❖ Standard 5: Use a consistent data management framework in accordance with internal and partner organization data standards. [conceptualize]1

Rationale

Establishing and using a consistent data management framework will enable more effective analyses and implementation by the sponsoring organizations, partners and key stakeholders. Implementing data management best practices will improve efficiency and allow the organization to become more agile in developing new iterations and updates to our ecoregional assessments.

Recommended Products

- A database formatted to meet organizational standards. The Ecoregional Assessment Data Standard 1.0 is the standard for the Nature Conservancy.
- Geospatial data representing the ecoregional conservation portfolio (ideally, spatial data and tabular database described above are incorporated within a geodatabase).
- Archived source data [spatial and tabular] on occurrences of biodiversity targets, landscape suitability, and threats to biodiversity that were used in the assessment.
- Metadata describing tabular and spatial data (products and source data) that includes sources and contacts, data confidence, projections, scale accuracy, etc.
- Data sharing agreements with data providers and partners that document appropriate data access, restrictions on use, and disclaimers.
- The above products managed in accordance with best practices. The Nature Conservancy has Data Management Best Practices as implemented by the network of Conservation Data Nodes.

GUIDANCE

Ecoregional Assessment products typically include recommendations for priority conservation areas in the form of maps, text, and supporting data in a variety of media. Just as each assessment begins by collecting available data, future value of the assessment to others will depend on the quality, availability, and management of the resulting data products.

If data are not managed well and made easily accessible, the printed ecoregional assessment report becomes the only means of delivering the results to partners, stakeholders, and our own staff. The wealth of information gathered during the project remains hidden from view and its use is often severely limited. In our own hands, an assessment that results not merely in a report but in a well managed data resource provides

[1]This PDF does not provide active links to documents and websites referred to in this document. Utilize the online version at http://conserveonline.org/workspaces/cbdgateway/era/standards/std_5 to access active links.

us the opportunity to deliver the information in many forms including graphic presentations, geographic information systems (GIS), and dynamic web-based tools. The managed data resource also allows us to use data in post-hoc analyses and will form the foundation for future iterations of the assessment. Managing these data helps those outside our organization as well. Many organizations interested in our assessments and conservation recommendations also ask us to share with them the source data and derived data from which the recommendations were formed. We can build and strengthen our partnerships, and contribute to the work of the broader conservation community through our ability to leverage this information through sharing the data and using it in planning and implementation work that follow the ecoregional assessment.

Conservation approaches depend on reliable, credible and current information. One of the great successes represented by TNC's ecoregional assessments is the collaboration between partner organizations and scientists who are gathering and interpreting the needed data. The data resource in hand during the assessment process, and the information products distributed when the assessment is completed, are unique and powerful resources, but will continue to be useful only if well managed.

The data management strategy for an ecoregional assessment should consider:

- the organization's data resource management strategy (Box 1)
- the data manager's responsibilities for data stewardship; and
- the life cycle of the data being managed for ecoregional assessment.

Data Management Strategy

Ecoregional assessments help identify where we work, the status of the biodiversity and the goals that define success. Information gathered and developed through this process is valuable for the assessment itself, marking our progress toward goals and for broader scale analyses. Without a strategy for data management that is in synch with the organization's data management strategy, products of ecoregional assessments may be produced and distributed, but in the long run the organization loses opportunities to leverage the information resource through additional projects and broader efforts.

Box 1: The Nature Conservancy's Conservation Information Systems Strategy

In 2006, TNC published a new Conservation Information Systems Strategy. This strategy will guide the development of regional conservation data nodes, improvements to our information infrastructure and enterprise datasets, and produce guidelines for data management. Following are the 14 major recommendations of the CISS, note that the majority are relevant to developing and managing conservation data:

Data

1. Develop core datasets for measuring our progress towards the 2015 Goal.
    - Ecoregional assessment data rollup
    - TNC preserves and easements
    - TNC conservation projects
    - Land status and managed areas
    - Threats to biodiversity
2. Define, implement, and support minimum data standards.
3. Define, implement, and monitor data management best practices.
4. Adopt and communicate the concept of "Data Management Nodes" as a key part of our data management and analysis processes.
5. Define, implement, and support a data management framework.
6. Build out ConserveOnline as a multi-faceted Conservation Portal.
7. Create a process and infrastructure to support publishing of our conservation data without risk of liability.
8. Define, implement, and monitor an engagement strategy for key partners.

