



## **I&M Network Data Management Reviews: Process and Expected Outcomes**

January, 2011

### **I. Background**

2010 marked five years since the finalization of the first round of network data management plans. When written, these plans contained material that was largely conceptual, as most networks had not yet implemented monitoring. The plans, however, provided a framework to guide data managers during the initial years.

In the meantime, each network has developed new data management procedures, refined many, and relinquished others. Procedures that seemed prudent or necessary may have proved unrealistic when implemented. Other unforeseen processes may have been developed as monitoring progressed. Every data manager has had to make decisions about what to do (or not do) in response to an ever-increasing workload.

The goal of network data management reviews is to have a process for structured, periodic reviews of network data management practices, to ensure that, on a network and national level, monitoring data are well-managed, high-quality, secure, documented, and available to end users.

The benefits of these reviews include:

- Expectations of network data management is clarified via established benchmarks
- Data managers have the opportunity to receive focused attention and evaluation of their procedures
- I&M can programmatically assess the effectiveness of network data management
- Areas in which the national I&M Program can provide more structured guidance or assistance can be identified
- Confidence in data is increased with the knowledge that data management procedures are periodically reviewed and evaluated.

### **II. Data Management Evaluation Criteria**

In January, 2010, a work group of 11 I&M network data managers, plus the national I&M data manager, assembled in order to establish evaluation criteria that should be used when conducting network data management reviews. The workgroup was diverse in terms of expertise, geographic location, and network size. Members included: Bill Johnson (SEAN); Bill Moore (CUPN), Christina Wright (SECN); Gareth Rowell (HTLN); Geoff Sanders (NCRN); Helen Thomas (NCPN); John Boetsch (NCCN); Kristina Callahan (ERMN); Margaret Beer (WASO); Mark Hart (GLKN); Rob Daley (GRYN); Scott Miller (ARCN); and Sean Mohren (KLMN).

Principles that guided the group in determining data management evaluation criteria (“benchmarks”) were:

- Benchmarks are generally-accepted standards, conventions, and rules data managers should follow in acquiring, managing, and disseminating information.
- Benchmarks should not be the “lowest common denominator” in data management practices nor should they represent unrealistic goals or practices.
- Benchmarks should be developed via a collaborative process among data managers, WASO staff, and others who may have a particular perspective or expertise
- Benchmarks would be a primary point of reference when conducting data management technical reviews
- Most benchmarks would not be absolutes. Networks and parks are diverse; the process must be flexible in reviewing and assessing data management within a network.
- Established and accepted data management benchmarks would feed directly into any revised requirements or recommendations for data management plans.

Through regular conference calls and collaboration via SharePoint, the group established three main components that form the basis of a Data Management Review:

1. A [Data Management Assessment Matrix](#). This is an Excel spreadsheet containing 12 topic areas and specific related assessment items. Some assessment items are flagged as “priority,” which means they are particularly important to meet. Assessment items are designed to be self-scored:

3 - Outstanding: network has taken specific and successful initiative in assessment area

2 - Network fully meets assessment

1 - Assessment needs attention or is not met

n/a (Assessment not applicable )

2. The group concluded that feedback from other network staff or cooperators would be useful in the overall review process. A [Stakeholder Survey](#) was developed for non-data management staff and stakeholders at a network. Respondents to the survey would remain anonymous.

3. This document, which outlines the basic premises of the reviews, as well as the suggested process to follow.

### **III. Desired Outcomes of Data Management Reviews**

The workgroup agreed that the goal of Data Management Reviews is not to pass or fail a network; rather, the goal is a productive evaluation that strengthens an individual network and the I&M Program as a whole.

Specific desired outcomes include:

- Identify network strengths and how to capitalize on them
- Identify network weaknesses and how to improve them

- Identify any lapses or threats that create significant risk to network data
- Identify specific opportunities that may improve network data management
- Evaluate each review in the context of other reviews to see if positive or negative patterns are emerging across networks
- Provide a program-wide assessment of network information management to better guide WASO-level support.

#### **IV. Review Process**

Each network is encouraged to complete the review process by May 1, 2011. Steps comprising the review are:

1. Assessment Matrix: the network data manager completes the Data Management Assessment Matrix (collaboratively with the program manager and other network staff if desired).
2. Stakeholder Survey: network staff and others selected by a network are asked to complete a SharePoint stakeholder survey. The survey can be made available in Excel or Word format to those unable to access the SharePoint site
3. Internal Discussion: Network data manager, program manager (or other staff members as desired) review stakeholder survey results, review assessment matrix, and identify areas of specific strength and areas needing improvement
4. National Submission: The stakeholder survey and completed assessment matrix are submitted to the national I&M data manager, along with any comments or observations. The national I&M data manager reviews each network's submission.
5. Follow-up: If multiple priority assessment items are identified by the network as not being adequately met, or if a network requests specific assistance, the national I&M data manager works one-on-one with the network to develop an improvement strategy. This can include an on-site workshop with other data managers (see below), conference calls, or other options for targeted help.
6. As surveys and assessments are submitted: The national data manager anonymizes and merges individual network results into a master table on SharePoint. This table highlights overall I&M network strengths, reveals where problems or gaps are occurring systematically, and indicates the need for focus or attention from a national level. Information is shared and discussed with the data management community.

