template | No SOP covers how data is currently entered from datasheets into excel sheets which can be used directly in reporting. As of 2022 the database referenced is not being used. | 1.1         |
|                  |               |             |                                                                               |                                                                                                                                                                              |             |
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This SOP is adopted with substantial revisions from Symstad et al. (2012) and Dinger et al. (2013).

## Differences in methods

- Protocol- and NGPN-specific staff roles, file layout, and naming conventions
- Simplified data management processes reflecting smaller data collection effort
- Updated data entry procedures as they exist now in 2022. Zipped excel files can be uploaded to IRMA in place of a Microsoft Access database.

## Introduction

This protocol produces three major types of data for the Network to manage: paper data sheets, photographs, and spatial data collected with GPS receivers.

Paper data sheets will be entered into reporting templates from Southeast Coast network with a few changes and can be used directly in generating data reports. As of 2022, the relational database from Klamath network only exists as a template and is not set up for front-end users. The reporting templates can be stored in each park's folder then imported to the Access database or EQuIS database.

## Procedures

The Aquatic Ecologist is responsible for the data during entry, verification and validation. The Aquatic Ecologist ensures consistency between field forms and the database by noting how and why any changes were made to data on the original field forms. In general, changes made to the field forms should not be made via erasure, but through marginal notes or attached explanations. Rescan field datasheets with corrections, notes, or other changes, replacing the original files.

### File Naming and Storage

Use standard NGPN file naming conventions whenever possible. In general, name files following the template **PARK\_SCM\_ID\_Content\_YYYYMMDD**, separating all file name components by underscores.

- **PARK** is the four-letter park code,
- **SCM** is used to indicate stream channel monitoring,
- **ID** is the site identification number, currently only 001 is used being there is only one site per park
- “**Content**” indicates a description of the file. Options for the file contents include:
  - Datasheets
  - Reporting\_Form1

- Reporting\_Form2
  - Reporting\_Discharge
  - Reporting\_Detailed\_Transects
  - AllProfiles
  - ReportingBasinCharacteristics
  - IndexSiteLocations
  - “Field\_Notes” for written field notes kept in a notebook or on loose-leaf paper
- **YYYYMMDD** is the sampling visit date (or first day of a multi-day visit), in the format: year (4 digits) month (2 digits) day (2 digits). The exception to this date format is in the approved/accepted data files, ready for publication, where only the year (YYYY) is listed before the file extension.

Store scanned data sheets, field notes, and unprocessed spatial data on the NGPN file server in a folder for the sampling year, in the respective Park’s DATA subfolder in the SCM workspace (e.g., N:\Groups\Monitoring\Stream\_Channel\DETO\DATA\2019). Use the park’s IMAGES folder to store photographs and photo logs.

The Aquatic Ecologist checks that all electronic files are legible and correctly named.

### **Spatial Data (from GPS receivers, etc)**

Spatial data files collected with GPS receivers should be stored in the GIS folder on the N drive using the same file naming conventions. These files may include GPX, KML/KMZ, or RINEX formats. Spatial data should include rebar locations and transect cross-sections stored in NAD 83 2011 datum. If the data file does not contain adequate metadata to identify the receiver type and settings (as with some older Garmin receivers), create a text file that describes the receiver used and its settings.

### **Scanning and Data Entry**

On their return to the office, field crews will immediately scan data sheets to the NGPN file server. Combine all data sheets from a single site visit into a single Portable Document Format (PDF) file. If a site visit took more than one day, use the visit start date for naming the file.

Enter data into the reporting sheets as soon as possible after collection, but no more than two weeks after the site visit. Data should be entered by a person familiar with field procedures and data. Current Reporting Templates are stored N:\Monitoring\Stream\_Channel\Protocol\Data Entry Templates, make sure to use the most recent one. The templates follow the format of the datasheets. There are four main forms to enter in addition to the Basin Characteristics Reporting form which is from the GIS desktop exercise and the details of which are in the

SCM\_SOP\_WatershedAndSegmentScaleAssessment. The data generated in that exercise can be input directly in the Basin Characteristics worksheet. The other 4 sheets are :

- Detailed\_Transects\_Reporting
- Form\_1\_Reporting
- Form\_2\_Reporting
- Discharge\_Reporting

As of winter 2022, we are on the 1.1 version of the templates. Copy the template from here:

N:\Monitoring\Stream\_Channel\Protocol\Data Entry Templates and paste the appropriate park's year folder like so: N:\Monitoring\Stream\_Channel\KNRI\DATA\2022.

Rename :

- Basin\_Characteristics\_Reporting\_Template\_20221222.xlsx to PARK\_SCM\_001\_Basin\_Characteristics\_Reporting\_YYMMDD.xlsx
- Discharge\_Reporting\_Template\_20221222.xlsx to PARK\_SCM\_001\_Discharge\_Reporting\_YYMMDD.xlsx.
- Detailed\_Transect\_Reporting\_Template\_20221222.xlsx to PARK\_SCM\_001\_Detailed\_Transect\_Reporting\_YYMMDD.xlsx.
- Form\_1\_Entry\_Processing\_Reporting\_Template\_20221226.xlsx to PARK\_SCM\_001\_Form\_1\_Reporting\_YYMMDD.xlsx
- Form\_2.1\_Entry\_Processing\_Reporting\_Template\_20221226.xlsx to PARK\_SCM\_001\_Form\_2\_Reporting\_YYMMDD.xlsx

Workbook pages starting with “Entry.” Indicate data should be entered there. Light gray boxes indicate data should be entered on that line. Some boxes are optional or may not have been collected. See relevant SOPs for explanation of data fields. The ‘Reporting’ tabs can be used for tables in the reports. ‘ForCombine’ is a tab in each template, the results of which can be easily extracted and stored in a database.

