



Data Mining at Big Bend National Park 2008

Introduction

About the Databases

Methods

Results

Status

Appendix A – Data Mining History

Appendix B – NatureBib citation entry sheet

Appendix C – Full-text Documents in NatureBib



Introduction

Data mining involves thoroughly assessing park information sources and finding appropriate natural resource-related records to populate nationally accessible National Park Service databases (**NatureBib**, **NPS Data Store**, **NPSpecies**, etc.). Ultimately, resource managers can use these databases to: 1) determine what work has been done in each park; 2) quickly and easily provide information to park researchers and visitors; 3) determine future research needs; and 4) support future research needs. The data mining process is critical in developing a complete baseline of information for each of the network's parks. Of highest priority is to compile and catalog high quality, well-documented data originating from park-specific scientific investigations.

This document describes the current and historic data mining activities of the **Chihuahuan Desert Network Inventory & Monitoring Program** (CHDN), as well as the tools that facilitate the citation and storage of the park reports and data sets found. The goals of the CHDN data mining activities at Big Bend National Park (BIBE) are to document the park natural resource-related data and reports in the available national databases (NatureBib, Dataset Catalog, NPS Data Store), and to assist the staff with defining effective data management practices. Specific data mining objectives include:



- locating and entering bibliographic citations (~2001-present) into NatureBib;
- scanning and uploading park priority documents to NatureBib;
- identification and training of park personnel in NatureBib entry (as needed);
- providing quality assurance/quality control of data;
- gathering park data sets (non-GIS), assistance in creation of metadata, and uploading data and metadata to the NPS Data Store;
- providing accurate/comprehensive park species data through rigorous review and gathering of species data (references, vouchers, observations); and
- assistance in creating a functional data flow plan for park natural resource information.

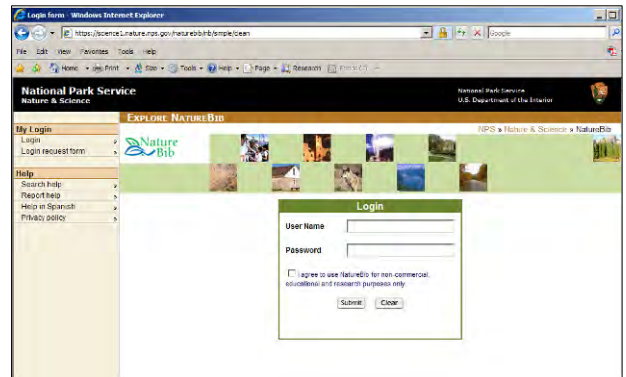
The BIBE Science and Resource Management (ScRM) staff have moved into a new building since the last data mining activities, however, reference to locations and processes in this document will refer to the original ScRM building location.

Previous data mining activities at BIBE were accomplished by University of Idaho in 1994-96, Texas Tech University in 2000-01, and New Mexico State University in 2003-2005. Details of the data mining history at BIBE can be found in **Appendix A**.

About the Databases

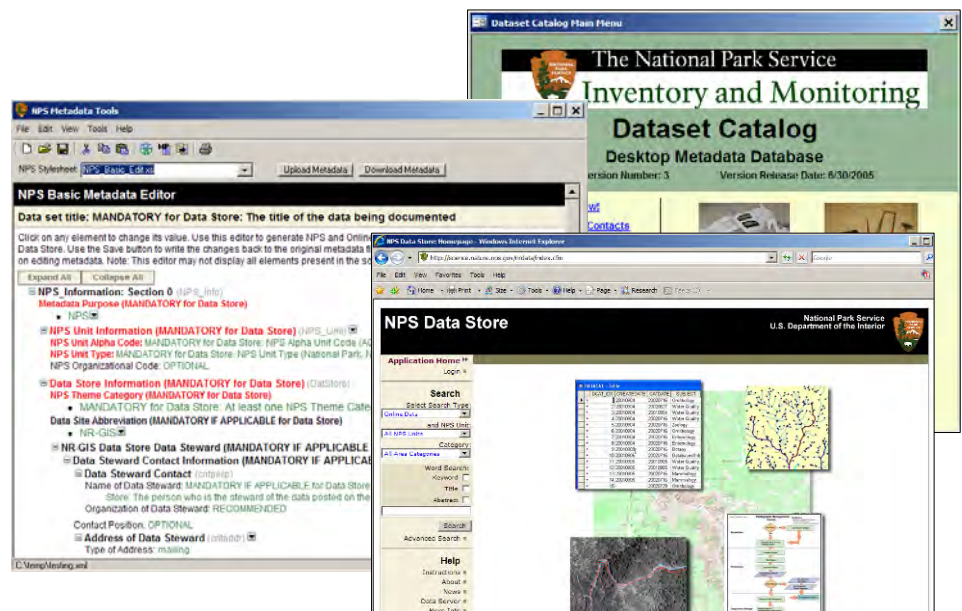
NatureBib

NatureBib is the NPS's master web-based database for bibliographic reference of scientific citations. NatureBib is one of the 12 Natural Resource Challenge-related inventories; it complies with the Government Performance and Results Act (GPRA) goals. NatureBib contains references for natural resource information pertaining to, and/or written by, the National Parks. NatureBib merges a number of earlier databases that contained information about natural-resource topics like water resources, air, geology, and paleontology. Eventually, NatureBib may contain information on cultural resources and other park operations. Although NatureBib is a bibliography, and not a catalog, some parks have chosen NatureBib to catalog all park natural resource information aiding in easier retrieval of information. Each reference is linked to one or more parks. NPS staff members may access NatureBib after obtaining a login ID and password. Complete the form at <https://science1.nature.nps.gov/naturebib/nb/simple/clean> and send to the CHDN NatureBib Point of Contact (currently **Missy Powell**) for processing. The national contact is **Margaret Beer**, National I&M Data Manager.



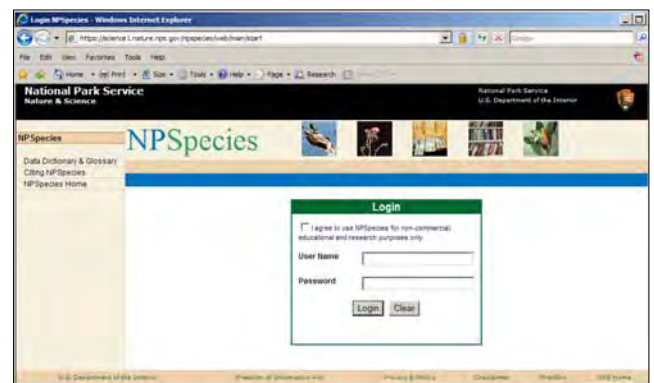
Data, Metadata, and Storage

Dataset Catalog and **NPS Metadata Editor** are desktop metadata-recording applications that may be used by NPS staff. These tools will be used for documenting metadata for park non-spatial datasets (e.g., MSAccess database, Excel spreadsheets, paper products, photo data sets, etc.). This metadata and the related data (non-sensitive) will be stored in the **NPS Data Store** as appropriate.



NPSpecies

NPSpecies is the National Park Service's master database for documenting the occurrence and status of species in the national park units that contain significant natural resources. The database includes standardized information associated with the occurrence of species in parks, including scientific names and their synonyms, common names, abundance, residency, nativity, T&E status, and reasons why a species may be of particular management interest to a park (e.g., invasive, weedy, overabundant, globally or regionally rare, state-listed species). Within NPSpecies, each species record is supported by evidence in the form of voucher specimens, references (scientific reports or datasets), and/or observation records that document the occurrence of the species in the park. Records are managed in a standard data structure and are periodically verified (certified) by subject-matter experts with the goal of providing high quality, scientifically credible, and continually improved data to users. Historical and currently-accepted scientific names from multiple taxonomic classification systems are cross-referenced using taxonomic standards (e.g., the Integrated Taxonomic Information System and the USDA PLANTS database) to allow for data integration and sharing across parks and with other agencies and organizations. In addition, parks are able to produce species lists based on the taxonomic authorities that are most accepted in their region and by their partner agencies.



