Data Stewardship Workshop Report

March 2016, Therkildsen Field Station at Emiquon

Jeffery W. Walk, Karen S. Baker, Richard E. Sparks

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Data Stewardship Workshop Report

Conducted 21 March 2016, Therkildsen Field Station at Emiquon

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Contents

Suggested Citation:

Cover Photo:

Water flows from The Nature Conservancy's Emiquon Preserve into the Illinois River. The newly installed gate in the levee has been named *Ahsapa*, which means "web" in the Myaamia language of Emiquon's pre-European inhabitants. The photo is a visual metaphor for the Preserve's pool of data from many cooperating investigators and institutions that connects to a web of scientific research at other restoration sites around the world. Photo credit: The Nature Conservancy.

Executive Summary

The Nature Conservancy is a science-based organization that makes significant investments in research and monitoring of the ecological outcomes and effectiveness of our conservation work. The Illinois Chapter has large and rapidly increasing quantities of data that must be appropriately managed to make the data accessible and to prevent their loss. The purpose of the data stewardship workshop was to design and launch a TNC data stewardship initiative to organize and manage data internally in the near term, and scope future efforts for multi-organization collaboration and coordination. This initiative, focusing initially on the Emiquon project with data from many sources including university and agency partners, will inform subsequent data and information stewardship initiatives for other TNC programs.

Prior to the workshop, participants identified the major needs relating to data as: centralized data storage, easy access, and data quality and completeness. During the workshop, participants indicated it was very important to find, access and integrate data sets, but not particularly easy to do so.

The group discussed the merits of various platforms for storing and sharing data. In use among the field stations, UIS and TNC is Box, a file sharing system for which TNC has an enterprise license. As a practical matter, most TNC data are stored on local shared drives, which is fast and efficient for local users with small files, but slow for large GIS and image files. Important for Emiquon and the field stations, files on the shared drive are accessible locally even when there are (frequent) internet connection problems.

Three case studies were presented by partners to provide a sense of the spectrum of data management systems. Among the lessons learned were these: (1) designate data specialists; (2) create a data team; (3) plan collaboratively for the long term; (4) inventory holdings; (5) establish file and station naming conventions; (6) create and post shared documentation; and (7) create and post a dataset catalog. Participants agreed that the term 'data' is much more encompassing than just the products of scientific research. The record of permits for scientific research at Emiquon is one such example.

While hardware and software are clearly important parts of the digital information infrastructure for this data stewardship initiative, equally if not more important, is the human or social infrastructure that designs, develops, maintains, and updates it. Social infrastructure includes data teams, liaisons, best practices, documentation, and help desks. Collaboration across the partners working at Emiquon and other TNC projects is a form of community infrastructure to support data management. In addition, organizational infrastructure includes appropriate staffing and training in data management, as well as support for infrastructure growth by the management team and trustees.

When formulating a data team, the basic minimum components are system administration (hardware, security, applications), data management (data assembly, metadata, web content), and programming (application use, database, web). In addition, Geographic Information System (GIS) expertise supports work with spatially-oriented data that often proves useful in visualizing site-based data. In the case of Emiquon, a community approach spanning organizations is most appropriate. At current staffing, the data manager role for our sites, including Emiquon, is not adequately addressed, and a draft job description for a data manager was developed (Appendix D).

<u>Action Items:</u>

1. Investigate opportunities for funding information infrastructure growth and collaborative data efforts at Emiquon, such as the NSF-sponsored Research Coordination Network program, which supports projects of up to $500,000 and 5 years in duration.
2. Present a synopsis of key take-aways from the workshop at this year's Emiquon Science Symposium on May 18th.
3. Include data stewardship as a recurring topic at the annual science symposia.
4. Develop a business plan to justify additional resources and staffing for data management.
5. Building from the Emiquon permit catalog, complete an inventory of various data sets, ensure they are internally findable and secure, share the inventory via Box, and then develop the documentation or metadata for those data sets.
6. Create and share a place name list in Box.

Purpose & Intended Outcomes

The Nature Conservancy is a science-based organization that makes significant investments in research and monitoring of the ecological outcomes and effectiveness of our conservation work. The Illinois Chapter has large and rapidly increasing quantities of data that must be appropriately managed to make the data accessible and to prevent their loss. Although the Nature Conservancy has long experience with conservation, science, and land stewardship, it is critical that TNC also begin investment in data stewardship. With the ongoing transition to a digital era, an understanding of data stewardship together with development of data management capabilities is needed to ensure data are well-managed and available for scientific and conservation efforts. Data stewardship refers to taking responsibility collectively for data as a shared resource. Data management focuses on assembling, documenting, organizing, and preserving data and making data sets accessible to meet local data needs as well as sharing with the broader scientific community.