#### On-site workshop (optional)

The initial concept of data management reviews was to include, at the time of the review, an on-site visit by two other network data managers who could provide assistance and peer perspective. Travel restrictions imposed in 2011, as well as concerns about overall time commitments that would be required, prompted the workgroup to make these on-site visits optional.

The benefits of an on-site visit and involvement of other data managers in a Data Management Review include:

- Focused feedback to data managers from data managers regarding how to improve particular data management procedures
- Development of joint learning opportunities and productive relationships among networks and data managers
- A collaborative exchange of information about technical problems and potential solutions

### Suggested workshop structure

One or two data managers work on-site at a network for two or three days. Ideally, one data manager will have skills that complement (and don't necessarily duplicate) the skills or strengths of the network being assessed, or will have skills in the areas specifically targeted for improvement. The national data manager is either on-site or participates as needed via conference call. Suggested workshop structure:

*Day 1 – General review:* Network has determined ahead of time who from the network should attend to make the meeting as productive as possible. Assessment matrix and survey results are discussed. Key staff can bring up specific topics or concerns. Discuss strengths, weaknesses; what's working, what isn't; where specific guidance or assistance is needed.

*Day 2—Focus areas:* Discuss areas specifically needing improvement; assemble ideas on how to shore up weak areas; identify achievable items that could be incorporated into an improvement plan. Go through areas where network has particular strength or expertise; identify items that could be made more broadly available to benefit other data managers and in what format.

*Day 3 (optional) – Focused collaboration on specific topics (e.g., database design, GIS, reporting)*

#### *Within two weeks after on-site workshop*

Network and visiting data managers collaborate to prepare and submit a summary to network program manager and national data manager. Content should include:

- Areas that may require specific attention along with practical suggestions on how to improve them
- Any issues that may constitute a significant risk to network data, with recommendations for remedies.
- Areas that represent successful or novel approaches to various information management problems

#### *Within six months of on-site review:*

WASO (lead) and reviewers follow up with network data manager (and other staff, as needed) on effectiveness of review and improvement items. Questions posed include:

- Was the review helpful to your network?
- What would have increased the value of the review process for your network?
- What progress has been made in addressing areas needing attention?
- If you didn't address some of the things identified in your network's recommendations, why?

**V. Overall schedule**

|                       |   |
|-----------------------|---|
| December, 2009        | Call for workgroup volunteers; establish SharePoint site  |
| January, 2010         | Convene workgroup   |
| April 20, 2010        | Present preliminary results at Data Management/GIS Conference   |
| September 1, 2010     | Finalize evaluation criteria and review process; distribute to data managers, network GIS staff, program managers, and regional coordinators for review and comment |
| September 14, 2010    | Conference call to review documents and process; invite data managers and program managers  |
| October 15, 2010      | Deadline for feedback on documents  |
| December 15, 2010     | Incorporate feedback into review documents; finalize  |
| January 3, 2011       | Notify networks of process and documents  |
| January - April, 2011 | Networks complete matrix and survey; matrix results returned to I&M data manager  |
| March, 2011           | Presentation at George Wright on status of reviews  |
| May, 2011             | WASO compiles all reviews, identifies patterns and potential actions  |
| 2011 - 2012           | On-site reviews scheduled and conducted, as requested by networks   |

| Assessment Matrix                                    |  |      |          |            | Assessments   |          |
|--|--|------|----------|------------|---|----------|
| Topic Area   | Benchmark/Goal   | Item | Priority | 1-3 or n/a | Please provide a rating for each assessment item.   | Comments |
|  | 1-a. Information technology infrastructure meets the needs and circumstances of the network and staff.   | 1    | ✓        |            | Infrastructure is sufficiently documented so that a new staff member can understand and use it  |          |
|  |  | 2    |          |            | There is a written plan for managing hardware, software, LAN/WAN maintenance, and sensitive equipment   |          |
|  |  | 3    |          |            | Program has adequate server space, speed, and bandwidth for staff to work efficiently.  |          |
|  |  | 4    | ✓        |            | Software licenses are compliant and current   |          |
|  | 1-b. Training and support for using the infrastructure and systems is available to staff.  | 5    |          |            | Staff have the software licenses they need  |          |
|  |  | 6    | ✓        |            | IT support, or network staff skills, are sufficient to keep the computers, servers, and Internet and NPS connectivity operational with a minimum of down time   |          |
|  |  | 7    |          |            | Servers are located in a secure area with limited access  |          |
|  |  | 8    |          |            | IT requests and problems are resolved in a timely and effective manner  |          |
|  |  | 9    |          |            | Staff have the training and skills to manage hardware and software needed by the network (e.g., SQL server, ArcGIS Server, or Access databases with complex code)   |          |
|  |  | 10   |          |            | Staff have computer user account credentials and file permission settings to complete their work  |          |
|  |  | 11   |          |            | Network infrastructure supports distributing data to the parks and public (e.g., ArcGIS Server, web-based applications, SharePoint)   |          |
| <b>2. Project Management and the Data Life Cycle</b> | 2-a. Data management requirements are incorporated into all elements of the monitoring project life cycle (e.g., initiation, planning, implementation, closing). | 12   |          |            | Data Management staff participate in project planning meetings and in developing data-related sections of study plans and project protocols (e.g., provide guidance and feedback on data forms or data dictionary components) |          |
|  |  | 13   |          |            | Contracts, agreements, permits and protocols include standard language describing the formats, specifications, and timelines for data deliverables  |          |
|  |  | 14   | ✓        |            | Data management SOPs are followed for protocols that are implemented  |          |
|  |  | 15   | ✓        |            | Data management SOPs are maintained and updated as changes occur. A change log is maintained that documents changes.  |          |
|  |  | 16   |          |            | Each monitoring protocol includes a data management section and SOPs that describe in detail how data management-related tasks are accomplished   |          |
|  |  | 17   |          |            | A system is in place to track the status of each monitoring project and its associated deliverables   |          |
|  |  | 18   | ✓        |            | Project deliverables are posted and archived as required or planned   |          |
|  |  | 19   |          |            | Seasonal or final project wrap-up sessions that include data management staff are held that evaluate procedures and tasks associated with the data life cycle.  |          |
|  |  | 20   |          |            | Data managers perform or participate in annual or final project evaluation and close-out activities   |          |
|  |  | 21   |          |            | The data manager is provided adequate time and advance notice to properly scope, plan, develop, test, and implement database applications and other solutions to meet project needs   |          |
|  |  | 22   |          |            | The project data life cycle is communicated so that all staff understand their roles and responsibilities   |          |