Methods

Missy Powell (CHDN biological science technician) and Chris Maher (New Mexico State University Partner) conducted data mining activities at BIBE on October 17-20, 2006, and July 8-10, 2008. CHDN provided a presentation to BIBE staff prior to data mining to introduce staff to activities of data mining, and to address discussion items. BIBE staff provided an orientation to natural resource documentation and location information. Data mining plan included the following:

- ❖ **Data sources** (e.g., Library, central files, etc.) – Identify data source holdings with records requiring documentation.
- ❖ **NatureBib data**
 - Enter document citations into NatureBib as necessary. Write Bibkey ID numbers on the upper right corner of all documents, previously or newly-entered into NatureBib. (This will assist future data miners in easily determining whether a document has been cited.)
 - Scan (or convert) priority documents to full-text pdfs.
 - Upload full-text document pdfs to NatureBib after sensitivity status approval by BIBE.
- ❖ **NPSpecies data**
 - Collect additional references, as available, for support of species presence within park boundaries.
 - Collect ANCS+ data, as available, and incorporate into NPSpecies database.
- ❖ **Data sets** – Assess the availability of non-GIS data sets. Copy data sets and provide assistance in creating metadata for those products with none. Upload data sets and metadata to the **NPS Data Store** as appropriate.



Warnock Vegetation Plot Surveys 2007

Results

- ❖ **Data sources**
 - **BIBE Science and Resource Management (ScRM) Library** – The BIBE ScRM Library is located at the ScRM building and contains the park-specific, natural resource reports as well as general references. The library is maintained by the ScRM Administrative Assistant. Documents are filed by category and then by author, with some exceptions where documents are filed by subject and author for a single category.
 - **Central Files** – Correspondence related to natural resource files are filed in the Administrative files in the ScRM building.
 - **Staff Offices** – Resource management staff was questioned regarding availability of natural resource materials being stored in staff offices. Staff offices are not generally used as a central permanent storage location for official documentation, but where necessary, office files were reviewed for relevant materials.
 - **Electronic Files** – BIBE maintains natural resource reports on the S drive of the server. Electronic files were reviewed for relevant reports to converted to pdf for upload to NatureBib as appropriate.
 - **Museum Collections** – BIBE specimen collections are held in the Bally building outside the ScRM building.
 - **Research Permit and Reporting System (RPRS)** – Outside researcher permit files are located in the BIBE ScRM Library, generally filed by category and then author's last name.
 - **BIBE Website** – A few documents are available on the BIBE internet website. Pertinent reports were cited in NatureBib (e.g., Fire Management Plan, Backcountry Management Plan, etc.).
 - **Maps** – There are referential maps available in the ScRM Library, and paper maps available in the cartographer's office. A list of the maps held in the cartographer's office is available. Those paper maps referencing project information will be cited as appropriate.
- ❖ **NatureBib data**
 - Park employees and volunteers have historically cataloged the park library information in a Procite database. In 2006, the park had imported all Procite data into NatureBib and began entering data only into NatureBib. Due to the ongoing update of library contents into NatureBib, data miners placed less focus on legacy data. However, document citation and writing the Bibkey ID on legacy documents was still done opportunistically.

- During visits, data miners entered a backlog of data into NatureBib. BIBE park history files were thoroughly reviewed for documents related to natural resources and entered into NatureBib as appropriate. Files were spot checked for entry needs, however, it was assumed that BIBE was mostly up-to-date on citation entry due to consistent entry into the database.
- Bibkey ID numbers were written on some previously cited and all newly cited documents in NatureBib. The Holdings Location in NatureBib was completed for new citations in keeping with BIBE using NatureBib as a catalog.
- To ensure quality of citation entry, CHDN developed a NatureBib entry sheet for ScRM staff (biologist, botanist, hydrologist, etc.) to complete and provide to the park NatureBib editor (see [Appendix B](#)).
- BIBE ScRM Administrative Assistant (currently Bunny Larson) was trained in NatureBib data entry using the [CHDN NatureBib Guidelines](#). CHDN provides regular quality control of data and on-going supportive training.
- Four-hundred and twenty-six (426) citations were added (by all BIBE NatureBib editors) to NatureBib from 2006-present for a current total of 4,047 citations linked to BIBE, for an increase of about 11% in documented citations.
- CHDN has begun quality control on BIBE NatureBib records.
- At CHDN's recommendation, BIBE has procured additional copies of Adobe Acrobat for use in converting documents to pdfs in preparation for upload to NatureBib.
- Staff provided priority documents to CHDN for scanning and upload to NatureBib. Other documents were also scanned and converted to pdf opportunistically (although some focus was on references supporting species occurrence in the park). Seventy-three (73) documents are currently uploaded to NatureBib. Twenty (20) full-text documents are currently awaiting sensitivity approval before upload to NatureBib. Additional documents continue to be scanned at the CHDN office.
- A list of full-text documents linked to BIBE are available in [NatureBib](#) and listed in [Appendix C](#).

❖ Data sets

BIBE has numerous non-GIS data sets that are in various states of containing metadata. Currently, the Intermountain Regional Office is assisting the park with some data organization, but there are other data sets at the park that may require documentation. This work is not yet completed.

❖ NPSpecies data

- **Herbarium data** – BIBE herbarium specimens were annotated by Richard Worthington, however, it is unclear whether data was entered into the NPS ANCS+ database. No data was collected at this time. A permanent museum curator was recently hired at BIBE. CHDN will follow up on this when staff is available.
- **Observation data** – Most of BIBE natural history observation data is not available digitally, but instead in card files. Mountain lion and black bear observation data is available digitally. The following criteria is used by CHDN to assess inclusion of CHDN park observations in NPSpecies:



When the only evidence for species occurrence in a park is an observation record, species status will be rated on the following criteria in NPSpecies:

1. An observer **name**, observation **location** (within park boundaries), and observation **date** is available
2. Species is within its normal migratory, breeding, or wintering range
3. Recorder is a qualified observer (e.g., ornithologist, biologist, or recognized by scientific peers as an expert in taxa observed)
4. Written description sufficient to rule out similar species is available
5. Photo sufficient to rule out similar species is available

Note: All records must meet criteria 1 to be rated

Present in Park: **Meets criteria 1, 2 and 3**
*Species within normal range and seen by qualified observer, **or***
Meets criteria 1, 2 and 4
*Species within normal range and details given by observer whose experience could not be qualified, **or***
Meets criteria 1, 3 and 4
*Species not within normal range, but details given by qualified observer, **or***
Meets criteria 1 and 5
Acceptable photo available

Probably Present: **Meets criteria 1 and 2**
*Species within normal range but no details available by observer whose experience could not be qualified, **or***
Meets criteria 1 and 3
*Species not within normal range and recorder is qualified, but no details available, **or***
Meets criteria 1 and 4
Species not within normal range, details available, but observer experience could not be qualified

Unconfirmed: **Meets criteria 1 and 3**
Species not within normal range and no details given by qualified observer

- **Note: An observation of a species not within its normal range where no details are given by an observer whose experience could not be qualified will not be recorded in NPSpecies.**

Current park species record information can be found on the **NPSpecies** website. Note that CHDN will continue to further refine species lists (per gathering of available vouchers, references and observations, and expert review) to ensure the most accurate park species information.