The purpose of the data stewardship workshop was to design and launch a TNC data stewardship initiative to organize and manage data internally in the near term, and scope future efforts for multi-organization collaboration and coordination. This initiative, focusing initially on the Emiquon project, will inform subsequent data stewardship initiatives for other TNC programs.

The Intended Workshop Outcomes included:
• Understanding of data stewardship concepts and data management activities
• Clear statement of user needs and definitions of data types
• Understanding/consensus on technical support configurations and data support options
• Essential functions of a potential data management position
• Workshop report

The workshop was conducted on 21 March 2016 at the University of Illinois at Springfield's Therkildsen Field Station at Emiquon. Participating were 10 TNC staff and one trustee, and four partners (Appendix B). Informal participant comments appear in boxes throughout the report. Identified action items are indicated.

Needs Assessment

A pre-workshop survey indicated participants performing many data-related roles (majorities performing research and research support; writing proposals, reports or publications; performing conservation and conservation support; providing technical and field support; carrying out data entry, production of tables/graphs, and statistical data analysis). Prior to the workshop, participants identified the major needs relating to data as centralized data storage and easy access as well as data quality and completeness. These results corresponded closely to similar surveys of other scientific communities (see word clouds below). During the workshop, participants indicated it was very important to find, access and integrate data sets, but not particularly easy to do so.

The group discussed the merits of various platforms for storing and sharing data. In use among the field stations, UIS and TNC is Box (for which TNC has an enterprise license). Due to security concerns, file

sharing with federal partners via Box or other tools is difficult. Box capabilities include granting selected levels of privileges to users, no effective limit on number or size of files, and the ability to modify files via the web or by downloading to a desktop. CONNECT is a Microsoft SharePoint-based TNC system of collaborative software. It governs what types of information can be entered, structures the organization of files, and imposes version control to reduce/eliminate unwanted or outdated versions. As a practical matter, most TNC data is stored on a local shared drive, which is fast and efficient for local users with small files, but slow for large GIS and image files. Important for Emiquon and the field stations, files on the shared drive are accessible locally even when there are (frequent) internet connection problems.

Most important "must haves" for collaborative data efforts, derived from National Science Foundation (NSF) EarthCube surveys (left) and survey for this workshop (right). [These versions created excluding the word 'data' from responses.]

How IMPORTANT is it for you to find, access, and/or integrate multiple datasets, models, and/or software? (0 not important; 10 very important)

How EASY is it for you to find, access, and/or integrate multiple datasets, models, and/or software? (0 not easy; 10 very easy)

"When we get inquiries and have to find data, it's like detective work - a jigsaw puzzle that we're trying to put together."

Participants' Highest Priority Data Activities	Greatest Challenges to Data Management
Field Work permit catalog	Planning coordinated data management across partners
Dataset catalog	
Metadata forms and guidelines	Availability of data expertise across partners
Data assembly and storage	Acquiring knowledge about data management
Emiquon community data system	Planning coordinated data management within organizations
Data management training & skills	
	Availability of data expertise within organizations

Three case studies were presented by partners to provide a sense of the spectrum of data management systems. For a two-year Emiquon-specific project, Dr. Mike Lemke, University of Illinois Springfield, reported on data management associated with the NSF Rapid Grant studying the effects of the 2013 Illinois River flood on Emiquon. Dr. Andy Casper, Illinois River Biological Station, provided an overview of the USGS's Long Term Resource Monitoring Program at 6 core sampling areas, designed to track changes in the Upper Mississippi River system owing to natural or human-induced causes (Corps of Engineers projects, changes in land use, invasive species, etc.). (Emiquon is in one of the core sampling areas, the 78-mile-long La Grange Pool of the Illinois River.) USGS has 3-4 staff managing the data, summaries of which are made public, but raw data are not suitable for most users. Karen Baker, University of Illinois at Urbana-Champaign, shared the experience of the NSF's Long-Term Ecological Research network comprising more than two dozen sites. Among the lessons learned were these: (1) designate data specialists, (2) create a data team, (3) plan collaboratively for the long-term, (4) inventory holdings; (5) establish file and station naming conventions, (6) create and post shared documentation, and (7) create and post a dataset catalog.