Assessment rating values:

3 - Outstanding: network has taken specific and successful initiative in assessment area

2 - Network fully meets assessment

1 - Assessment needs attention or is not met

n/a - Assessment not applicable

|  |  |      |  |            | Assessment Matrix   |   |  |
|--|--|------|--|------------|---|---|--|
| Topic Area   | Benchmark/Goal   | Item | Priority   | 1-3 or n/a | Assessments   |   |  |
|  |  |      |  |            |   | Please provide a rating for each assessment item. |  |
| <b>3. Data Management Roles and Responsibilities</b> | 3-a. Document and explain to staff their data management responsibilities; ensure that responsibilities are met. | 23   |  |            | Common or universal data management tasks are described in written documents  |   |  |
|  |  | 24   |  |            | Training is provided to explain data management responsibilities to staff   |   |  |
|  |  | 25   |  |            | Each project protocol clearly defines the role of each person involved and their responsibilities during each phase of the project life cycle   |   |  |
|  |  | 26   |  |            | Data management roles and responsibilities are clearly explained to cooperators or contractors  |   |  |
|  |  | 27   |  |            | Cooperators, contractors, and network staff are trained for the specific data management-related tasks they are expected to perform for each protocol   |   |  |
|  |  | 28   |  |            | Project personnel are informed in a timely manner about changes in data management practices  |   |  |
|  |  | 29   |  |            | Cooperators, contractors, and internal staff consistently perform the data management tasks for which they are responsible  |   |  |
|  | 3-b. Maintain awareness of and involvement in NPS-wide and regional data management issues, tools, and policy.   | 30   |  |            | The data manager collaborates with national and regional data management staff via working groups, conference calls, and events such as national meetings   |   |  |
|  |  | 31   | ✓  |            | The data manager is familiar with how data for each project are collected, managed, and used  |   |  |
|  |  | 32   | ✓  |            | The data manager drafts or reviews the data management sections of each monitoring protocol   |   |  |
|  |  | 33   |  |            | The data manager and project manager conduct year-end reviews of each project to evaluate whether all data management objectives are met and recommend improvements for subsequent project operations |   |  |
|  |  | 34   |  |            | Data management responsibilities are included in each network staff member's Employee Performance and Appraisal Plan  |   |  |
|  |  | 35   |  |            | The program manager understands the significance of data management, and is aware of staff data management roles and responsibilities   |   |  |
|  |  | 36   | ✓  |            | The data manager participates in meetings with contractors and cooperators to identify and communicate data management requirements   |   |  |
|  |  | 37   |  |            | The program manager holds staff and cooperators accountable to follow established data management procedures and practices  |   |  |
| 38   |  |      | The Data Manager and program manager communicate effectively |            |   |   |  |