Systems

9. Adopt a modular system architecture that embraces multiple, communicating conservation applications.
10. Create a team of technical resources dedicated to building and supporting conservation systems.
11. Migrate enterprise conservation systems to the ConserveOnline Conservation Portal and create linkages among systems wherever possible.

Capacity/Community Building & Communication

12. Foster community building and communication in order to support our conservation mission.
13. Provide regularly scheduled learning opportunities and knowledge exchange in the areas of data management and conservation systems.
14. Invest in new or realign current staff to support data, data management, and conservation systems development activities starting in Fiscal Year 2007.

CISS Vision*: TNC and its conservation partners value and invest in conservation data and information management as a core strategy to achieve mission success.*

CISS Mission*: TNC and its conservation partners will work together to design, develop, and implement tools and programs that support and serve the information and data management needs to achieve the 2015 global conservation goal.*

Data manager's role and responsibilities

There are two ways to approach data management on an ecoregional assessment team project. One is to position data managers as team members responsible for specific project tasks. The other is to position data managers as stewards of information resources who coordinate data management for ecoregional assessment projects while keeping larger organizational goals and data management practices in mind. This latter approach is needed in an organization seeking to build and steward conservation information as a strategic resource. This is how The Nature Conservancy is beginning to manage conservation data.

It is paramount that a qualified data manager be an integral part of a team undertaking an ecoregional assessment, and that they are engaged in planning for data management activities early in project planning. Agreement on a data management plan and responsibilities should be well thought out and agreed to in a charter to document the project team's roles and responsibilities. All ecoregional assessment teams need the support of a data manager to collect and manage information, archive source data and distribute digital products, and document these information resources. The data manager should be facile with software tools including spreadsheets, databases, and GIS. The data manager may also need expertise in formatting digital products, CDs, DVDs, or Internet web tools for accessing information. In some cases, the data manager may perform GIS analyses, create maps and information products, may negotiate data sharing agreements with data providers, and must assist the team in observing these data use agreements.

Data managers should also be responsible for coordination among team members including GIS analysts, technicians, and data providers such as US State Heritage Programs or Conservation Data Centers (who also may be contracted to provide data management).

The data manager should be identified early in project planning to develop the project's data management strategy. This person should coordinate the management of the data during active planning and between editions of the plan, considering the data life cycle stages described below.

Responsibilities for defining data management strategy, identifying priority data to be managed, facilitating team members in interacting with the data, setting and enforcing standards, and systematizing data are all essential to efficient assessment project teamwork. The data manager's role is also key to insuring the project creates a useful data archive that is documented and transferable for use in other future projects or information systems.

Good data stewardship requires that data managers recognize and promote the organization's information as a valuable resource to be managed for the long term. As the TNC implements Conservation Data Nodes as part of its Conservation Information Systems Strategy, data managers should remain aware of the data management best practices, tools, and support that are being made available throughout the organization.

Data Life Cycle

A robust data management strategy recognizes that information has its own life cycle in the organization. The role of data stewardship brings responsibilities at each stage of data management.

Data collection and data use agreements.

Planning for adequate data stewardship should be part of a project's planning phase. Data often comes from a wide variety of sources; data stewards in partner organizations benefit from coordinating their roles and activities so that information can be shared among partners and intellectual rights are respected.