Emiquon Data Stewardship
Force Field Analysis
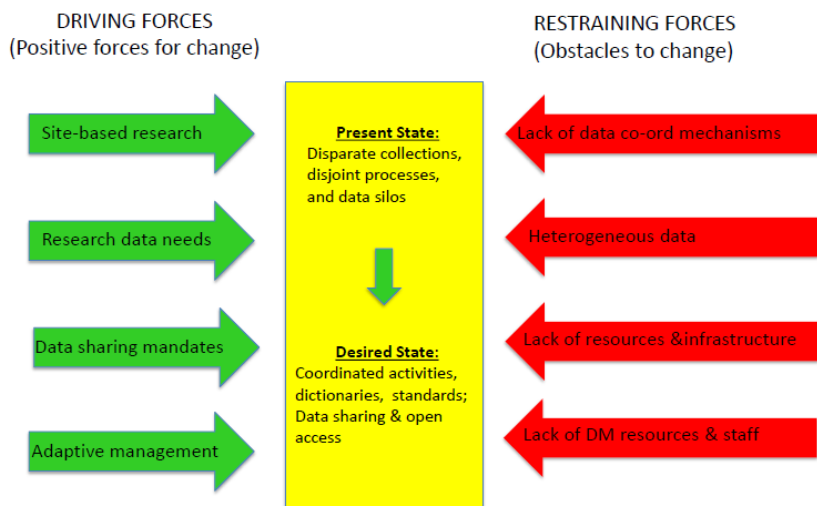
What are Data?

For Emiquon, the participants agreed 'data' is much broader than the narrower sense of that derived from scientific research.

"There are a lot of things that are good data that we don't think of as data."

Five categories of data were identified that warranted management at Emiquon, each with somewhat different ownership and potential legal sensitivities:

1. Site information: The basic types of information about Emiquon that all researchers may like to access. Includes archived information and real-time information from sensors and automated samplers. Examples include digital elevation models (DEMs), weather data, water quality. Also construction and management records, and perhaps legal documents (e.g., easements).
2. Data collected by staff: To date, these have been difficult to track because there is not necessarily a record, such as a permit, that the data had been collected.
3. Data collected by contractors: Data owned by TNC, but perhaps with a license for use by the contractors.
4. Data collected by outside researchers: Data not owned by TNC.
5. Use permits: Applications that request permission to sample contain important information, including contact information, sampling design, and sampling locations. Data sharing agreements, some degree of standardization (e.g., for reporting site locations) and unique identifiers could be built into use permits. If accessible and shared among researchers, permits provide a way to avoid duplication of effort, facilitate communication, and facilitate cooperative research.

Infrastructure & Staffing

While hardware and software are clearly an important part of the digital information infrastructure for this data stewardship initiative, equally if not more important, is the human or social infrastructure that designs, develops, maintains, and updates it. Social infrastructure includes data teams, liaisons, best practices, documentation, and help desks. Collaboration across the partners working at Emiquon and other TNC projects is a form of community infrastructure to support data management. In addition, organizational infrastructure includes appropriate staffing and training in data management, as well as support for infrastructure growth by leadership such as the management team and trustees.

When formulating a data team, the basic minimum components are system administration (hardware, security, applications), data management (data assembly, metadata, web content), and programming (application use, database, web). Such a data team can be developed for an individual research project or program, or for an organization such as TNC. In the case of Emiquon, a community approach spanning organizations is most appropriate so designating a data contact at each partner organization enables a community approach. At current staffing, the data manager role for TNC, including Emiquon, is not adequately addressed, and a draft job description for a data manager was developed (Appendix D).

Recommendations for initial steps for partnership-based data management:

*   Identify data contacts for each partner organization (i.e. other than lead researcher)
*   Develop a collective vision for success
*   Form a data management committee with member contacts
*   Establish data management communication & meetings

- Identify distribution of responsibilities within organizations and across partners
- Initiate pilot projects

On the horizon, given the rapidly expanding digital realm, are several technological developments that should make data management easier and more effective: unique identifiers (such as Digital Object Identifiers [DOI] for data sets as well as publications), emerging information environments, and new funding for the information environment.

Achieved Outcomes & Action Items

Participants agreed we had arrived at a shared understanding of data management concepts, activities, and teams; discussed technical configurations and support options, user needs and audiences; and conducted an inventory of user needs and of data types. This section expands on the action items listed in the executive summary.

It is important to investigate opportunities for funding infrastructure growth and collaborative data efforts. One example is the NSF-sponsored Research Coordination Network--a particular funding source that should be explored for Emiquon, which supports projects of up to $500,000 and 5 years in duration (Action 1).

> *"We need data management relief, not new data management jobs."*

Besides production of this report, next steps include presenting a synopsis of key take-aways from the workshop at this year's Emiquon Science Symposium on May 18th (Action 2). There was consensus that data stewardship should be a recurring topic at the annual science symposia (Action 3).

TNC staff will need to develop a business plan to justify additional resources and staffing for data management (Action 4).