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| Assessment Matrix   |   |      |          |  | Assessments  | Comments |
|---------------------|---|------|----------|--|--|----------|
| Topic Area          | Benchmark/Goal  | Item | Priority | 1-3 or n/a   |  |          |
| <b>4. Databases</b> | 4-a. Develop databases that are consistent with NPS standards and industry-accepted practices.                                  | 39   | ✓        |  | Where appropriate, databases include the core elements of the NPS Natural Resource Database Template (NRDT)  |          |
|                     |   | 40   |          |  | Database tables and fields are documented in a manner that allows for extraction when creating or updating project metadata records (i.e., internal object definitions in Access can be harvested and included in FGDC metadata elements for database structure) |          |
|                     |   | 41   |          |  | Metadata records are kept up-to-date as changes to the database structure are made   |          |
|                     |   | 42   |          |  | Standard naming conventions are used for all database objects (tables, fields, queries/views, etc.)  |          |
|                     |   | 43   |          |  | All objects are named in a way that avoids potential conflicts with reserved words (e.g., through compound words)  |          |
|                     |   | 44   |          |  | Data value domains (lookup lists and/or enumeration tables) are used among multiple applications to maximize data set compatibility  |          |
|                     |   | 45   |          |  | Databases are spatially enabled as appropriate to meet project requirements  |          |
|                     | 46  |      |          | Data integrity elements such as range limits, required fields, and referential integrity are incorporated in the databases   |  |          |
|                     | 4-b. Design and develop database applications that balance ease of use with maintainability, long-term stability, and security. | 47   | ✓        |  | Databases distinguish between certified (final) and preliminary data   |          |
|                     |   | 48   | ✓        |  | Databases distinguish between sensitive and public data.   |          |
|                     |   | 49   |          |  | Databases provide record auditing information (such as who added or updated records and when), and other pertinent record source information   |          |
|                     |   | 50   |          |  | Databases are split into back-end (data) and front-end (user interface) applications that provide uninterrupted access to the master data  |          |
|                     |   | 51   |          |  | Database applications allow efficient data entry, manipulation, summarization and output   |          |
|                     |   | 52   | ✓        |  | Protocols describe how to perform essential database tasks (e.g., data entry, quality review, data output)   |          |
|                     |   | 53   |          |  | User interfaces are intuitive and include buttons, labels, messages, and form layouts for a user-friendly application  |          |
|                     | 4-c. Design databases with considerations for long-term maintenance by multiple developers.                                     | 54   |          |  | Users know how to provide feedback (e.g., report a bug or suggest an improvement) on database issues   |          |
|                     |   | 55   |          |  | Databases provide tools for project leaders to review data quality on a regular basis (e.g., annually, in order to certify data)   |          |
|                     |   | 56   |          |  | Automated data summary and reporting functions are included in the database interface application  |          |
| 57                  |   | ✓    |          | Each project database includes sufficient internal and external documentation to allow a different developer to take over database management (data dictionary, entity-relationship diagram, and technical descriptions of views, triggers, scripts, code documentation, etc.) |  |          |
| 58                  |   |      |          | The database is supported by a user manual, cheat sheet or other tutorial documentation to facilitate its proper use   |  |          |

Assessment rating values:

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2 - Network fully meets assessment

1 - Assessment needs attention or is not met

n/a - Assessment not applicable

| Assessment Matrix                         |   |      |          |  | Assessments  | Comments |
|---|---|------|----------|--|--|----------|
| Topic Area                                | Benchmark/Goal  | Item | Priority | 1-3 or n/a   |  |          |
| <b>5. Data Acquisition and Processing</b> | 5.a. Preserve data used to make decisions about the design or implementation of a project.            | 59   |          |  | Data sources used for project design, sample site selection, or other decisions are documented, error checked, archived, and made available to project staff |          |
|   |   | 60   |          |  | Project leaders have sufficient skill, equipment, and documentation to train crew members  |          |
|   |   | 61   | ✓        |  | Training procedures and training documentation promote consistent data collection over the life of the project   |          |
|   |   | 62   | ✓        |  | Staff are adequately trained in the field methods and equipment used to collect and manage data  |          |
|   | 5.b. Collect, manage, and document data in ways that maximize data quality for the life of a project. | 63   |          |  | Electronic data entry forms mimic paper data sheets  |          |
|   |   | 64   |          |  | Feedback from field crews is considered in database design or updates  |          |
|   |   | 65   | ✓        |  | Field crews ensure the quality and security of data while in the field   |          |
|   |   | 66   |          |  | Datasheets are intuitive and match workflow in the field   |          |
|   |   | 67   |          |  | Data are entered into the database in a timely manner  |          |
|   |   | 68   |          |  | A method is in place to ensure GPS/GIS data collection devices are properly set up   |          |
|   |   | 69   |          |  | Field crews demonstrate competency with GPS devices  |          |
|   |   | 70   |          |  | When appropriate, GPS data are differentially corrected and the original data are archived   |          |
|   |   | 71   | ✓        |  | When using automated data collections devices (sondes, HOBO, etc), calibration and maintenance procedures are documented and followed                        |          |
|   |   | 72   |          |  | Automated collection devices are checked at appropriate intervals to ensure they are working properly  |          |
|   |   | 73   |          |  | Procedures for downloading data from automated collection devices are documented and followed  |          |
|   |   | 74   | ✓        |  | If auto-collected data are corrected, procedures are documented and raw data are archived  |          |
|   |   | 75   |          |  | Cameras: photo resolution and format standards are documented and followed   |          |
|   |   | 76   | ✓        |  | The network has a photo management system is in place for tracking photo metadata  |          |
|   |   | 77   |          |  | A system is in place to collect, handle, catalog, and store or transfer physical specimens   |          |
|   |   | 78   | ✓        |  | Loan agreements are in place (via park permitting) to ensure accessibility and proper curation of specimens stored at non-NPS facilities                     |          |
|   |   | 79   |          |  | Procedures exist for making and documenting changes to certified data  |          |
|   |   | 80   |          |  | Instructions are in place for cascading changes across multiple data types or sources due to a change in one data source                                     |          |
|   |   | 81   |          |  | Data management requirements for each project are reviewed at the end of each field season to ensure all tasks have been completed                           |          |
|   |   | 82   |          |  | Outside data sources are documented locally to describe data quality, source, creation date, intended use, etc.  |          |
|   | 83  |      |          | Procedures to acquire necessary updates from outside data sources are documented |  |          |