In 2007, CHDN staff thoroughly reviewed NPSpecies data for accuracy. The **CHDN NPSpecies Guidelines** provides information regarding the species list compilation procedures. Significant changes were made to the database. Some evidence was removed from the database if they did not meet criteria established for valid evidence. New references and other important older references were also added in support of species occurrence in the park. CHDN will request additional review of the data by individual taxa experts as requested by each network park. Additional references, voucher and observation records will also be added in support of species presence as they are available. The following is a summary of BIBE NPSpecies data:

Amphibians – Currently, NPSpecies data includes 11 amphibian species confirmed for BIBE with a status of Present in Park. Supporting evidence includes 3 references, 328 voucher specimens and 15 observation records. References include:

Easterla, D. A., G. Dayton and J. Scudday. 2002. Amphibians and reptiles checklist. Big Bend Natural History Association, Big Bend National Park, TX.

Leavitt, D. J., T. C. Mullett, C. M. Ritzi and J. R. Skiles. 2007. Hyla cinerea. Herpetological Review. 38:97

Prival, D. and M. Goode. 2005. Chihuahuan Desert National Parks reptile and amphibian inventory: Final report. University of Arizona

Reptiles – Currently, NPSpecies data includes 59 reptile species confirmed for BIBE with a status of Present in Park. Supporting evidence includes 3 references, 1,252 voucher specimens and 72 observation records. References include:

Easterla, D. A., G. Dayton and J. Scudday. 2002. Amphibians and reptiles checklist. Big Bend Natural History Association, Big Bend National Park, TX.

Bailey, L., J. Jackson, A. Ferguson, M. R. J. Forstner and J. R. Dixon. 2005. Geographic distribution. Brewster County, Texas. Pseudemys gorzugi. Herpetological review. 36:465-466. According to Michael

Forstner, trapping in 2007 resulted in capture of another specimen of *Pseudemys gorzugi*, which was again marked and released at the capture location.

Prival, D. and M. Goode. 2005. Chihuahuan Desert National Parks reptile and amphibian inventory: Final report. University of Arizona

Fish – Currently there are 38 fish species confirmed for BIBE with a status of Present in Park. Supporting evidence includes 3 references and 43 voucher specimens and observation data. References include:

Moring, J. B. 2002. Baseline assessment of instream and riparian-zone biological resources on the Rio Grande in and near Big Bend National Park, Texas. US Geological Survey, Austin, TX. Water-Resource Investigations Report 02-4106

National Park Service. 2003. Fishes of Big Bend National Park and the Rio Grande Wild and Scenic River.

Platania, S. P. 1993. List of fishes found in the Rio Grande and tributary streams in the Big Bend of Texas.

Mammals – Currently there are 82 mammal species confirmed for BIBE with a status of Present in Park. Supporting evidence includes 6 references, 352 voucher specimens and no observation records. References include:

Schmidly, David J. 1977. The Mammals of Trans-Pecos Texas. Texas A&M University Press. College Station. Pp xiii+225

Easterla, D. 1973. Ecology of the 18 Species of Chiroptera at Big Bend National Park, Texas Parts I and II. The Northwest Missouri State University, Maryville, Missouri 64468.

Borell, A. E. and M. D. Bryant. 1942. Mammals of the Big Bend area of Texas. University of California Publications in Zoology. 48:1-62

Higginbotham, J. L., L. K. Ammerman and M. T. Dixon. 1999. First record of *Lasiurus xanthinus* (Chiroptera: Vespertilionidae) in Texas. Southwestern Naturalist. 44:343-347

Ammerman, L. K. 2005. Noteworthy records of the Eastern Pipistrelle, *Perimyotis subflavus*, and Silver-haired bat, *Lasionycteris noctivagans*, (Chiroptera: Vespertilionidae) from the Chisos Mountains, Texas. The Texas Journal of Science. 57:202-207

Big Bend National History Association. 2000. Mammal checklist: Big Bend National Park, Rio Grande Wild and Scenic River. Big Bend Natural History Association, Big Bend National Park, TX.

Birds – Currently there are 413 bird species confirmed for BIBE with a status of Present in Park. Supporting evidence includes 7 references, 263 voucher specimens and 4,964 observation records. References include:

Gutzwiller, K. J. and W. C. Barrow Jr. 2002. Does bird community structure vary with landscape patchiness? A Chihuahuan Desert perspective. *Oikos*. 284-298

Flippo, M. 2007. [BIBE Checklist of Birds]. This checklist was last updated in May 2007.

Flippo, M. 2007. Accepted records of review species: Big Bend National Park 1995-2006.

Bryan, K. B. 2007. A survey of winter-resident grassland birds in Big Bend and Guadalupe Mountains National Parks: Draft Final Report.

Vascular Plants – Currently there are 1,362 vascular plant species (species and subspecies /varieties /hybrids) confirmed for BIBE with a status of Present in Park. Supporting evidence includes 4 references, no voucher specimens (voucher records to be added) and no observation records. The BIBE plant list was updated after review by the park during the summer of 2008. There were significant changes to this data set. References include:

Alex, B., A. Leavitt, J. Timmer and J. Sirotnak. 2006. Final report on the sensitive plant project: Big Bend National Park, Texas: Field Seasons: June 2003-April 2006. Big Bend National Park, Big Bend National Park, Texas.

Big Bend National Park. 2008. BIBE Plant List. Dataset.

Fenstermacher, J., J. Sirotnak, A. M. Powell and M. Terry. 2008. Annotated vascular flora of the Dead Horse Mountains, Big Bend National Park, Texas, with notes on local vegetation communities and regional floristic relation. *Journal of the Botanical Research Institute of Texas*. 2:685-730

Young, K. E., T. S. Schrader, K. G. Boykin, C. Caldwell and G. W. Roemer. 2007. Early detection of invasive species in Big Bend National Park: Remote sensing and GIS strategies. (<http://fws-nmcfwru.nmsu.edu/BIBE/>)

Discussion of Data Management Processes

In addition to populating the national databases with BIBE data, CHDN assessed the current data management practices and provided comments for consideration. A discussion follows.

NatureBib - Data Entry

Currently, the BIBE ScRM Administrative Assistant, is the only NatureBib editor at BIBE. ScRM staff places documents in the ScRM Library when they become available and citations are entered as available. Although BIBE staff has made a good effort to keep NatureBib up-to-date, lack of protocols for ensuring comprehensive data entry has led to gaps in the data.

CHDN suggests preparation of written protocol for flow of data and reports, ensuring products are both cited in NatureBib and distributed to the appropriate persons and files. Any assigned NatureBib editors should become familiar with the **CHDN NatureBib Guidelines** available on the CHDN website. This will ensure data entry consistency, both within the park and across the network. CHDN is willing to provide additional training as necessary and participate in a discussion of park data flow as requested.

Finally, continued attention to writing the Bibkey ID number on the upper right hand corner of documents cited in NatureBib will help to reduce the effort of re-checking their entry status and consequently, reduce future data mining efforts. As time permits, those documents cited in the legacy Procite database (now in NatureBib) should be reviewed and the Bibkey ID written on the document to ensure comprehensive data entry.

NatureBib - Scanning and Uploading Full-text Documents

NatureBib now has the ability to make available full-text documents related to citations in the database. Currently, BIBE has no formal plan for what and how documents should be scanned for upload to NatureBib. **Network-specific** guidelines for scanning/uploading documents are available on the CHDN intranet website. CHDN recommends that park-specific guidelines be developed, with the use a large, more efficient copier/scanner for this work. Currently, there are some unresolved issues regarding the secure use of a large networked copier/scanner.