Pilot data projects were identified and are underway. Building from the Emiquon permit catalog, we will complete an inventory of various data sets, ensure they are internally findable and secure, share the inventory via Box, and then develop the documentation or metadata for those data sets (Action 5). Sally McClure is leading this effort. Secondly, a team (Karen Baker, Sally McClure, Aaron Lange) volunteered to create and share a place name list in Box (Action 6).

> *"Think of the ideal future like this: going to a website and seeing all the data that had been collected and you could plan out research program."*
>
> *"What do we want this final system or temporary system to do?"*
>
> *"Are we moving to one large database, I don't think so."*

Workshop Evaluation

When asked to describe the workshop in 3 words, participants most frequently used positive terms related to the subject matter (informative, enlightening, helpful, n=6), context (important, necessary, imperative, n=5), and workshop format (productive, organized, structured, n=5). Responses also suggest it was a lot to cover in a single day (overwhelming, dense, n=4).

> *"I came with a preconceived notion, but it's more complex than I realized. I didn't know about it all."*

Appendix A. Workshop Agenda

Emiquon Data Stewardship Workshop Agenda
21 March 2016
Therkildsen Field Station at Emiquon

Purpose: To design and launch a TNC data stewardship initiative to organize and manage data internally in the near term, and scope future efforts for multi-organization collaboration and coordination. This initiative, focusing initially on the Emiquon project, will inform subsequent data and information stewardship initiatives for other TNC programs.

Intended Workshop Outcomes
- Understanding of data stewardship concept and data management activities
- Clear statement of user needs and definitions of data types
- Understanding/consensus on technical support configurations and data support options
- Essential functions of a potential data management position
- Workshop report

Schedule

Time	Activity
8:30	Gather, coffee and refreshments available
9:00	Welcome, logistics & purpose
9:15	Introductions
10:15	Break
10:30	Case Studies: NSF Rapid, LTRMP, LTER – what works, what to change
11:15	Situation analysis and Emiquon information environment
12:00	Lunch (provided)
1:00	Types of data, Team approach to data stewardship, and What's on the horizon for data stewardship
2:00	Design & Develop the System I: Data practices and data activities
2:45	Break
3:00	Design & Develop the System II: Infrastructure & roles of current and future staff
3:45	Review & report, Next steps, Workshop evaluation
4:30	Adjourn

Appendix B. Workshop Participants

<u>**TNC participants**</u>

Illinois River Program

Doug Blodgett, Jason Beverlin, Tharran Hobson, Sally McClure

Mackinaw River Program

Maria Lemke, Krista Kirkham

Mike Taylor - TISOM (Technology & Information System Operations Manager)

Aaron Lange – Conservation Information Specialist (primary GIS guy for state)

Jeff Walk - Director of Science

Rip Sparks – Trustee and Chair of Science Advisory Committee

<u>**Partners**</u>

Andy Casper - Illinois Natural History Survey

Mike Lemke, Tom Rothfus - University of Illinois Springfield

Karen Baker - University of Illinois Urbana-Champaign

Workshop Surveys

Three surveys were conducted for a small Data Stewardship Workshop organized by The Nature Conservancy.

- PreWorkshop Survey (by email, n=11)
- DuringWorkshop Survey (at workshop, n=12)
- PostWorkshop Survey (at workshop, n=10)

Participants, Pre-Survey

The majority of participants were from The Nature Conservancy and 2-3 from the University of Illinois Springfield.

-Participant titles at TNC included River Conservation, Science Specialist, Conservation Practitioner, Aquatic Ecologist, Conservation information manager, Field Station Director, Director of River Conservation, Applied Scientist, Program Coordinator, Professor, and Director of Science.

-Participant departments at TNC included Conservation units: Science, Illinois Rivers Program, and Science/GIS.
-Participant departments at UIS included Dept of Biology and Therkildsen Field Station at Emiquon

Experience in years (n=11)
<5	0
5 to 10	1
11 to 20	7
21 to 30	0
>30	3

Participant Activities (preSurvey, n=11)

9 - research support

8 – research

8 - proposals, reports, pubs

7 – conservation

7 - conservation support

7 - technical support

7 - tables/graphs production

6 - field support

6 - data entry

6 - quant/stats data analysis

4 - data verification

1 - GIS Database management

1 - GIS

1 - Prepare permits

Data Management Values/Strategy	2
shared values & language	x
communication across organizations	x
Priority Tasks	**19**
shared assembly location (storage)	xxxx
access to std GIS data ILFO/TNC/Partners	x
categorization of information	xx
organization of data	xx
metadata, documented	x
searchable data (findable)	x
emiquon database & its upkeep	xx
data system (software & design choices)	xx
security - access; who has access? Control?	xx
security- backup, archive	x
able to integrate datasets	x
Data Issues	**11**
easy access	xxx,-x
multiple sites	x
multiple data contributers	x
multiple subject	x
kinds of data (data selection)	x
data quality& completeness (procedures/control)	xxx
data policy - timeframes	x
Roles	**1**
clear roles wrt data/integrating datasets	x
Products/Outcomes	**2**
data catalog	x
historical data	x