Before collecting data, the data manager should fully understand the project's needed analyses and source data required for these analyses, For all incoming data or products, the manager should document data sources, contact information, data update schedule. Also any necessary data use agreements should be in place to guide or prohibit further uses, sharing, or redistribution of the source data. These metadata should reside with a well organized archive of the source data, and access to these source data should be controlled by the data steward in accordance with accompanying data use agreements.

An example of a memorandum of understanding is the MOU between TNC AZ and the Bureau of Land Management (.doc, 15 kb), Also view the Draft NatureServe and TNC data sharing agreement (.doc, 146 kb)(available with a password through ConserveOnline Discussion Board) for and example of a data sharing agreement.

Data standardization

Data stewarded internally should be managed to standards developed by the organization, and closely coordinated with the standards of data providers and data sharing partners. Data standardization should be aligned with the organizations needs for updating and/or aggregating data, such as regional rollups of data recommended by the CISS.

Data standards must be adopted and shared with team members before significant work is performed beyond initial data collection. Documented data standards should include standardized definitions and data dictionaries for databases, and may include data models and geodatabase schema for use by GIS professionals. Good standards are usually developed by teams with membership from within the organization as well as key data sharing partners. Standards should be designed to persist over time, vetted with those who will use them, and be widely shared once adopted.

ERA Data Standard 1.0 is an example of TNC using this approach. These standards should be formally adopted by the assessment team, and the project's data manager should support the team in using them.

TNC Ecoregional Assessment Data Standard 1.0

Data standards guide the process of collecting, managing and storing data to keep data organized and useful for assessment teams, partners and for further analyses. Data standards identify the minimum contents of a data set including conceptual attributes and values for tabular and spatial data sets.

The Nature Conservancy, along with input from partner organizations, has developed its first iteration of data standards to formalize data definitions and a data model for archiving ecoregional assessment data sets. The Ecoregional Assessment Data Standard version 1.0 was released in August, 2004 and is available on ConserveOnline at: http://conserveonline.org/docs/2004/09/ERA_Data_Standard_Version_1.0.zip

The standards are intended to guide ecoregional data managers and planners on the minimum data attributes that should be compiled in an ecoregional assessment, and how to format these for compatibility with other data sets and future iterations of TNC's Conservation Planning Tool (CPT). They will enable us to roll up and share ecoregional datasets – an increasingly important task within and between TNC operating units and with our conservation data partners.

Version 1.0 of the standard addresses descriptive data for ecoregions, ecoregional assessment targets, viability, conservation goals, target occurrences, and conservation areas, but does not yet cover other relevant data such as threats, strategies, or spatial data associated with these. Additional effort will be made to expand on these standards to better incorporate topics including spatial data, viability and integrity, threats, and status measures. Assessment teams are encouraged to use this data standard to effectively manage conservation information in ecoregional assessments, and to contribute their experience to future standards development.

Data analysis and products

Data managers will often perform analyses during ecoregional assessments. Methods used in ecoregional assessments have progressed over the years and there are now a variety of methods from which to choose. (Analytical tools such as SPOT and Marxan commonly used in ecoregional assessments are described in Standard 11.) In all cases, analytical methods should be chosen based on the information outputs needed and the ability of available data to meet these needs.

The data manager must assure appropriate spatial representation and scaling throughout data analysis, as well as observing adequate cartographic standards in map production; using spatial data out of scale can lead the user to incorrect conclusions. Not all scientists participating in an assessment will understand the limitations of data used; the data manager should help to guide data use as appropriate.

Documentation

Metadata – or '*information about the data*' - is the documentation that accompanies any data set whether tabular or spatial. Metadata records information such as the source, reliability and scale of the data, the citation, appropriate uses of the data, and a contact person or agency. Metadata also documents the accuracy, projection and derivation of

spatial data, and describes data quality, including confidence assessments of output data and products.

While the project team may be confident in their knowledge and data use during the project, staff turnover will occur and knowledge is lost. Documentation is essential to allow the work to live on.