Ideally, the primary editor for NatureBib at the park should be assigned the duty to upload documents to NatureBib. Assigned personnel should maintain a copy of Adobe Acrobat on his/her computer for converting documents to pdf. This could be a more time-consuming effort than entering citations as 1) sensitivity must be approved by appropriate Resource Management personnel prior to upload, and 2) there are a number of older documents that still need conversion, sensitivity approval, and uploading.

It is now possible to upload full-text documents (pdfs), one at a time, to the online version of NatureBib; however, due to the lengthy time it takes to upload large documents, it may be more efficient to gather a number of documents for upload, copy them to cd as they are available, and send them with a request for a batch upload to NatureBib Coordinator, National Park Service, 1201 Oakridge Drive, Suite 150, Fort Collins, Colorado, 80525.

NatureBib - Sensitivity

Appropriate BIBE resource management staff will be responsible for verifying sensitivity of all NatureBib records prior to upload. There are three sections in NatureBib that require sensitivity settings (Public, NPS Only, Park Only):

- **Basic citation Section**
CHDN has begun quality control on BIBE NatureBib citations and will contact BIBE resource management staff in the future to verify the Basic Citation sensitivity in bulk.
- **Park-specific Abstract Section**
Park-specific abstract sensitivity is rarely populated and will need less attention.
- **Document Upload Section**
Sensitivity settings for documents uploaded to NatureBib are determined prior to each document upload (usually after a batch has been collected). A draft version (currently under formal review) of Director's Order 66 (FOIA) and interim guidance can be found at <http://www1.nrintra.nps.gov/DO66/DO66.htm>. See **CHDN NatureBib Guidelines** for more information on sensitivity in NatureBib.

NatureBib - Copyright Issues

General guidelines follow for setting the *sensitivity* of a document to be uploaded as it relates to *copyright*:

- Published works for which the copyright is unknown should be set as **NPS Only** or **Park Only** until copyright permission is obtained or the document is determined to be of fair use.
- Documents written by government employees are considered fair use and may be assigned a **Public** setting.

- Per **NPS copyright guidelines**, a document created by an outside researcher for distribution to the park is generally copyrighted (set as **NPS Only** or **Park Only**) unless the researcher's contract with NPS *explicitly* states that the product is a work for hire and all rights belong to the NPS (set as **Public**).
- Sensitive documents (release poses a risk to the resource) should not be uploaded to NatureBib.

NatureBib - Cataloging

While NatureBib is a bibliography, not a catalog (i.e., document location is not a required field in a bibliography), it may be used as a catalog. A disadvantage to using NatureBib as a catalog is that it must not catalog sensitive materials (materials with restrictions beyond the **Park Only** sensitivity setting). Citing the presence of a document (citation only) is rarely sensitive, but sharing the full-text document may be. Simply provide a non-sensitive citation (e.g., no rare species location information given in the abstract) and do not upload the full-text document. (WASO may be providing a server for sensitive information in the future.) BIBE currently uses NatureBib as a 'catalog' to track park data, but due to the change from Procite to NatureBib, changes in file locations, etc., it will be necessary to update the Holdings Location field in NatureBib as file locations are re-defined. While perhaps time-consuming, this task does not have to be accomplished in a single effort, but can be done with a little planning (e.g., review one file drawer a week, or review files on one afternoon a week). If time and personnel are available, CHDN may be able to provide some additional assistance with this task. A confidence in current organization of files is best to have before updating the Holdings Location field in NatureBib.

Written documentation of the cataloging system is encouraged as it will ensure on-going quality of the system and can result in staff confidence and cooperation.

Digital Image Management

Digital image management was not addressed with BIBE, however, staff have inquired about methods to embed photo metadata with the digital image. Microsoft provides free software, **Microsoft Pro Photo Tools 2** (previously Photo Info), for more easily managing imbedded photo metadata. CHDN will keep BIBE informed as to new tools available in the future.

File Management

There is generally no separation of outside research and in-house project files in the Library. Documents are generally filed by category and then author's last name, with the exception of a few sections filed by project within a category. These exceptions may be a bit confusing to an outsider, but as long as the cataloging of documents in NatureBib remains consistent, this filing system seems to work well enough for staff. Ideally, consistent folder labeling (by category or author's last name) would make it easier to located documents.

BIBE has made a good effort to file natural resource reports. However, it is difficult to determine whether a final report has been received and is just temporarily out of the file. There is some concern that files removed from the Library are not returned timely and occasionally are considered lost. It may be useful to obtain some file 'out guides' to put in place of a removed file and track the location of removed files. Increased compliance with noting removal would improve confidence in the system. A listing and tracking of projects (especially in-house projects) may also be useful to determine easily what work is completed.

Map Documentation

Paper copies of maps containing project information may be appropriate for NatureBib entry. Maps containing project information should be cited in NatureBib. Due to the difficulty in handling these large maps, it might be useful to catalog large collections of park-specific, project-related maps/drawings on a spreadsheet that contains the necessary NatureBib fields to cite easily these maps. A **Map Documentation Spreadsheet** containing all appropriate fields to complete can make it easier to cite them in NatureBib. A paper copy of the spreadsheet can be kept with the organized maps and updated as new maps are added.

Non-GIS Data Set Documentation

The NPS is mandated to maintain metadata for all park GIS data. Associating metadata to non-GIS data sets (e.g., Excel, Access, etc.) is also essential to maintaining quality, credible data sets. There are several options for creating metadata for non-GIS data sets at the park level:

- Staff can download the desktop version of **Dataset Catalog** or **NPS Metadata Editor** (becoming more widely-used); create metadata; upload data and metadata to the **NPS Data Store**. These metadata databases may be used for creating metadata for all types of data sets (i.e., paper data sets, photo databases, MS Excel data sets, etc.).
- If an MS Access data set needs associated metadata, one option is to import **Metadata.mbd** to your current MS Access database.

BIBE Natural Resource Data Flow

The following procedures are suggestions to ensure all parties (including CHDN) receive proper notification of product availability (data and reports) at BIBE, and that all products are preserved appropriately in the record. It may be useful for BIBE staff to consider this as a starting point for developing a park data flow.

In-house reports and data

In-house reports and data are products resulting from research at BIBE performed exclusively by BIBE staff.

1. CHDN Program Coordinator is notified of new, natural resource-related, in-house projects at start-up. ***This information may have importance regarding integration with I&M monitoring activities.***
2. Staff is responsible for submitting final reports and data to supervisors.
3. Supervisor will assign copying of final reports: original to BIBE Library project files, and copy to CHDN Program Coordinator, as appropriate.
4. Electronic files are located in an appropriately labeled folder in a centralized and secure (as appropriate) location on the BIBE server. Electronic copies of final reports are provided to CHDN Program Coordinator when relevant to the program.
5. Person assigned to copy reports (needs to be determined by staff) will create project folder for report (based on written guidelines on how to create files consistently).
6. BIBE office will be responsible for entering new BIBE report citations into NatureBib. (Folder label and location will be entered into Holdings Location field to aid in easier relocation. Bibkey ID is written on top right corner of document to indicate entry.)
7. BIBE will assign responsibility for managing new natural resource related data sets and associated metadata, and will upload this data and metadata to the **NPS Data Store**, as appropriate (non-sensitive only).

Researcher reports and data

Researcher reports and data are products resulting from research done by permitted outside researchers.