Crew members should enter field data whenever possible during a field season (e.g., in spare time at the end of a day or at the end of a tour before the next tour is scheduled to begin). Enter and verify all field data before seasonal crew members leave. The Aquatic Ecologist is responsible for training crew members on the use of the reporting templates, on proper data entry, and QA procedures.

## **Data Verification**

Immediately after data entry, a person other than the one who entered the data verifies 100% of the entered data against the original data sheets. Correct any errors immediately.

The Aquatic Ecologist re-verifies 10% of the entered and verified data, and the results of that comparison are reported in the project's metadata. If the Aquatic Ecologist finds any errors, the entire data set is verified again and corrected as needed.

## **Data Validation**

Validation is checking that collected and entered data are accurate and logical. Data are validated at least three times: before the field crew leaves a site, during data entry, and after data verification is complete.

Field crew leads will review all data sheets before leaving a site, correcting errors as they find them. For example, a wetted width of 225 meters might be recorded, but it is illogical and almost certainly incorrect (22.5 meters are more likely).

Automatic data validation rules are built in to the NGPN database to prevent missing or out-of-bounds data, and the people entering and verifying the data should note and resolve any suspicious entries.

Validate site locations and other spatial data by comparing them to maps of natural features, roads, or other landmarks. This could include aerial or satellite imagery, topographic maps, or park maps. Each location should be confirmed by two members of the field crew that collected the data to confirm correct locations were entered.

After data are entered and fully verified, the Aquatic Ecologist can query the database for outliers, unexpected results, and other potential errors. Results of these final validation tests become part of the project metadata.

## **Data Archiving**

After data are verified and validated, the Aquatic Ecologist can classify them as Approved or Accepted (following NPS data standards), and the paper data sheets and electronic files can be archived. The Aquatic Ecologist archives paper data sheets in NGPN's fireproof cabinets. The NGPN Data Manager archives the electronic data by posting a certified copy to the IMD Data Store and moving the data files to NGPN's server archive share (i.e. the R: drive).

Data on the NGPN servers are backed up regularly. Full backups run at the end of each work week (i.e., every Friday night), with incremental backups each night, Saturday through Thursday. Nightly backups are retained for fourteen days; weekly backups are retained on-site for two weeks and off-site for four weeks. Monthly full backups are retained off-site for one year. Off-site backups are stored securely at Mount Rushmore National Memorial. Restoration from backups is tested at least annually.

Final data products will be posted to the NPS Service-Wide EQuIS database when a suitable EDD is created.

### **Photo Management**

Copy photos from the camera to the NGPN file server as soon as possible after fieldwork. If this will take more than a few days, use an SD card reader or USB cable to copy the photos to an iPad, laptop, or other backup device.

Once the NGPN file server is available:

- Copy photos to the park's Images\Original folder on the NGPN file server (N:\Groups\Monitoring\Stream\_Channel\PARK\IMAGES\Original\)
- Scan the Photographic Record Datasheet to a PDF on the NGPN server (N:\Groups\Monitoring\Stream\_Channel\PARK\IMAGES\PhotoLog).
- Make a working copy of the original photos, then rename them according to the Naming Conventions below. Refer to the Photographic Record Datasheet while renaming them. If time permits, use Irfanview, Adobe Bridge, or similar program to add EXIF metadata for park, photographer, caption, and other information.
- Move the renamed photos to the park's Images\Edited folder on the NGPN file server (N:\Groups\Monitoring\Stream\_Channel\PARK\IMAGES\Edited\)
- The Aquatic Ecologist validates the photos by comparing them to the photo log and previous years' photos, and notifies the Data Manager that they are ready to be archived (see SOP 14 for details on archiving data).

### ***Naming Conventions***

Name photos using the pattern **PARK\_SCM\_SiteID\_Transect\_Description\_YYYYMMDD.jpg**, separating file name components with underscores:

- **PARK** is the four-letter park code.
- **SCM** indicates the photograph is related to stream channel monitoring.
- **SiteID** is a short site name or site identification number. For general photos not related to the sampling site, the Site ID is not required.
- **Transect** is the number transect identifier (e.g. T1, T6, or T11).
- **Description** is a brief description of the photo; for instream photos, this should be location and direction. Use consistent categories for the description. For example:
  - BM(benchmark)
  - FromLeftBank

- FromRightBank
- People (for crew photos)
- **Date** (YYYYMMDD) is the date the photo was taken in the format: year (4 digits), month (2 digits), and day (2 digits).

If there is more than one photograph taken on the same date with the same content category, sequential numbers are used after the date the photos were taken.

Example file names for data and general photographs:

- DETO\_SCM\_02\_T1\_LBM\_20190921.jpg
- DETO\_SCM\_02\_T6\_LefttoRightBank \_20190921.jpg
- DETO\_SCM\_02\_People\_20190919\_1.jpg
- DETO\_SCM\_02\_People\_20190919\_2.jpg

## Literature Cited

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