Assessment rating values:

3 - Outstanding: network has taken specific and successful initiative in assessment area

2 - Network fully meets assessment

1 - Assessment needs attention or is not met

n/a - Assessment not applicable

|                                       |  |      |          |  | Assessment Matrix  |  |  |
|---------------------------------------|--|------|----------|--|--|--|--|
| Topic Area                            | Benchmark/Goal   | Item | Priority | 1-3 or n/a   | Assessments  |  |  |
|                                       |  |      |          |  | Please provide a rating for each assessment item.  |  |  |
| <b>6. Data Analysis and Reporting</b> | 6-a. Specify routine and scheduled data summary, analysis and reporting requirements in project plans.                                     | 84   | ✓        |  | Project SOPs have clearly-written requirements and schedules for analysis and reporting needs  |  |  |
|                                       |  | 85   |          |  | Project leads and data managers work together to create and test data processing tasks (e.g., database queries, scripts) that produce required outputs |  |  |
|                                       |  | 86   |          |  | The network has the analytical software and expertise needed to meet planned and <i>ad hoc</i> analysis needs  |  |  |
|                                       |  | 87   |          |  | Data processing and analysis procedures are built into project databases   |  |  |
|                                       |  | 88   | ✓        |  | Results of vital signs monitoring are published through the national or regional Natural Resource Report Series  |  |  |
|                                       |  | 89   |          |  | Changes in analysis or reporting requirements are accommodated and documented  |  |  |
|                                       | 90   |      |          | Data management and processing activities meet the defined timelines for project reporting |  |  |  |
|                                       | 6-b. Provide consistent and timely support for analysis and reporting while retaining flexibility to meet the changing needs for projects. | 91   |          |  | Project leads, cooperators, and other staff can readily access project data and documentation remotely, if needed                                      |  |  |

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|   |   |      |          |   | Assessment Matrix   |  |  |
|---|---|------|----------|---|---|--|--|
| Topic Area  | Benchmark/Goal  | Item | Priority | 1-3 or n/a  | Assessments   |  |  |
| Please provide a rating for each assessment item. |   |      |          |   |   |  |  |
| <b>7. Quality Assurance and Quality Control</b>   | 7-a. Comply with NPS Director's Order #11B to produce high-quality data by addressing quality assurance at every stage of the project life cycle.     | 92   |          |   | Data producers and users have a high degree of confidence in the quality of the data produced by the network.   |  |  |
|   |   | 93   |          |   | Each staff member understands the significance of QA/QC procedures and his or her role in performing them   |  |  |
|   |   | 94   | ✓        |   | QA/QC activities are incorporated into all stages of each project, starting with planning and continuing through to seasonal close-out and evaluation |  |  |
|   | 7-b. Minimize data collection and data entry errors by preventing and identifying errors.   | 95   |          |   | Procedures are in place to evaluate the success of QA/QC procedures and to correct deficiencies   |  |  |
|   |   | 96   |          |   | Field crew personnel receive sufficient training on data collection procedures  |  |  |
|   |   | 97   | ✓        |   | Data collection procedures are documented for each project.   |  |  |
|   |   | 98   |          |   | Data collection procedures are regularly evaluated to ensure that data are collected efficiently and in a manner that minimizes error                 |  |  |
|   |   | 99   |          |   | Field data recording sheets are clear and unambiguous   |  |  |
|   |   | 100  |          |   | Electronic data entry forms capture all relevant information from paper field sheets  |  |  |
|   |   | 101  |          |   | Electronic data recording devices are used where appropriate and include QA/QC checks   |  |  |
|   |   | 102  |          |   | Procedures are in place to review data stored on electronic field data recorders  |  |  |
|   |   | 103  |          |   | Procedures are in place to back up data stored on electronic field data recorders   |  |  |
|   |   | 104  |          |   | Automated data collection devices are used where possible to reduce the need for manual data entry  |  |  |
|   |   | 105  |          |   | Procedures are in place to calibrate automated data collection devices  |  |  |
|   |   | 106  |          |   | Automated data collection device calibration results are logged and stored with project documentation   |  |  |
|   | 107   | ✓    |          | Project databases incorporate validation rules, pick lists, range limits, and required values                   |   |  |  |
|   | 108   | ✓    |          | Database field value domains are clearly defined  |   |  |  |
|   | 109   | ✓    |          | Staff follow procedures to identify, address and document errors in project data sets                           |   |  |  |
|   | 110   |      |          | Staff are trained to follow written QA/QC procedures  |   |  |  |
|   | 7-c. Regularly review and certify data to confirm that data are complete for the period of record, and meet standards for distribution and archiving. | 111  |          |   | All active projects have a clearly-articulated timeline for data entry, processing, review, and certification   |  |  |
| 112   |   | ✓    |          | All projects include a certification process that results in 'final' data and products at appropriate intervals |   |  |  |
| 113   |   |      |          | The certification process includes documentation of specific QA procedures and statements about data quality    |   |  |  |
| 114   |   |      |          | Data sets are certified as scheduled in written procedures  |   |  |  |

