A Future For Data: An Overview of Data Management for Analysis, Decision-making and Reuse

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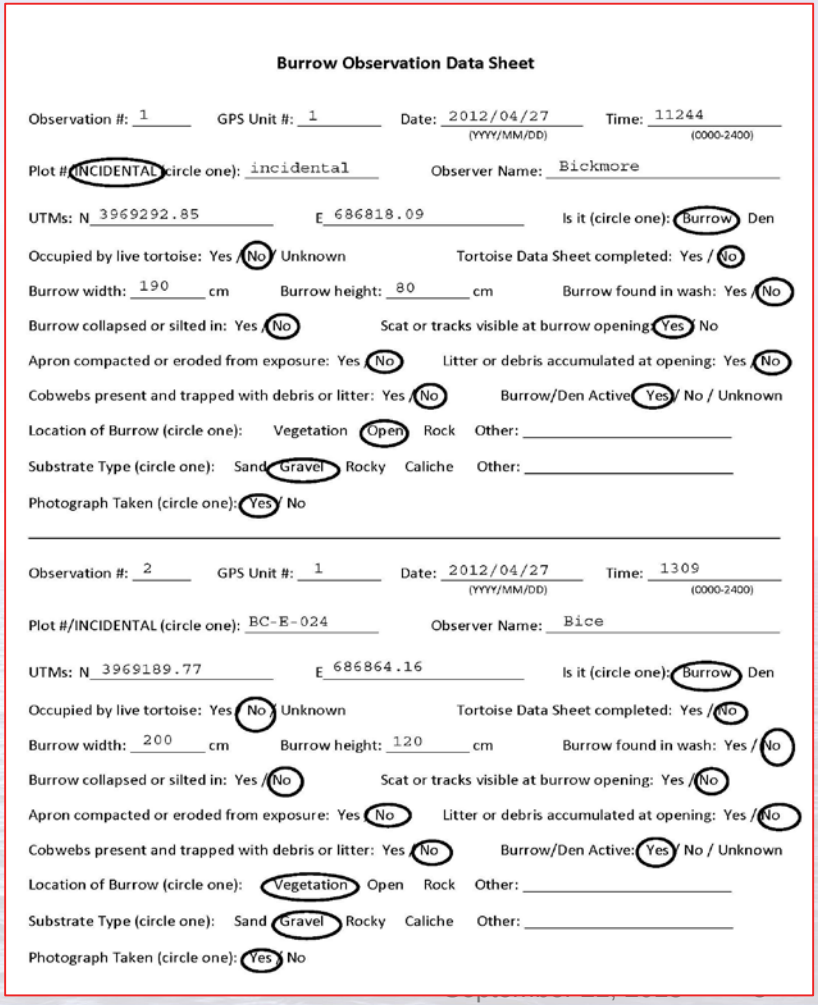
Desert Tortoise Burrows

- In plot and incidental observations
- Basic data
  - Occupied by tortoise
  - Burrow or den
  - Burrow dimensions
  - Burrow location
  - Burrow condition
- Classify as active or inactive with checklist of evidence



Burrow Observation Data Sheet

Observation #: 1 GPS Unit #: 1 Date: 2012/04/27 (YYYY/MM/DD) Time: 11244 (0000-2400)

Plot #/(INCIDENTAL circle one): incidental Observer Name: Bickmore

UTMs: N 3969292.85 E 686818.09 Is it (circle one): (Burrow) Den

Occupied by live tortoise: Yes / (No) / Unknown Tortoise Data Sheet completed: Yes / (No)

Burrow width: 190 cm Burrow height: 80 cm Burrow found in wash: Yes / (No)

Burrow collapsed or silted in: Yes / (No) Scat or tracks visible at burrow opening: (Yes) / No

Apron compacted or eroded from exposure: Yes (No) Litter or debris accumulated at opening: Yes / (No)

Cobwebs present and trapped with debris or litter: Yes / (No) Burrow/Den Active: (Yes) / No / Unknown

Location of Burrow (circle one): Vegetation (Open) Rock Other: _____

Substrate Type (circle one): Sand (Gravel) Rocky Caliche Other: _____

Photograph Taken (circle one): (Yes) / No

Observation #: 2 GPS Unit #: 1 Date: 2012/04/27 (YYYY/MM/DD) Time: 1309 (0000-2400)

Plot #/INCIDENTAL (circle one): BC-E-024 Observer Name: Bice

UTMs: N 3969189.77 E 686864.16 Is it (circle one): (Burrow) Den

Occupied by live tortoise: Yes / (No) / Unknown Tortoise Data Sheet completed: Yes / (No)

Burrow width: 200 cm Burrow height: 120 cm Burrow found in wash: Yes / (No)

Burrow collapsed or silted in: Yes / (No) Scat or tracks visible at burrow opening: Yes / (No)

Apron compacted or eroded from exposure: Yes (No) Litter or debris accumulated at opening: Yes / (No)

Cobwebs present and trapped with debris or litter: Yes / (No) Burrow/Den Active: (Yes) / No / Unknown

Location of Burrow (circle one): (Vegetation) Open Rock Other: _____

Substrate Type (circle one): Sand (Gravel) Rocky Caliche Other: _____

Photograph Taken (circle one): (Yes) / No

Desert Tortoise, Nevada

Practical Guidance for Integrating Data Management into Long-Term Ecological Monitoring Projects