As part of the information produced to document the assessment, the data manager should deliver complete metadata for source data and products. Because data ages, and can quickly become outdated, data users will depend on accurate metadata included with source data and products that states the availability of data updates and the time sensitivity of the information. The assessment team should also document gaps in available data that represent data needed for further assessment.

An example of a Metadata report for the Southern Rocky Mountains Ecoregion Boundary can be viewed at http://gis.tnc.org/community/projects/FWI/metadata/srock_ecoreg.htm

ERA products, data access and data sharing

The ability of the project team to deliver quality information products – whether through a printed report, CD, DVD, software, or Internet web tool – are the result of quality analyses and presentation work that can only be successful if well-formatted and well-managed data are in place. In the end, many will judge the value of the ecoregional assessment largely by the relative ease of use they experience in accessing the information.

The assessment team should seek to distribute its products widely to the conservation community, and should at the same time recognize that the data collected – a compiled archive of interpreted biodiversity information – is of principle interest to many. Access to these data can be the basis of significant partnership opportunities between TNC, WWF, Natural Heritage programs, Conservation Data Centers, other NGOs, government agencies, and the many other organizations with whom we work.

An assessment project is not complete without developing a data distribution plan that considers data sharing agreements, licenses, and MOUs that are in place, as well as potentially undocumented data sensitivity issues of data such as accidental disclosure of imperiled species locations or private property information. The information will be shared with others and used in other phases of conservation action, and data access must be guided by appropriate agreements and standards. Caution should be exercised to avoid recompiling others' data and redistributing as 'TNC data'; keep a system in place to ensure the organization observes its data use agreements.

ERA teams should recognize that the assessment produces an information product that is useful for awhile, while the data resource created may continue to be useful for additional purposes. In the end, the most important attribute of the data resulting from assessment is its ability to be shared and easily interpreted by others, and - in the future - transferred to other data formats and information systems to live on and be accessed yet again.

Upon completion of an ecoregional assessment, The Nature Conservancy recommends that reports and links to information are posted on the following locations:

- **The Ecoregional Assessment Status Tool (EAST)** is TNC's database of record for the status of ERAs and is available at http://conservationtools.tnc.org/east/.
- Conservation Geoportal, a collaborative effort to build a comprehensive GIS data and map service catalog for the conservation community. This data catalog includes metadata records describing conservation GIS datasets and online map services. It also includes a generic map viewer to allow interactive viewing of multiple map services.
- ConserveOnline is s an online, public library making conservation tools, techniques, and experience available to a broad community of conservation practitioners.

For all new ecoregional assessments, or updates, the data manager should ensure that update and contact information is updated in the Ecoregional Assessment Status Tool, that data from the assessment are archived in an Ecoregional Data Standard 1.0-compliant database (see Data Management Tools), and that portfolio and target information are incorporated into TNC's Core Ecoregional Rollup Dataset., now in production in TNC's Worldwide Office and Conservation Region offices.

Update and refresh

Data ages, and can quickly become outdated. Strategies for data update vary. In some cases, entire data sets must be updated periodically. In other cases, various data may be prioritized for update. In any case, data users should read and contribute to metadata that documents needs for updating of data sets.

Good data architecture provides the standardization and systematization that makes the automation of data updating possible. As TNC increasingly recognized the need to use ecoregional information to measure and track status or progress of conservation work, the ability to update data becomes more important. Ecoregional assessment teams should plan their data management with these needs in mind, and the data manager should consider the needs of both the project and of the organization.

Data Management Tools for Ecoregional Data

While no tool manages information for us, several software tools are in use at TNC, and several conservation information systems are in development.

As one chooses or develops the tools that will aid their data management activities, remember that information systems and software technologies come and go. In the end, the most important attribute of the data resulting from assessment is its transferability, while the most important attribute of the information system software used is its ability to provide for transfer of the data to another system to continue its utility in the future.

The information collected in an ecoregional assessment, ranges from tabular and spatial data of conservation targets (species, communities and ecological systems) and their

attributes, to names of participants and experts consulted in the process. Below is a brief description of the primary tools recommended for use in management of ecoregional assessment data.