Top two 'must haves'

Pre Survey, n=11

In Comparison

Top "Must Haves" from NSF EarthCube Surveys (2013, 2015)* &
TNC Data Stewardship Initiative Emiquon PreSurvey (2016)

Geochemists (EarthCube)
- Access to formatted published data [and models]
- Complete geo-referenced geochemistry of rocks and minerals
- Cross disciplinary knowledge discovery and utilization
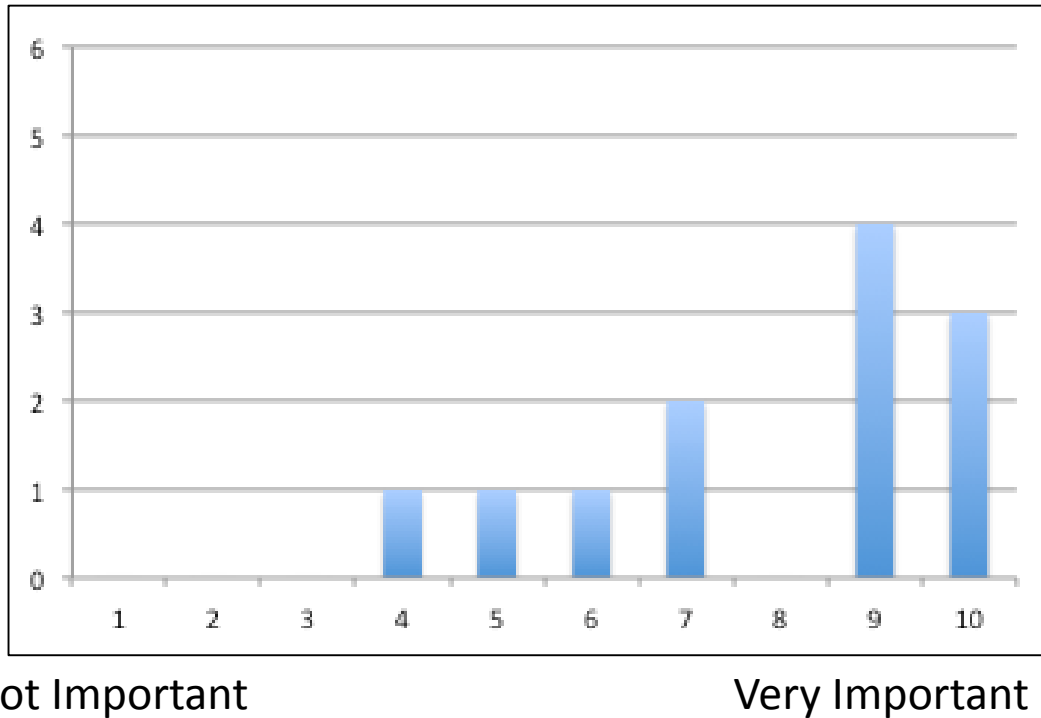
Atmospheric scientists (EarthCube)
- Easy and free access to atmospheric data
- A way to document and disseminate complex datasets for community use
- Source Code for environmental models
- Assessment of global climate change impacts [in] real time

Emiquon environmental scientists (TNC)
- Easy access to assembled data
- Organization and findability of data and information
- Attention to data quality
- Data system and security of data

In Comparison

Top "must haves" from NSF EarthCube Surveys & TNC Data Stewardship Initiative Emiquon Survey

Geochemisty & Atmospheric Scientists

TNC Emiquon with data

During Survey

Not Important   Very Important

How IMPORTANT is it for you to find, access, and/or integrate multiple datasets, models, and/or software. (Score 0-Not Important to 10-Very Important or NA); DuringSurvey.