1. Researcher sends proposal to **Research Permit and Reporting System (RPRS)** Coordinator (currently Raymond Skiles).
2. RPRS Coordinator issues the *approved* (by RPRS Coordinator and Superintendent) permit to the researcher.
3. RPRS Coordinator (or assigned person) creates an individual folder for the permitted project (based on written guidelines on how to create files consistently).
4. Electronic files are located in an appropriately labeled folder in a centralized and secure (as appropriate) location on the BIBE server.
5. RPRS Coordinator notifies Museum Curator if a permit proposal involves collections.
6. RPRS Coordinator notifies CHDN Program Coordinator of permit issued. ***This information may have importance regarding integration with I&M monitoring activities.*** Notification may be through the RPRS system if more efficient.
7. RPRS Coordinator tracks permitted research. Spreadsheet includes documentation of receipt, review and approval of products (reports, data sets, metadata, etc.). RPRS Coordinator reviews projects annually (for current and previous years where products are due).
8. The RPRS Coordinator will make a copy (or assign copying) of annual or final reports:
 - a. original is filed in researcher's folder in the ScRM Library
 - b. copy (final products only) is provided to CHDN (electronic copies preferred) when relevant to the program.
9. BIBE office cites/catalogs/uploads final reports in NatureBib and uploads data sets and associated metadata to the NPS Data Store (as appropriate).
10. Other original data (databases, maps, photos, etc.) will be properly archived by BIBE Museum Curator.

Status of BIBE Data Mining

The focus of the current CHDN data mining effort was on cataloging and processing the backlog of data at BIBE, scanning and uploading full-text documents, and helping to establish or recommend improved methods for managing park data. Adherence to good data management practices can help to minimize future data mining efforts.

The following summarizes the data mining tasks completed and tasks remaining at BIBE:

1. **Entering the backlog of bibliographic citations into NatureBib**
 - a. **Completed**
 - BIBE has been consistently cataloging in NatureBib (or Procite) the park natural resource reports held in the ScRM Library. After a review of document sources at BIBE, CHDN entered the backlog of legacy and recent park-specific natural resource-related documentation into NatureBib. Four-

hundred and twenty-six (426) citations were added to NatureBib (by all NatureBib editors from 2006-08), resulting in about 11% increase in number of citations.

- Bibkey ID numbers were written on some legacy and all new documents cited in NatureBib to indicate entry into the system.
- To ensure quality of citation entry, CHDN developed a NatureBib entry sheet for ScRM staff (biologist, botanist, hydrologist, etc.) to complete and provide to the park NatureBib editor (see [Appendix B](#)).

b. **Tasks remaining**

Due to the use of Procite for cataloging of legacy documents, Bibkey ID numbers were not written on these older documents. This makes it difficult to ensure comprehensive document entry. As time and personnel permits, it may be useful to complete this task to address gaps in cataloging. Additionally, to ensure the usefulness of NatureBib as a catalog, it is important to verify the correctness of the Holdings Location field in NatureBib.

2. **Scanning and uploading of park priority documents to NatureBib**

a. **Completed**

Seventy-three (73) documents are currently linked to BIBE and uploaded to NatureBib. Additional documents (~20) have been scanned and await sensitivity approval. At CHDN's recommendation, BIBE has procured additional copies of Adobe Acrobat for use in converting documents to pdfs in preparation for upload to NatureBib.

b. **Tasks remaining**

Twenty (20) full-text documents collected by CHDN are currently awaiting sensitivity approval before upload to NatureBib. Additional documents continue to be scanned at the CHDN office. After BIBE gains the ability to scan documents on a large copier, CHDN will also work with BIBE to develop further protocols for ongoing scanning of natural resource documentation at the park.

3. **Identification and training of park personnel in NatureBib entry**

a. **Completed**

CHDN provided NatureBib editor training to the BIBE Administrative Assistant, Bunny Larson, and followed up with additional training regarding quality control of records. [CHDN NatureBib Guidelines](#) are made available online for park NatureBib editor.

b. **Tasks remaining**

CHDN will train additional assigned personnel in NatureBib citation entry and document upload as needed.

4. **Providing quality assurance/quality control of data**

a. **Completed**

CHDN has begun quality control of BIBE NatureBib data.

b. **Tasks remaining**

CHDN will continue quality control of records. Some of these tasks include:

- Spell-check of data
- Title consistently entered in sentence-case
- Removal inappropriate citations of Investigator's Annual Reports (IAR)
- Keyword consistency check
- BIBE approval of sensitivity status for all *citations* (this is different from the sensitivity approval of uploaded documents)
- Check for and delete duplicate records (the national office will be assisting with much of this task)
- Assure Holdings Location field is accurate (depends on availability of time and personnel)
- Enter abstract where none exists (depends on availability of time and personnel)

5. **Gathering of park data sets (non-GIS), assistance in creation of metadata, and uploading data and metadata to the NPS Data Store**

a. **Completed**

This activity has not yet been completed.

Tasks remaining

Continue to work with BIBE staff to identify non-GIS data sets and assist with metadata completion as necessary. Upload non-sensitive data sets and associated metadata to the NPS Data Store.

6. **Provide accurate and comprehensive park species lists through rigorous review and gathering of species data (references, vouchers, observations)**

a. **Completed**

CHDN re-certified the BIBE animal species lists (mammals, birds, fish, reptiles, amphibians) in FY07 and BIBE vascular plants species list in FY08 (after park review of data in summer 2008). CHDN providing additional quality control of the data in FY08, linking new references as available.

b. **Tasks remaining**

- After updating of Richard Worthington's annotations of BIBE plant specimens to the ANCS+ database (CHDN will assist with this task as time and personnel are available), upload new voucher records to NPSpecies.

- Assign taxa experts to further review BIBE species lists.
 - Provide training to BIBE staff in managing NPSpecies data after new website interface is activated.
7. **Assistance in constructing a functional data flow plan for park natural resource information.**
- a. **Completed**
Recommendations for data management at BIBE have been outlined in this report.
 - b. **Tasks remaining**
CHDN staff will participate in BIBE data management discussion if requested.

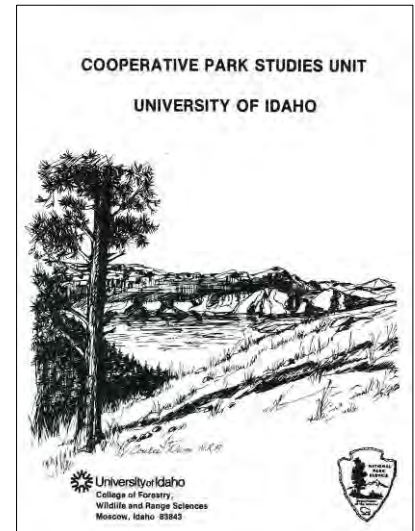
Appendix A. Data mining history at Big Bend National Park

I. Summary of the 1994-96 University of Idaho NatureBib Data Mining Efforts

In 1994, the National Park Service Inventory and Monitoring Program (NPS I&M) directed and funded the Cooperative Park Studies Unit at the University of Idaho to 1) create a computer based annotated bibliography and supportive cataloging information of all documents related to the natural resources of the Southwest; 2) develop a thesaurus; and 3) develop a procedure for cross-referencing documents in the NPS Technical Information Center (TIC) in Denver.

Results of this effort were reported in "The Southwest Region Natural Resource Bibliography Project Final Report" (Wright and Ostergren 1996). Some sources of information included the following:

- Park library, resource management collections, private offices, and administrative files (Citation Only records included additional documents referenced in park materials where no document was available).
- Major natural resource related commercial bibliographic databases (OCLC, TreeCD 1939-April 1995, Georef 1985-March 1995, Water Resources 1967-April 1995, Oceanographic & Marine Resources 1960-June 1995, CAB 1984-present, BIOSIS Jan 1989-Dec 1990, July-Dec 1993, Jan-June 1994, Agricola 1979-March, 1995, Fish & Fisheries Worldwide 1971-present, Uncover, and the Expanded Academic Index).
- TIC database (Denver, CO)



This information was provided to parks in Pro-Cite format and later migrated to NatureBib.