Wildlife Society Bulletin 39(3):451–463; 2015

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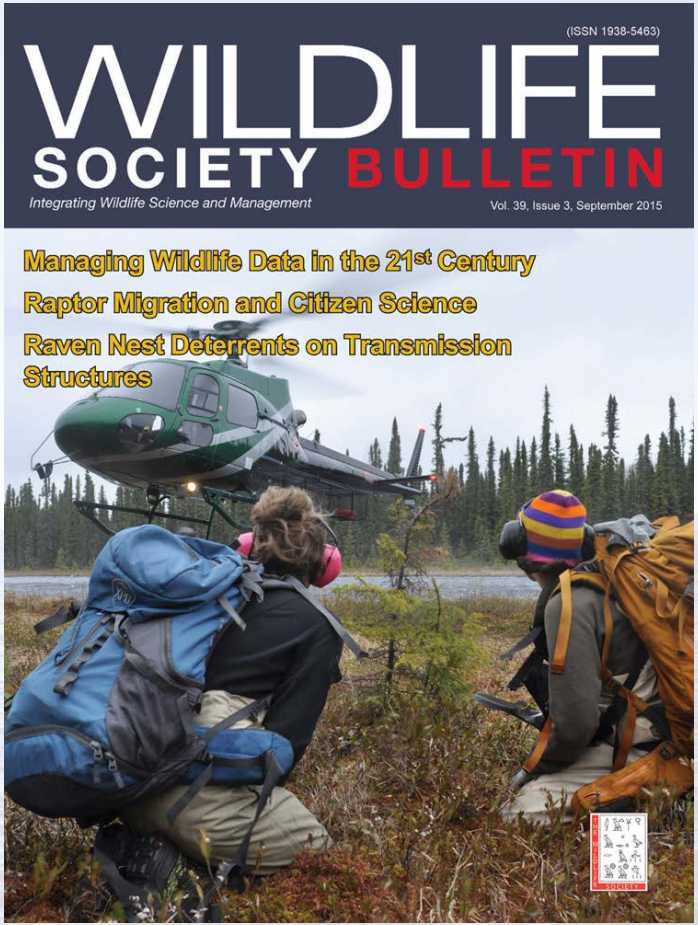

Application of Quality Assurance and Quality Control Principles to Ecological Restoration Projects

Appendix A: Data Management

Outline of Presentation

- Define data and data management
- Discuss the value of data management
- Introduce elements of data management planning and implementation

Definition of Data

Environmental Data

- Any measurement or information that describe
  - Environmental processes, location or conditions
  - Ecological health effects or consequences
  - Performance of environmental technology
- Includes:
  - Primary data: directly from measurements
  - Secondary data: existing data

(USEPA 2002)

Data Management

- A structured process that promotes data quality, availability, and preservation for analysis, informed decision-making and data reuse.

Three Principles:

- Discoverability
- Accessibility
- Usability

Value of Data Management

Essential for:

- Analysis: data available during the life span of a project
- Informed Decision-making: data available for use in making decisions
- Reuse: data available to resample, reanalyze and other uses

Value of Data Management

Restoration Questions Requiring Long-term Data Collection

- Population dynamics
- Dynamics of ecological processes
- Cumulative effect of stressors
- Effectiveness of management and restoration
- Changing Climate

Big Data

How Much Effort into Data Management?

Graded Approach

- Recognizes that not all monitoring projects require the same level of detail in their data management plan

- Ensures the rigor of data management planning is commensurate with:
  - Importance of the work
  - Resources
  - Needs of participating organizations
  - Consequences of potential decisions

Important Questions to Ask for a Graded Approach

- What is the intended use of the data?
  - Human health consideration
  - Protection of federally listed species
  - Quantitative assessment of restoration effectiveness
- What is the level of effort supporting the project?
  - Short term or long term
  - Single organization or an interagency task force
  - Small scale ($) or large scale ($$$)
  - Local or national issue
- What is the potential impact?
  - Ecological impacts
  - Economic impacts
  - Legal defensibility of the data

Data Management Plan Implementation Model

Data Management Plan Implementation Model

Planning for Data Management

Three Components

- Project description
- Project administration
- Data management requirements

Data Management Plan Implementation Model

Data Acquisition and Collection

Projects generate and compile environmental data from numerous sources

- Field observations and measurements
- Field images, audio, voucher specimens, laboratory samples
- Secondary sources: soil surveys, community descriptions, field guides

Data Acquisition and Collection

- SOPs (Standard Operating Procedures) – written instructions that document a routine or sampling activity
- Data collection forms
- Field logistics and data conveyance from field to workspace
- Documenting and resolving unknowns
- Form and sample custody protocols
- Training and debriefing
- Verification and validation

Data Management Plan Implementation Model

Organization, Storage and Security

Data management must eliminate the potential of data loss throughout the project lifecycle

- Workflow to guide storage of data in original and processed formats
- Version control
- Storage methods
- Access and censorship

Data Management Plan Implementation Model

Data Processing and Analysis

- Procedural Steps for Processing
  - Any manipulation of data to convert it into a useable format for subsequent applications
- Procedural Steps for Analysis
  - Preparing data for analysis, validating statistical assumption
  - Document statistical methods and analysis steps

Data Management Plan Implementation Model

Data Preservation

- Long-term protection and archiving of interim and final data products
  - Data are complete and certified
  - Managed and secure environment
  - Lossless data format
- Data access, distribution and deposition protocols

Data Management Plan Implementation Model

Data Sharing and Reuse

Sharing data and data products to ensure that they are readily accessible and can be used internally and by the broader scientific community

- Discoverability
- Accessibility
- Usability

Data Management Plan Implementation Model

Summary

- Proactive integration of data management into research
- Model provides a guide to the elements of data management
- Quality assurance is part of every element
- Final product of research is not only a manuscript, but the whole data management document

Great Lakes RESTORATION

GENERAL DYNAMICS
Information Technology

Thank You

Questions