During Survey
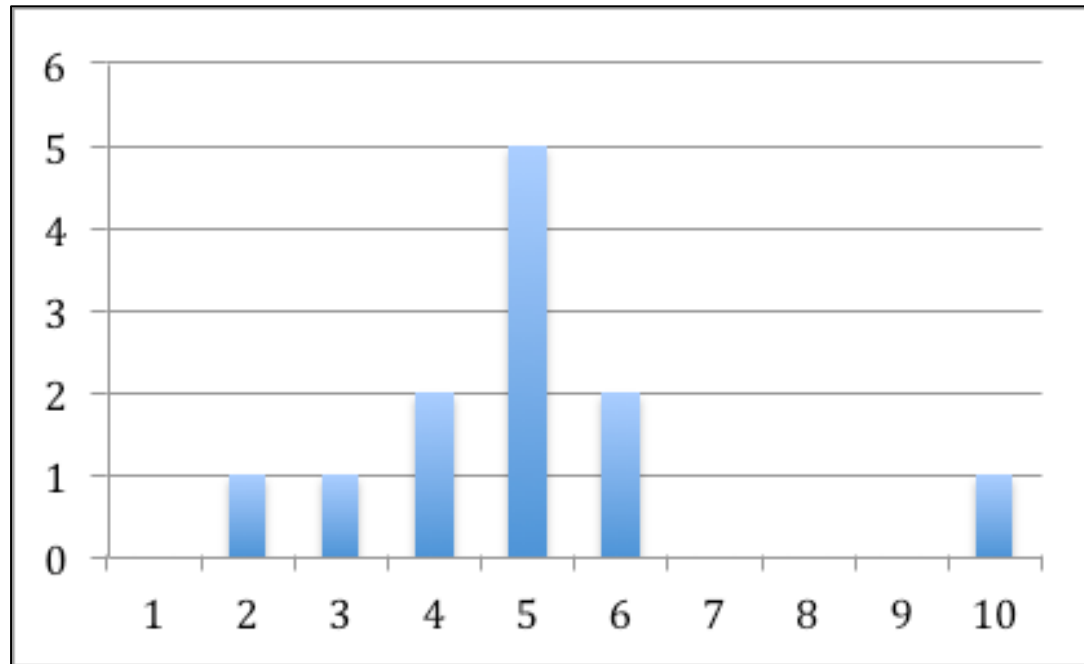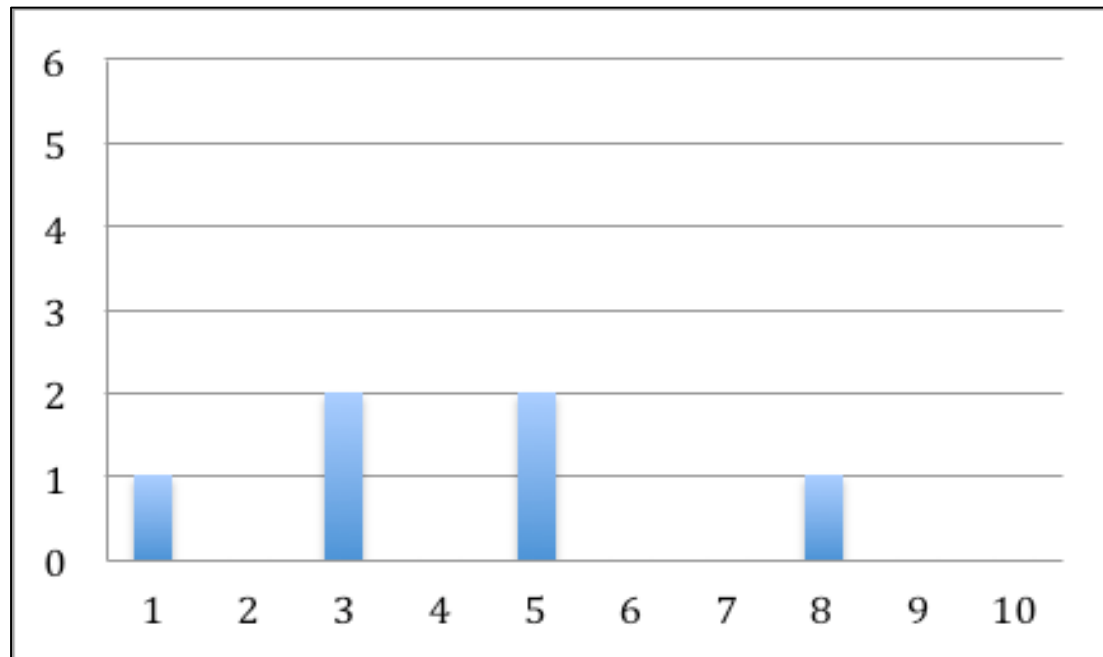

Not Easy   Very Easy

How EASY is it for you to find, access, and/or integrate multiple datasets, models, and/or software. (Score 0-Not Easy to 10-Very Easy or NA); DuringSurvey.

Pre Survey

Strongly Disagree   Strongly Agree

Do you have adequate templates, procedures, and standards to ensure well-documented and reliable sharing of data, tools, models, and software? (Score 0-No, Strongly Disagree to 10- Yes, Strongly Agree; or NA for 'don't know'); PreSurvey.