Big Bend National Park (BIBE) - specific data mining information:

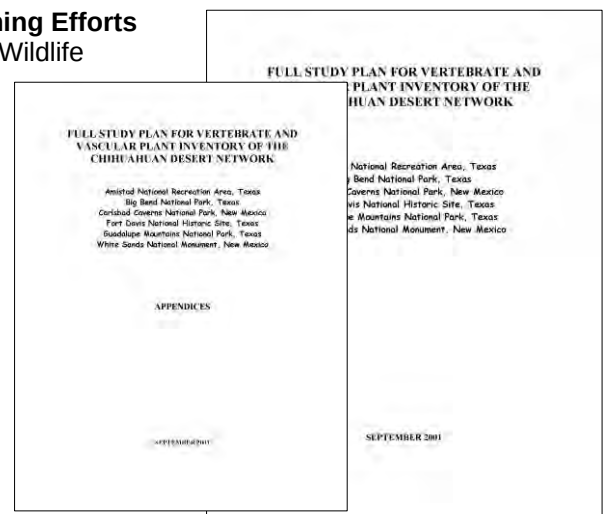
The contact person at BIBE was Mike Fleming. The number of records in the data mining database was 1,486. There were 87 documents held at TIC and not found elsewhere. The number of citations to documents not found was 235. The Procite database was installed on a computer in the Science and Resource Management Library. Park locations of documents included:

Science and Resource Management Library
Commercial Databases
Intermountain Cultural Resource Center Library
Sul Ross State University Library
Southwest System Support Office (Natural Resource Program Office
Technical Information Center Office

II. Summary of 2000-01 Texas Tech University (TTU) Data Mining Efforts

A work order was awarded to the Texas Cooperative Fish and Wildlife Research Unit of the USGS-BRD at Texas Tech University in Lubbock, Texas. Graduate students were hired to do the work at the six CHDN parks. Work began in June 2000. A final report was submitted and is available in **Appendix C** of the **Full Study Plan for Vertebrate and Vascular Plant Inventory of the Chihuahuan Desert Network**.

An original "expected species" list was generated from various sources, including: park checklists, data from the Texas GAP Analysis program, the Natural Science Research Laboratory of the Museum of Texas Tech University, and the Condor database (Schmidly). Expert opinion was relied upon to come up with an "expected species" list for taxa at all parks.



Documentation of a species in a park was verified by the presence of voucher specimens, photographs, physical evidence (e.g., scat, tracks, etc.), and observation or research records. In some cases, records derived from locations within 1-mile area of park boundaries were included in the survey.

As a starting point to the data mining, each park completed a self-assessment of the inventory completeness for taxa for their park. Data mining at all parks revealed documentation of target species by examining the *museum collections* housed at the park (specimens, photos, sound recordings, etc.), *collecting permits*, *Annual*

Investigator's Reports, Wildlife Observation Cards (less desirable, but used only for reliable observers), and later in the process using *park checklists*.

Additionally, museum facilities throughout the US were solicited for records of voucher specimens collected in the counties that encompassed park property. Only nine of 32 solicited museums responded with data, or were available on-line:

- Dallas Museum of Natural History (Dallas, TX)
- Field Museum of Natural History (Chicago, IL)
- Museum of Southwestern Biology, University of New Mexico (Albuquerque, NM)
- Museum of Texas Tech University Mammal Collection (Lubbock, TX)
- Natural History Museum of Los Angeles County (Los Angeles, CA)
- Sul Ross State University Vertebrate Collection (Alpine, TX)
- Texas A&M University, Texas Cooperative Wildlife Collection (College Station, TX)
- University of Michigan Museum of Zoology (Ann Arbor, MI)
- University of Texas Natural History Collection (Austin, TX)

A good portion of the available observation data had not yet been examined. Taxonomic accuracy of the park collections was not verified at this time, however, several parks expressed concern about this.

New citations were not added to NatureBib by TTU, however, Table 1 represents the number of publications identified for major taxa by park.

Table 1. Number of publications identified for the CHDN (by TTU) in park ProCite version of NRBib (currently referred to as NatureBib).

	Mammal	Bird	Reptile	Amphibian	Fish	Plant	Total
AMIS	16	16	4	4	13	12	65
BIBE	132	98	37	25	53	129	474
CAVE	73	73	42	41	51	106	386
FODA	1	0	0	0	4	16	21
GUMO	89	95	44	40	101	159	528
WHS	28	23	15	12	17	95	190
Total	339	305	192	122	239	517	1664

Park data sets, maps and GIS themes were not identified as supporting evidence for species. Location of these data and creation of metadata for important data sets should be addressed.

The following is taken from **Appendix C** of the **Full Study Plan for Vertebrate and Vascular Plant Inventory of the Chihuahuan Desert Network**.

Fish

Checklist (1998) lists 39 native species and 11 exotic species. Seven species extirpated. Limited surveys in 1987, 1997-99. Annual Big Bend mosquitofish survey.

Reptiles and Amphibians

Checklist updated in 1996 with 46 reported. Amphibian inventory in 1998-99. Numerous species-specific studies.

Birds

Bird checklist for Big Bend NP updated in 1999 with 462 species. Neotropical migratory bird inventory in 1995-97 and wintering bird inventory in 1999-2000. Annual monitoring of endangered black-capped vireo and peregrine falcon. Three breeding bird survey routes and a Christmas bird count conducted annually.

Mammals

Mammal checklist updated in 1997 with 55 species. Partial mammal inventory in 1999-2000. Comprehensive (1977) and partial (1996-99) bat inventories. Annual survey for Mexican long-nosed bat. Species range maps indicate 68 species are likely to occur in Big Bend NP. NRSL database of voucher specimens indicates 55 species collected from Big Bend NP. CONDOR database of voucher specimens indicates 67 species collected from Big Bend NP.

Plants

Plant list completed in 1997 with 1,200 species. Vegetation map completed in 1989. Partial rare plant surveys conducted and invasive plants are surveyed along roads and at springs. Long term plant monitoring plots are

established but not monitored.

III. Summary of the 2003-05 New Mexico State University (NMSU) Data Mining Efforts

NMSU was contracted to data mine for the completion and certification of NPSpecies and natural resources databases. Work began in 2003 and a final report (**Phase I Workshops and Assistance in the Development of the Phase I Report: Amendment to Data Mining and Data Entry for Chihuahuan Desert I&M Network and Development of a Vital Signs Monitoring Plan – Final Report**) was provided October 2005 by Jennifer Frey, NMSU project coordinator.

The following tasks were outlined for completion:

- Enter, clean, and certify voucher data that has been partially entered by Texas Tech University and network data technicians on NPSpecies (approximately 6000 records). Data will have to be filtered by location to exclude records that are remote from the parks. The CHDN criterion as “encroaching” is that a species must be within a half mile of the park boundary and in a similar ecosystem. For the Rio Grande Wild and Scenic River, with no actual NPS lands, the CHDN will define the extent of the river corridor to be included.
- Locate, enter, and certify data from regional museums with possibly significant collections from the areas in the CHDN. These include, but are not limited to, NMSU, MSB at UNM, UTEP, New Mexico Museum of Natural History, Southwest Texas State University, and UT Austin. Some of these data may be available in electronic formats.
- Enter and/or convert Excel files of exotic plant management data to the APCAM (Alien Plant Control and Monitoring) MS Access database and NPSpecies (approximately 100 daily records).
- Enter and certify Natural Resources Observation Card data (approximately 10,000 records) in NPSpecies.
- Enter and certify biological inventory data as received. The CHDN has several ongoing field investigations from which data will be delivered as Excel files.
- Enter data from reports, books, and scientific literature that pertain to network species in NatureBib.
- Describe park datasets that yield valuable natural resource data in the Inventory and Monitoring Dataset Catalog.