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|                              |  |      |          |   | Assessment Matrix  |  |  |
|------------------------------|--|------|----------|---|--|--|--|
| Topic Area                   | Benchmark/Goal   | Item | Priority | 1-3 or n/a  | Assessments  |  |  |
|                              |  |      |          |   | Please provide a rating for each assessment item.  |  |  |
| <b>8. Data Documentation</b> | 8-a. Create and maintain compliant metadata or other data documentation for all data products created or used. | 115  | ✓        |   | Metadata are created and maintained in an appropriate time frame for all new and revised databases, geospatial data, and reports (e.g., within three months of data certification, or concurrent with publication) |  |  |
|                              |  | 116  |          |   | Metadata records include, at a minimum, the author/producer, title, location, date, park code, access constraints, copyright information and contact information.  |  |  |
|                              |  | 117  |          |   | Documentation of digital images meets the NPS Digital Photo Metadata Standard  |  |  |
|                              |  | 118  |          |   | Metadata records for non-spatial NPS data sets meet NPS requirements to include complete content for FGDC Sections 0, 1, 6 and 7.  |  |  |
|                              |  | 119  |          |   | Metadata records for NPS biological data sets meet NPS requirements to include complete content for FGDC Sections 0, 1, 2, 6 and 7.  |  |  |
|                              |  | 120  |          |   | Metadata records for geospatial data sources include content for FGDC Sections 0 through 7.  |  |  |
|                              |  | 121  |          |   | Technical staff review metadata records for errors and inconsistencies, and use a metadata parser before publishing and distributing.  |  |  |
|                              |  | 122  |          |   | The project leader reviews metadata records before they are finalized and published.   |  |  |
|                              | 123  | ✓    |          | All contracts and cooperative agreements require metadata and other pertinent forms of documentation as project deliverables. |  |  |  |
|                              | 8-b. Make metadata and associated data products widely available to park staff and the general public.         | 124  | ✓        |   | Final metadata and, if appropriate, associated data files are published to the NRInfo Reference Application (formerly the NPS Data Store and NatureBib)  |  |  |
| 125                          |  |      |          | Metadata and data-use agreements are in place for data sets collected by cooperators or external agencies.                    |  |  |  |

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| Assessment Matrix                    |   |      |          |   | Assessments  |          |
|--------------------------------------|---|------|----------|---|--|----------|
| Topic Area                           | Benchmark/Goal  | Item | Priority | 1-3 or n/a  | Please provide a rating for each assessment item.  | Comments |
| <b>9. Data Ownership and Sharing</b> | 9-a. Specify NPS ownership rights for all project deliverables, including those produced under contracts and cooperative agreements.                  | 126  | ✓        |   | Cooperative or interagency agreements and contracts include language from, or similar to, OMB Circular A-110 regarding the ownership of information products developed for or shared with the NPS    |          |
|                                      |   | 127  |          |   | There is clearly-defined schedule of reports and deliverables in all agreements and contracts, including field notebooks, photos (digital and non-digital), specimens, raw data, data and reports    |          |
|                                      |   | 128  |          |   | The delivery schedule in agreements or contracts provides sufficient time to review and accept or reject products before the final submission date   |          |
|                                      |   | 129  |          |   | For ad hoc data requests, recipients are informed of any caveats or restrictions on data provided by the network, including a statement regarding ownership  |          |
|                                      | 9-b. Identify and protect sensitive data that could be used to harm, remove, or destroy NPS resources.  | 130  | ✓        |   | Potentially sensitive park resources and information are identified, and documented for each project   |          |
|                                      |   | 131  | ✓        |   | Procedures are documented for identifying and managing sensitive and protected data. Project staff follow written procedures to identify and document sensitive and protected data                   |          |
|                                      |   | 132  |          |   | Staff who respond to data requests are familiar with the guidance in Draft Reference Manual RM 66-B: Handling Protected Information  |          |
|                                      |   | 133  |          |   | Cooperators and contractors are trained at project start-up to understand the types of sensitive or protected information the study may encompass, and their associated responsibilities             |          |
|                                      |   | 134  | ✓        |   | Where necessary, contracts and agreements include a standard confidentiality clause  |          |
|                                      |   | 135  |          |   | Cooperators and contractors are aware that all data, including presentations, reports, and publications, will be reviewed by NPS personnel before release  |          |
|                                      |   | 136  |          |   | Project staff are aware that protected and sensitive data may not be released in any format until approved by NPS personnel  |          |
|                                      | 9-c. Comply with the Freedom of Information Act (FOIA) and Draft Director's Order #66: Freedom of Information Act and Protected Resource Information. | 137  |          |   | Data sharing laws (sunshine laws) for states in which the project occurs are understood in term of how access to sensitive and protected data is affected once those data are shared with the states |          |
|                                      |   | 138  | ✓        |   | Procedures are in place to ensure that all references to protected information are removed or obscured in reports, publications, maps, data, or other externally distributed formats/materials       |          |
|                                      |   | 139  | ✓        |   | Sensitive data are clearly identified in order to prevent inadvertent release  |          |
|                                      |   | 140  |          |   | Non-disclosure agreements include all sensitive items entrusted to cooperators and contractors   |          |
| 141                                  |   |      |          | Non-protected data are available for inspection and copying in public reading rooms or online   |  |          |
| 142                                  |   |      |          | At least one Network staff has received FOIA training, is familiar with FOIA requirements, or knows the regional or park FOIA officer   |  |          |
| 143                                  |   |      |          | Procedures are in place to share data that comply with Draft Director's Order #66: Freedom of Information Act and Protected Resource Information and the accompanying Reference Manual RM-66B: Handling Protected Information |  |          |