- *A populated database formatted to meet The Conservancy's Ecoregional Assessment Data Standard 1.0:* Currently the Ecoregional Data Management Toolbox [EDMT 1.0] geodatabase and Conservation Planning Tool [CPT 1.7, development pending] are formatted to meet this standard.

- *Geospatial data representing the ecoregional conservation portfolio:* Ideally, spatial data and tabular database described above are incorporated within a geodatabases or shapefile.

EAST

Ecoregional Assessment Status Tool (EAST 1.5) is the database where TNC maintains a current list of the status of all ecoregional assessments. Information on terrestrial, marine, freshwater assessments can be accessed here, including status, contacts, summary reports and hyperlinks to available ERA reports. EAST can be accessed through TNC's Conservation Portal at: http://conservationtools.tnc.org/east/ (or http://east.tnc.org).

CPT

The Nature Conservancy developed the **Conservation Planning Tool (CPT)** to manage the common types of tabular data collected during the Ecoregional Assessment process. CPT is a relational database developed for Microsoft Access and is the Conservancy's primary tool for tabular data management designed to standardize data storage With CPT, one can catalogue data related to portfolio sites, targets, ownership/administration, threats, strategies, stratification units, participants and experts, and general ecoregion description data. The tool helps organize and archive data, identify data gaps, standardized data for larger scale roll-ups and analyses and ready data for import/export for other purposes such as GIS and Conservation Action Planning. For a useful description of one teams experience with CPT see Populating the CPT: the Southeast Division's Experience in the Resources section of this document.

While the most-recently released version (CPT 1.5) does not fully comply with the new data standard, a new version in development (CPT 1.7) will incorporate all of the tables and fields from Ecoregional Data Standard 1.0 making it the tool of choice for assessment teams to meet the standard with a tabular Microsoft Access database.

EDMT

The **Ecoregional Data Management Toolbox (EDMT 1.0)** http://conserveonline.org/workspaces/EDMT is a new geodatabase and software tool developed to comply with Ecoregional Data Standard 1.0. EDMT provides the functionality of CPT, but is a geospatial application built on ArcView GIS. This geodatabase is in its first release and provides for archiving of tabular and spatial data from one or more ecoregional assessments. EDMT also provides an ESRI ArcMap-based menu of options for querying,

reporting, and visualizing data from completed ecoregional assessments. Custom reports of any ecoregion or geographic area of interest can be created through EDMT. This application will be online in September 2007 and available for use on the TNC network. Contact Steve Farone sfarone@tnc.org for access or information.

GIS: software platform for spatial data management

A **Geographic Information System (GIS)** provide one of the most comprehensive, standardized and flexible data management tools. Widely available, with ongoing support and innovations, GIS will provide a user with the basic data management and analysis tools to work with all spatial data, in both vector and raster formats. A GIS will also manage associated tabular information (the attributes) of spatial data and enable the user to update this information. Finally, the GIS provides a platform for map creation for communication products. There are many GIS software products with different approaches, costs, learning curves, sophistication, and each has its individual strengths and weaknesses.

ArcGIS is the more comprehensive software. ESRI ArcGIS offers extra tools that enable additional operability in analyses, databases, complex data models and metadata management. ArcGIS provides such a comprehensive GIS, that it is now becoming the standard recommendation for GIS, analysis and spatial data management. The preferred data management format is the Geodatabase.

ESRI is the software company that develops ArcGIS and ArcSDE softwares. The Conservancy is a member of ESRI's Business Partner Program. ESRI offers a yearly training event for conservation applications that is accessible for non-profit organizations for discounted or free access. Read up on the Society for Conservation GIS sponsored by ESRI at http://scgis.org/.

ArcView 3.x is a simple, robust and programmable application produced by ESRI that enables users to use data layers, connect them to databases, perform simple analyses and create good quality maps. Biodiversity analysis extensions for ArcView have been developed by a variety of authors.