The following references were added by NMSU to NatureBib for BIBE in support of species occurrence in the park:

Fishes

Bibkey ID: 585096 Moring, J. B. 2002. Baseline Assessment of Instream and Riparian-Zone Biological Resources on the Rio Grande in and Near Big Bend National Park, Texas. United States Geological Survey, Austin, TX. [18 names]

Amphibians

Bibkey ID: 590642 Prival, D., J. Borgmeyer and M. Goode. 2003. Chihuahuan Desert National Parks Reptile and Amphibian Inventory, 2003. Unpublished report [7 names]

Reptiles

Bibkey ID: 590642 Prival, D., J. Borgmeyer and M. Goode. 2003. Chihuahuan Desert National Parks Reptile and Amphibian Inventory, 2003. Unpublished report [37 names]

Mammals

Bibkey ID: 590351 Borrell, A. E. and M. D. Bryant. 1942. Mammals of the Big Bend Area of Texas. University of California Publications in Zoology, :1-49. [56 names]

Bibkey ID: 590318 Easterla, D. 1973. Ecology of the 18 Species of Chiroptera at Big Bend National Park, Texas Parts I and II. The Northwest Missouri State University, Maryville, Missouri 64468, 34:1-165. [18 names]

Additional details of the NMSU data mining efforts are available in the final report.

Appendix B. NatureBib citation entry sheet completed by BIBE staff and provided to NatureBib editor

ITEM TO BE ACCESSIONED				
Instructions: 1) Enter below your preferences for citation entry into NatureBib. 2) Save this file, <i>renaming</i> it with the author's last name and year (add other info to filename as needed to make unique...Bunny will use the information you enter here to enter a citation into NatureBib). 3) Place hard copy of referenced document in library accession box and/or place electronic file of referenced document in folder on S drive as indicated below (electronic files can be automatically converted to pdf via Adobe Acrobat).				
Author				
Year				
Title				
Note				
Abstract				
Keywords- Choose one bold keyword (mandatory) , and one or more of the sub-keywords; add more if desired:	☐ Animal Studies ☐ aquatic invertebrates ☐ fish ☐ reptiles/amphibians ☐ birds ☐ mammals ☐ threatened-endangered-sensitive animals ☐ exotic/invasive species - animals ☐ terrestrial invertebrates ☐ animal communities	☐ Plant Studies ☐ non-vascular plants ☐ plant communities ☐ threatened-endangered-sensitive plants ☐ exotic/invasive species - plants ☐ vascular plants	☐ Aquatic Studies ☐ coastal-marine systems ☐ flood management/history ☐ hydrology (general) ☐ hydrology (surface) ☐ limnology ☐ oceanography ☐ water quality ☐ water quantity ☐ water rights ☐ wetland/riparian ☐ hydrology (groundwater)	☐ Physical Sciences ☐ cave (flora/fauna) ☐ cave (karst) ☐ erosion-sedimentation ☐ geology ☐ geomorphology ☐ geophysics ☐ glaciology ☐ petrology/mineralogy ☐ sedimentology/stratigraphy ☐ soil science ☐ tectonics ☐ volcanology/geothermal ☐ cave (microbiology) ☐ dune/fields
	☐ Atmospheric Sciences ☐ air quality ☐ climatology ☐ night sky/light pollution ☐ soundscape	☐ Paleontology	☐ Management ☐ management/ administration ☐ visitor impacts ☐ recreation/aesthetics ☐ range management ☐ forestry ☐ fisheries management ☐ wildlife management ☐ watershed management ☐ integrated pest management ☐ minerals management ☐ restoration - natural ☐ restoration - cultural	☐ Other ☐ database/information systems ☐ GIS ☐ agriculture ☐ hunting ☐ fire ☐ microbiology ☐ inventory ☐ monitoring ☐ archaeology ☐ ethnology ☐ history ☐ sociology ☐ contaminants/hazardous materials
File Location (where document will be filed) Choose one (mandatory):	Drawer: ☐ AIR QUALITY ☐ AMPHIBIANS & REPTILES ☐ AQUATIC ☐ AVIFAUNA ☐ BORDER/RIO GRANDE ☐ ECOLOGICAL SURVEYS & CLIMATE REF ☐ ENDANGERED ANIMAL SPECIES ☐ ENDANGERED PLANT SPECIES ☐ FIRE ☐ GENERAL RESOURCE INFORMATION ☐ GEOGRAPHIC INFO SYSTEM (G.I.S.) ☐ GEOLOGY ☐ INTEGRATED PEST MANAGEMENT - GEN INFO ☐ INVERTEBRATES	Drawer: ☐ MAMMALS ☐ MAN AND THE BIOSPHERE ☐ PESTICIDES & HEAVY METALS ☐ PLANNING ☐ SOILS ☐ SPRINGS, SOIL & WATER ☐ USE & EFFECTS ☐ VEGETATION ☐ WILDERNESS ☐ Other - Specify:	Shelf: ☐ AIR QUALITY ☐ AQUATIC ☐ AVIFAUNA ☐ ECOLOGICAL SURVEYS ☐ ENDANGERED SPECIES - ANIMALS ☐ FIRE ☐ GIS ☐ GEOLOGY ☐ INVERTEBRATES ☐ WILDERNESS ☐ MAMMALS ☐ INTEGRATED PEST MANAGEMENT ☐ MAN AND THE BIOSPHERE ☐ USE AND EFFECTS	Shelf: ☐ PLANNING DOCUMENTS ☐ ENDANGERED SPECIES - PLANTS ☐ SLIDES AND PHOTOS ☐ VEGETATION ☐ ECOLOGICAL MONITORING ☐ BACK/COUNTRY USE ☐ THESIS/DISSERTATION ☐ Other - Specify:
Filename of referenced document on server (if available)	☐ Only hard copy available			
	☐ Electronic copy available			
Document scanning priority	☐ High ☐ Medium ☐ Low ☐ Do Not scan/upload			
Sensitivity - citation	☐ Public ☐ NPS Only			
Sensitivity - document uploaded	☐ Public ☐ NPS Only ☐ Park Only ☐ Do No upload			

Sensitivity Note: There are two places in NatureBib to note sensitivity: Citation (almost always Public), and; Document upload (occasionally want to limit this to NPS or Park Only). Do not upload sensitive documents to NatureBib. If you mark a document 'Park Only', note that it is accessible to all BIBE employees and IMR regional and CHDN network employees.

Copyright Note: If you have any doubt about the copyright permissions, mark the document upload sensitivity as NPS or Park Only (per WASO instructions), or do not upload. As time permits, copyright permissions will be investigated on these. General guidelines: Documents created by federal employees are considered fair use and can be marked as 'Public'; documents may be marked 'Public' if they are created by contractors and you have an agreement that 'explicitly' states that the individual's work is a work-for-hire and all copyrights belong to the National Park; journal articles are marked 'NPS or Park Only' until permissions are obtained (unless they meet the previously-mentioned criteria or you have information that deems them fair use). See <http://inside.nps.gov/helpdesk/copyright.htm> for more information. Contact CHDN staff or Margaret Beer (WASO) with additional questions.