Kinds of Data – During survey

Kinds of Data: Indicate which data, formats, and other categories apply to your current work (please check all that apply).

11 - a. Non-digital/unstructured text/documents
       (e.g. hand-written notes, sketches, logs, figures, maps)
 5 - b. Physical samples (e.g. biological, organic, inorganic)
 9 - c. Digital still images
 5 - d. Digital video and audio recordings
11 - e. Spreadsheets and other flat files (e.g. ascii, binary)
 6 - f. Databases (relational and other)
 7 - g. Data from in situ sensors (e.g. streaming, models)
 2 - h. Data from satellites (e.g. streaming, models)
 4 – i. Survey data involving human subjects
 8 - j. Spatial data (e.g. GIS)
 8 - k. Long-term data (e.g. time-series, monitoring)
 1 - l. Computer simulations and/or models
 2 - m. Computer code (e.g. executable files)
 0 - n. Classified data (e.g. military)
 1 - o. Other (please specify): _____legal documents___
 0 - p. Not applicable

Overview
-All participants indicated they work with non-digital data and spreadsheets with digital still images as the next most common item.
-Legal documents were added as a distinct type of data.

Kinds of Activities – During survey

2. Kinds of Activities for Emiquon: Rate the level of priority you would give to each of the following activities for Emiquon on a scale of 1-to-5. For each item, circle one scoring from Not Needed (1) to High Priority (5). Use 'na' if you're not sure.

4.3 - a. Fieldwork permit catalog
4.3 - b. Dataset catalog
3.9 - c. Data dictionaries
4.2 - d. Metadata forms and guidelines
3.6 - e. Website with science and data
3.8 – f. List of sampling station locations
3.8 - g. Maps of sampling locations
3.8 - h. List of Emiquon participants
3.8 - i. List of Emiquon publications
4.2 - j. Data assembly and storage capabilities
4.2 - k. Emiquon community data system
3.1 - l. Data policy
3.8 - m Emiquon data team (one member from each member organizational unit)
3.4 - n. Data team meetings
4.1 - o. Training & skills development in data management

Overview
-Average priority was 3.9 with results ranging from low of 3.1 to high of 4.3.
-Highest priority was for a fieldwork permit catalog and a dataset catalog. Lowest priority was for data policy and a website.

Indicator Issues – During survey

3. Rate each indicator issue in terms of its challenge on a scale of 1-to-5. For each item, circle one scoring *from Minor Challenge (1) to Massive Challenge (5)*. Use 'na' if not applicable.

3.6 - a. Planning data management for your collaborative projects
3.8 - b. Acquiring knowledge about contemporary data management
3.8 - c. Planning coordinated data management within your organization
3.6 - d. Availability of tech support for data work within your organization
3.8 - e. Availability of expertise for data work within your organization
4.1 - f. Planning coordinated data management across Emiquon
3.6 - g. Availability of technical support for data work across Emiquon
3.9 - h. Availability of expertise for data work across Emiquon

Overview
-The average challenge for data efforts was great (3.6) on a scale of 1 to 5.
-The greatest challenge was planning coordinated data management across Emiquon.

Describing the Workshop – Post survey

Responses to the post survey request for participants to use three words to describe the workshop:

- informative, timely, productive
- exciting, overwhelming, imperative
- this was great
- informative, open, important
- exploratory and introductory
- thought-provoking
- outside-the-box
- overwhelming, constructive, initiated
- good but overwhelming
- informative, enlightening, organized
- dense, helpful, necessary
- informative, productive, well-structured

Appendix D. Draft Data Management Job Description

JOB TITLE	Conservation Information Manager III
JOB FAMILY	Conservation
JOB NUMBER	xx
SALARY GRADE	x
STATUS	Salaried, 12 months, extension pending
DATE	xxxxxx