ArcGIS uses a data storage format known as a **geodatabase,** which has the ability to store many types of spatial and tabular data. Since all related data are managed in one database, updates and distribution of ecoregional information product can be made much easier. The tabular data stored are available through a personal geodatabase or file-based geodatabase on a personal computer. The personal geodatabase allows you to create complex queries and view mapped information in the ArcGIS viewer known as ArcMap. In addition, the geodatabase can export information to other geodatabases, or as map shapefiles or coverages. More sophisticated geodatabases can also be developed using Relational Database Management System (RDBMS) software such as SQL Server or Oracle.

GIS Tutorial Dataset provides data and a tutorial to teach basic GIS functions useful to conservation planning. This tutorial can be found at http://gis.tnc.org/knowledge/training/CSDintroAV.php

OPPORTUNITIES FOR INNOVATION

Existing data management tools and standards should be used by data managers to align the efforts of ecoregional assessment projects. However, in some cases they will need to create innovative solutions for data storage, analysis and distribution. Documenting this innovation is the key to providing learning opportunities. Developing a "next steps" section in final ecoregional assessment reports will help to highlight areas where more information is needed to create more complete decision support tools.

TNC efforts currently under development include:

- Efforts to build upon **Ecoregional Assessment Data Standard 1.0** will incorporate standards for spatial data, data rollup, and management.
- TNC's **Core Ecoregional Assessment Data Model** is being developed from the data standard to help implement the ecoregional data standards in new information systems. This updated model will prioritize core required attributes, contain an explicit data model and will incorporate spatial data. The Core ERA Data Model has been designed in the UML (Universal Modeling Language) environment and will be made available in XML (Extensible Markup Language) format compatible with ESRI geodatabases creation and allowing the model to be implemented in new software designs.
- User testing and continued application development using the **Ecoregional Data Management Toolbox** Software 1.0 (EDMT).
- **The US Conservation Blueprint** is a current TNC project designed to leverage TNC's $20 million investment in ecoregional assessments by aggregating data nationally to inform existing and future federal-, state- and NGO-led conservation opportunities at local to the national scale. This project goes far beyond a simple map of our combined ecoregional portfolios to the data itself, which is truly needed by TNC and our conservation partners to inform and drive our respective conservation actions. Materials describing this active project can be found at http://conserveonline.org/workspaces/us.conservation.information.strategy
- **TNC's Core Ecoregional Rollup Dataset** is one of the five core conservation datasets recommended by TNC's Conservation Information Strategy. This dataset is currently being designed by staff in Worldwide Office and Conservation Regions. All TNC portfolios, targets, and conservation goals information, including those contained in the US Conservation BluePrint (above) will be archived in this master dataset to serve many uses.

CASE STUDIES

Ecoregional Data Management Team:

In 2005, the Ecoregional Data Management Team (EDMT) pilot project (see TOOLS section below) spawned a formal project to develop *Ecoregional Data Management Tools Software 1.0,* on a shared TNC server. This project is currently in development and results will be formally evaluated by TNC in April 2006 to determine how these tools may serve the organization. A summary of this project can be accessed at: http://conserveonline.org/workspaces/EDMT

Working in collaboration with the development of ERA Data Standard 1.0, EDMT extends functionality provided by CPT to include spatial data, data rollup, data visualization, and the following features:

- Integrating spatial data into the CPT model. EDMT 1.0 is built on an SDE/Geodatabase model, and features a personal geodatabase version for use on laptop computers.
- Systematizing data resulting from ecoregional portfolios and also data extending beyond portfolio sites and across the ecoregional landscape.
- Compatibility with site optimization tools such as Marxan, SITES, and SPOT, without requiring the use of these tools,
- Freshwater and marine assessment data are supported and can be used in conjunction with terrestrial data for analysis and developing ecoregional-scale conservation vision.