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|   |   |      |          |   | Assessment Matrix  |   |  |
|---|---|------|----------|---|--|---|--|
| Topic Area  | Benchmark/Goal  | Item | Priority | 1-3 or n/a  | Assessments  |   |  |
|   |   |      |          |   |  | Please provide a rating for each assessment item. |  |
| <b>10. Data Distribution</b>  | 10-a. Develop and maintain network Internet and intranet (or SharePoint) web sites containing information and products. | 144  |          |   | Public-facing websites are indexed by major search engines.  |   |  |
|   |   | 145  |          |   | Internet and intranet sites follow I&M and NPS recommended design standards.   |   |  |
|   |   | 146  |          |   | The program website lists all products regardless of whether they are available on the web or through other venues.  |   |  |
|   |   | 147  | ✓        |   | The network website clearly identifies vital signs and direct links to associated protocols and products.  |   |  |
|   |   | 148  |          |   | The network follows an established procedure for updating website content and posting data.  |   |  |
|   |   | 149  |          |   | The websites provide contact information for user feedback and information requests.   |   |  |
|   | 10-b. Post products to the NPS Natural Resource Information Portal (NRInfo) and other NPS repositories.                 | 150  | ✓        |   | Network data, metadata, and information products are regularly posted to the NRInfo Portal (formerly NPS Data Store and NatureBib)   |   |  |
|   |   | 151  |          |   | A process is in place to upload digital data sets and documents associated with legacy Data Store or NatureBib records.  |   |  |
|   |   | 152  |          |   | Versions and editions of reports and data sets are managed and clearly identified  |   |  |
|   |   | 153  | ✓        |   | Water-quality data are regularly submitted to the NPS Water Resources Division and NPStoret  |   |  |
|   |   | 154  |          |   | Species lists are certified on a reasonable schedule as studies are completed  |   |  |
|   |   | 155  |          |   | A procedure is in place for updating NPSpecies with new information as a result of field work or other information sources   |   |  |
|   |   | 156  | ✓        |   | Protocols are cataloged in the NPS Protocol Database.  |   |  |
|   |   | 157  |          |   | All NPS publication series documents are uploaded to the NRInfo Reference Application.   |   |  |
|   | 10-c. Complete quality control and documentation before data are made publically available.                             | 158  | ✓        |   | Complete quality control and documentation of all data products before data are made publically available; any exceptions to this are clearly documented and marked as such. |   |  |
|   |   | 159  |          |   | Metadata are clearly attached to or integrated with products as part of the distribution processes.  |   |  |
| 160   |   |      |          | All products are subject to review by appropriate network staff before submission for publication                               |  |   |  |
| 10-d. Evaluate data and products for sensitive information before release | 161   |      |          | NPS staff approve, in advance, the distribution or presentation of potentially sensitive data or products regardless of format. |  |   |  |
|   | 162   | ✓    |          | Distribution of sensitive items is appropriately managed and controlled   |  |   |  |
|   | 163   |      |          | All NRInfo Reference records and products from legacy applications are reviewed by the Unit Point of Contact (UPOC)             |  |   |  |
|   | 164   |      |          | NPSpecies park species records are vetted by park staff before public release   |  |   |  |