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SUMMARY	The Conservation Information Manager III designs, manages, maintains, and delivers conservation data and provides support for data activities including work with technologies, data systems, data sharing and documentation, to Conservancy staff.
ESSENTIAL FUNCTIONS	The Conservation Information Manager III • Participates in planning of data and information environments supporting conservation at multiple levels. • S/he performs data management and data processing; familiar with differing information environments designs and data assembly, produces professional reports, processes data sets and carries out data tasks relating to tabular source material and advanced queries, and provides hardware/software support. • Develops and delivers training to staff individually and in groups, produces maps and other graphic products and reports. • Designs, documents, maintains, and monitors processes and workflow related to data acquisition, maintenance, organization, accessibility, and integrity. • Implements QA/QC (quality assurance/quality control) standards and oversees data transfer and documentation protocols including documentation of data collection methods, population of data dictionaries, and implementation of data certification procedures. • Ensures the long-term stewardship of datasets by developing and maintaining archival and retrieval protocols. • Establishes procedures for data accessibility, sharing, and security.
RESPONSIBILITIES & SCOPE	• Supervises staff and has ability to motivate, lead, set objectives and manage performance, including conflict resolution. • May help develop and manage data work plans and large project budgets. • May negotiate and contract with vendors. • Ensures integrity of both data collecting and management relating to conservation projects and project statistics. • Acts independently, under limited supervision, resolves complex issues within the program area and may act as a resource to others.
MINIMUM QUALIFICATIONS	• MS or BS degree and certification in a related field and 3 years related experience, or equivalent combination of education and experience. Related fields include biological sciences, agriculture, natural resource management, chemistry, or related disciplines, such as information sciences appropriate to the position. The nature and quality of this required course work must have been such that it would serve as a prerequisite for more advanced study in the field or subject-matter area. • Experience managing, maintaining and populating databases and manual files. • Experience with image analysis and interpretation, complex spatial analysis, data modeling and landscape scenario analysis. • Experience managing multiple projects. • Experience operating GIS software, analyzing data and producing data reports and creating maps. • Experience in work collaboratively and developing /delivering training to practitioners. • Experience with Microsoft Word, Excel, Access and delivery of content via the Web.

PREFERRED KNOWLEDGE, SKILLS & EXPERIENCE	• Successful completion of at least 1 year of higher level graduate education in data-driven biology, informatics, information sciences, or other closely related field which demonstrates the knowledge, skills and abilities required by this position. • Experience in collaborating and coordinating management of biological, agricultural, ecological, or natural resource data to facilitate the exchange of data among scientists; • Evidence of analytical and writing ability, in the form of reports, publications, or proposals that explain experimental design, procedures, and results. • Experience in computerized data collection, data assembly, processing, and quantitative and graphical analysis. • Experience in evaluating needs for management, acquisition, and enhancement of biological, agricultural, ecological, or natural resource data; • Experience in updating and maintaining research databases; • Experience in the following areas: interpretation of image analysis, complex spatial analysis, data modeling and landscape scenario analysis • Knowledge of current trends and practices in relevant discipline(s) and geographic region(s). • Experience collaborating with other parties to obtain data from a variety of sources • Experience in managing and prioritizing tasks and meeting deadlines. • Communicating clearly via written, spoken, and graphical means in English.

ORGANIZATIONAL COMPETENCIES	Accountability for Outcomes	Pushes for excellence. Establishes challenging goals for self and others to drive performance in support of the Conservancy's mission. Rewards behavior that achieves these standards and is aligned with the organization's mission/ values. Takes action to address performance problems in a timely and appropriate manner.
	Builds Organizational Capability	Builds or adapts organizational structures to accomplish the mission and to improve performance. This includes reorganizing organizational systems, structures, processes, procedures, communication channels or reporting relationships. With the Conservancy's strategic filter in mind, determines who can contribute, gets the right people involved, and builds bench strength for the future.
	Collaboration & Teamwork	Shows a willingness to put the needs and goals of a global organization before personal/local/departmental needs. Works with others across organizational boundaries. Makes decisions, sets priorities, and allocates resources to help the organization as a whole achieve results.
	Communications	Effectively expresses messages verbally and in writing. Actively listens to others. Fosters open exchange of issues. Is timely with information.
	Courage & Decisiveness	Makes decisions and stands by them. Makes timely decisions even under pressure and when lacking complete information. Has the courage to modify decisions and admit why and how they were wrong.
	Flexibility & Innovation	Flexible to changing circumstances. Takes innovative approaches towards work. Takes calculated risks and makes dependable decisions in the fact of uncertainty. Capacity to integrate disparate factors and to document limitations and constraints relating to decisions made.
	Influences for Results	Achieves results by persuading, convincing, or influencing others. Adapts approach to the individual or group and knows how and when to use complex influence strategies. Uses success stories and passion for the mission to generate enthusiasm and support.
	Open to Learning	Versatile learner and committed to self-improvement. Employs strengths effectively. Willingly shares knowledge with others. Seeks coaching on areas needing improvement. Adjusts behavior/performance as needed. Views mistakes as learning opportunities.
	Organizational Awareness	Understands the basics of our business. Knows how local job relates to the big picture & contributes to an overall data strategy. Knows how/why things work inside TNC. Easily moves through internal networks and channels for success.

This description is not designed to be a complete list of all duties and responsibilities required for this job.