Arizona Ecoregional Rollup

A six-ecoregion geodatabase for the southwestern U.S. and northwestern Mexico was completed by the TNC's Arizona chapter between 1999 and 2004. They were designed to identify an efficient network of lands where the viability of a region's biological diversity could be maximized by abating major threats. Assessments are systematic and comprehensive analyses that represent a new, synthetic data source for more than 1300 species and ecological systems found in the southwestern U.S. and northwestern Mexico. To facilitate analyses across ecoregional boundaries, we aggregated and standardized data for six assessments into a single geodatabase that includes the Apache Highlands, Arizona-New Mexico Mountains, Colorado Plateau, Mojave Desert, Sonoran Desert, and Southern Rocky Mountains ecoregions. A summary report describes the assessment process and the methods used to develop the geodatabase.

A summary report describing this work, as well as GIS data sets can be downloaded from: http://www.azconservation.org/ecoregions.htm

Conservation Priorities for Freshwater Biodiversity in the Upper Mississippi River Basin (2003) is a freshwater ecoregional assessment featuring extensive management of freshwater species and ecosystems data across a large geographic extent. A summary report describing this work can be downloaded from: http://conserveonline.org/docs/2003/08/UMRB_report.pdf

TOOLS

Here are quick links to many of the tools described in the Guidance section of this document.

CPT version 1.5 is available from Marjorie Bennett (mbennett@tnc.org). For more information download the user's manual (.pdf, 517 kb).

Ecoregional Assessment Data Standard, Version 1.0 (.zip, 1.3 MB) – is a standard that outlines the minimum required data attributes that must be compiled during an ecoregional assessment. The standard provides "dictionaries" of data attributes necessary for all stages of the EA process and definitions of these attributes.

Ecoregional Data Management Toolbox EDMT GIS Tools (.pdf, 3.2 MB). For more information contact Steve Farone (sfarone@tnc.org).

GIS Tutorial Dataset provides data and a tutorial to teach basic GIS functions useful to conservation planning. This tutorial can be found at http://gis.tnc.org/knowledge/training/CSDintroAV.php

RESOURCES

Examples of data sharing agreements, memoranda of understanding and metadata reports

MOU between TNC AZ and the Bureau of Land Management (.doc, 15 kb)

Draft NatureServe and TNC data sharing agreement (.doc, 146 kb) is available with a password through ConserveOnline Discussion Board

An example of a Metadata report for the Southern Rocky Mountains Ecoregion Boundary can be viewed at http://gis.tnc.org/community/projects/FWI/metadata/srock_ecoreg.htm

Websites

Available via *TNC's intranet* is the Conservation Portal containing electronic conservation tools such as EAST and ConPro http://conservationtools.tnc.org/

Conservation GeoPortal is a public data catalog where you can find and publish GIS data and maps. http://www.conservationmaps.org/index.jsp

To obtain ESRI GIS products for Conservancy offices, please contact Susan Miller (smiller@tnc.org) oat the Conservation Systems Office.

ArcView tools are available at the GIS.TNC.ORG website. See http://gis.tnc.org/systems/sw_links.php?display=sw_esri

The authoritative source for extensions for ArcView can be found at http://arcscripts.esri.com/

Society for Conservation GIS sponsored by ESRI at http://scgis.org/

ESRI http://www.esri.com

Publications

BCIS has developed an eight volume framework for data management and sharing available at http://www.biodiversity.org/

Biodiversity Conservation Information System. 2000. Framework for Information Sharing: Principles . Busby, J.R. (Series Editor).

Drafting a conservation blueprint: A practitioner's guide to planning for biodiversity. Groves, C. (2003). Washington, The Nature Conservancy. Island Press.

Populating the CPT: the Southeast Division's Experience. Minor, Brit (2005). Southern Resource Office, The Nature Conservancy.

Products of the EDMT Pilot Project 2003-05. Holt, Weiss, Farone, and Foster (2005). Pacific North America Conservation Region, The Nature Conservancy.