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|--|--|------|---|---|---|----------|
| Topic Area   | Benchmark/Goal   | Item | Priority  | 1-3 or n/a  |   |          |
| <b>11. Records Management, Data Maintenance, and Archiving</b> | 11-a. Maintain and ensure the preservation of mission-critical and permanent records.                          | 165  |   |   | Written procedures are in place to manage records, including filing systems, filing practices, and dealing with special media (e.g., large-format maps, aerial photos, video, slides) |          |
|  |  | 166  | ✓   |   | Significant documents and data sets are converted to current software formats if upgrades render them incompatible or unreadable  |          |
|  |  | 167  |   |   | Record management procedures are periodically audited   |          |
|  |  | 168  |   |   | Original hard copies of data sheets are scanned or photocopied to create working copies.  |          |
|  | 11-b. Use an enterprise or workgroup file server to store electronic files for projects.                       | 169  |   |   | Project resources (e.g., plans, study or sample design, documentation, data, analytical methods and results) are stored in a standard directory structure                             |          |
|  |  | 170  | ✓   |   | Procedures for storing files on a file server are documented  |          |
|  |  | 171  |   |   | File naming conventions and directory structures are documented   |          |
|  |  | 172  |   |   | Final product files are stored with read-only access permissions  |          |
|  |  | 173  |   |   | Working files are stored separately from archived files   |          |
|  |  | 174  |   |   | Differences between project files are regularly reconciled if files are used on more than one computer  |          |
|  |  | 175  |   |   | Files containing sensitive information are clearly marked and are stored separately   |          |
|  | 11-c. Storage, backup, and recovery practices ensure the integrity and security of all network digital assets. | 176  |   |   | Storage, backup, and recovery procedures comply with NPS policies   |          |
|  |  | 177  | ✓   |   | Storage, backup, and recovery procedures are followed   |          |
|  |  | 178  | ✓   |   | Backup files are regularly rotated off-site   |          |
|  |  | 179  | ✓   |   | Recovery procedures are regularly tested  |          |
|  |  | 180  | ✓   |   | Storage, backup, and recovery procedures cover files used by staff stationed at remote locations  |          |
|  |  | 181  |   |   | Previous versions of documents and data are preserved for possible recovery   |          |
|  | 11-d. Ensure the permanent preservation of natural history specimens, objects, and photographs.                | 182  | ✓   |   | NPS curators are consulted in project planning to address specimen handling, permitting, and archiving  |          |
|  |  | 183  |   |   | Curation and archiving costs are incorporated into project budgets  |          |
|  |  | 184  |   |   | Original data sheets are stored in an environment that meets NPS museum standards   |          |
| 185  |  |      |   | Paper records in archival storage have local working copies or finding aids   |   |          |
| 186  |  |      |   | Procedures requested by curators are followed when submitting products (e.g., file formats, labeling, archival folders)                                     |   |          |
| 187  |  | ✓    |   | Natural history specimens and associated field notes are submitted to an appropriate repository   |   |          |
| 188  |  |      |   | Project materials are accessioned into park museums or other approved repositories  |   |          |
| 189  |  |      |   | Photographic slides or prints are labeled with author, title, location, date, park code, access constraints, copyright information, and contact information |   |          |
| 190  |  |      |   | Photographic slides and prints are stored in an environment that meets NPS museum standards   |   |          |
| 191  |  | ✓    |   | High-value digital images are stored in a format appropriate for long-term preservation (e.g., TIFF)  |   |          |
| 192  |  |      | Digital images are stored in an archive (read-only) area of a file server |   |   |          |

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|--|---|------|----------|--|---|---|--|
| Topic Area   | Benchmark/Goal  | Item | Priority | 1-3 or n/a   | Assessments   |   |  |
|  |   |      |          |  |   | Please provide a rating for each assessment item. |  |
| <b>12. Data Management Guidance and Communication</b>  | 12-a. Establish, implement, and make available a network data management plan and associated procedures | 193  | ✓        |  | The data management plan is complete and finalized  |   |  |
|  |   | 194  |          |  | Versions of data management documents and procedures are tracked  |   |  |
|  |   | 195  |          |  | Staff are familiar with data management documents and SOPs and know how to access them  |   |  |
|  |   | 196  | ✓        |  | Essential tasks are documented to ensure data management continuity in the event of staff turnover or vacancy in the data management position |   |  |
|  | 12-b. Include data management specifications and guidance in project protocols and study plans.         | 197  |          |  | Data management requirements are specified for every project.   |   |  |
|  |   | 198  |          |  | Project staff track and know the status of project-related data management tasks  |   |  |
|  |   | 199  |          |  | Data management documents cannot be changed without the involvement or approval of the data manager   |   |  |
|  |   | 200  |          |  | Project staff understand and support project data management requirements   |   |  |
|  | 12-c. Ensure a high level of awareness among staff about the importance of data management.             | 200  | ✓        |  | Network staff are familiar with the data management plan and associated SOPs or guidance documents  |   |  |
|  |   | 201  |          |  | Staff know how to access web sites, SharePoint sites, shared drives, and other common resources   |   |  |
| 202  |   |      |          | Staff use file and folder names properly and consistently  |   |   |  |
| 203  |   |      |          | Project leads understand and complete the data management tasks required for their projects  |   |   |  |
| 204  |   |      |          | Project staff receive periodic training on data collection and handling procedures, data entry, and quality assurance                  |   |   |  |
| 12-d. Staff stay current in knowledge of relevant software, hardware, and data management processes.                     | 205   | ✓    |          | Data managers, GIS specialists, and other technical staff members receive the training they need to maintain expertise in their fields |   |   |  |
|  | 206   |      |          | Data management staff participate in national or regional meetings of their peers  |   |   |  |
| 12-e. Ensure regular communication among the data manager, the program manager, project leads and other technical staff. | 207   | ✓    |          | Data managers, GIS specialists, and other technical staff participate in project planning and throughout project implementation        |   |   |  |
|  | 208   |      |          | Data managers and project leads debrief after each data collection periods to resolve any data management or data quality concerns.    |   |   |  |
|  | 209   |      |          | Feedback from project personnel is solicited on a regular basis to help improve data management practices and tools                    |   |   |  |

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