Entry Form Filename: New NatureBib Entry-blank form.xls

Appendix C. Full-text documents (73) linked to BIBE in NatureBib

Bibkey ID	Author	Year	Title	File attached
7886	Schmidt, Karl, Smith, Tarleton	1944	Amphibians and reptiles of the Big Bend Region of Texas; Zoological Series of Field Museum of Natural History	Yes(Secure)
<i>This article documents the survey of amphibians and reptiles of Big Bend National Park, Texas during the summers of 1936-1938. Available collection locations are provided.</i>				
115178	Casey, Clifford	1969	Soldiers, ranchers and miners in the Big Bend; Div of Hist, Office of Archeology and Historic Preservation, USDI	Yes(Public)
<i>A description of early activities in the Big Bend area: Early Anglo-American Activities, 1849-1910; Military Activity in the Area - Camp Santa Elena; Land and Land Ownership of What is Now Castolon; La Harmonia Company and Its Activities, 1919-1961; Ranching in the Big Bend; Early Owners of the Land; Homer Wilson and His Ranching Activities; Problems of Ranching in the Big Bend Country; The End of Ranching in the Big Bend Park Area; Quicksilver Mining in the Big Bend of Texas; Quicksilver Deposits in the Big Bend of Texas; The Mariscal Mine; The Mariscal Mine and the Big Bend National Park. This article is an ethnographic and historical account of lifeways around the Big Bend. Included in the article are observations of the geographical and geological terrain, possible interactions with flora and fauna, waterways, and various other accounts of natural life. Testimonies of the various cultures (Apache, Comanche, Mexican, Spanish, ...), commerce, peaceful and military activities, ranching and farming, mining, and other various lifeways in the Big Bend area are noted. "... three studies, although bound together, were prepared separately by Dr. Casey. They deal with three distinct themes of the Big Bend story - U.S. Army occupation, mining, and ranching. Each paper reveals the lengths to which man will go to test nature's resiliency and exploit her resources. Although prepared for the National Park Service, these papers have not been edited by the agency, except for minor changes in their format to give continuity. Dr. Casey's work is a scholar's unretouched product, speaking for itself and its author." (abstract from report)</i>				
116072	Wright, R, Ostergren, Marilyn	1996	The southwest region natural resource bibliography project	Yes(Public)
<i>Describes the work done to produce the Natural Resource Bibliography for NPS units in the Southwest Region (New Mexico, northeastern Arizona, Texas, Oklahoma, Louisiana and Arkansas). The bibliography includes abstracts and document locations.</i>				
124863	Boer, William, Schmidly, David; Johnson, R, Jones, D	1977	Terrestrial mammals of the riparian corridor in Big Bend National Park; Importance, preservation, and management of riparian habitat; General Technical Report	Yes(Secure)
<i>"Thirty species of terrestrial mammals inhabit riparian habitats in Big Bend National Park (BBNP), but only one species (the beaver, <i>Castor canadensis</i>) is restricted to these areas. Major changes in the vegetation during the past 30 years, involving an increase in basal and canopy cover, have resulted in the elimination of at least one species (<i>Dipodomys ordii</i>) from the river corridor as well as increased abundance and distribution for two other species (<i>Sigmodon hispidus</i> and <i>Peromyscus leocopus</i>). Compared to the other major plant communities in BBNP, the rodent fauna of the riparian community has lower evenness, richness, and diversity indices. Human use and trespass livestock grazing are the major impacts acting upon the natural riparian communities in BBNP today." (From Abstract)</i>				
132994	Whitefield, Michael	1990	The vegetation of the North Rosillos Mountains area, Big Bend National Park, Texas	Yes(Secure)
<i>Report is designed to accompany the vegetation map of the north Rosillos Mountains area (on wall outside of SCRM library) prepared by the same author. Thirteen plant communities are described for the area, together with descriptions of separate 'phases' of vegetation for two of those communities. For each community shown on the map, gross features of the habitat are described, plus a compendium of important plant species is provided.</i>				
135677	Blackstun, David, Woosley, Lloyd, Flora, Mark	1998	Water-resources issues in the Rio Grande -- Rio Conchos to Amistad Reservoir subarea	Yes(Public)
<i>"In 1994, the U.S. Department of the Interior (DOI) chartered the U.S.-Mexico Border Field Coordinating Committee for the purpose of promoting and facilitating coordination among the DOI bureaus on environmental issues of Departmental interest along the U.S.-Mexico border. One of the foremost issues identified was that of shared-water resources. A multi-bureau Shared-Water Resources Issues Team was created to identify, compile, and communicate significant issues related to the shared-water resources of the U.S.-Mexico border area. Woodward and Durall (1996), as part of the Issues Team, used surface-water drainage basins as the primary basis for defining and delineating the extent of the border area from a shared-water resources perspective, and divided the border area into eight subareas (fig. 1). This Fact Sheet presents shared-water resources issues along the Rio Grande from its confluence with the Rio-Conchos to the Amistad Reservoir and Dam from a DOI perspective." (from report Introduction)</i>				
551997	National Park Service	2001	Full study plan for vertebrate and vascular plant inventory of the Chihuahuan Desert Network	Yes(Public)

Bibkey ID	Author	Year	Title	File attached
-----------	--------	------	-------	---------------

"The need for complete and credible biological information has long been recognized (Sellars 1997). In response to this need, the National Park Service initiated an Inventory and Monitoring Program in the early 1990s to conduct baseline inventories, scientific research and study long-term changes in the biological resources found in the parks (National Park Service 1992). This program largely emphasized work in 'prototype' parks that served as models for other parks in the system. In 1998, Congress appropriated service wide funding for a 'program of inventory and monitoring of National Park System resources to establish baseline information and to provide information on the long-term trends in the conditions of National Park System resources' (National Park Service 1999a). As the first step in this program, 32 networks of parks nationwide have been asked to develop detailed study plans for biological inventory. This document outlines the proposed plan for biological inventory of vertebrates and vascular plants in the Chihuahuan Desert Network (CHDN)." (from report Introduction)

558024	Manning, Richard, Jones, Clyde	1998	Annotated checklist of recent land mammals of Texas, 1998; Occasional Papers: Museum of Texas Tech University	Yes(Secure)
--------	--------------------------------	------	---	-------------

"This checklist is an updated version of two previous lists of free-ranging Texas mammals (Jones et al., 1988a; Jones and Jones, 1992). This checklist includes a phylogenetic listing of taxa, by order, family, and genus. Within genera, species and recognized subspecies are listed alphabetically. Species marked with an asterisk () are exotic species introduced from outside the United States. The approximate known geographic distribution within the state of Texas is reported for each mammal and pertinent comments and/or citations about that taxon may be included. Many accounts are unchanged from earlier editions of the checklist as Jones and Jones (1992) wrote them." (from article introduction)*

572382	Levy, Benjamin	1968	Hot Springs, Big Bend National Park: Historic structures report, Part I: Historical data	Yes(Public)
--------	----------------	------	--	-------------

"This report is authorized by Resource Study Proposal (RSP) BIBE - H-7 which calls for compilation of historic data to support the requisite rehabilitation and stabilization of the Hot Springs Complex. The Hot Springs site is one of those to be preserved and interpreted as provided for in the Historical Resource Development Plan for the Park which is currently being prepared. The Hot Springs area is regarded by this plan as a prime historical site and is assigned to the highest management category." (from report Forward)

572717	Stottlmyer, Robert, Baron, Jill, Edmonds, Robert, Scherbarth, Laura, Steltzer, Heidi	2002	Long-term ecosystem studies in Isle Royale, Olympic, and Rocky Mountain National Parks; Noatak National Preserve, and Fraser Experimental Forest	Yes(Secure)
--------	--	------	--	-------------

The Long-term Ecosystem Studies program, established by the National Park Service as the Small Watershed Research Program in 1982, consists of sites in Rocky Mountain National Park (Loch Vale watershed), Olympic National Park (West Twin Creek watershed), Isle Royale National Park (Wallace Lake watershed), the Noatak National Preserve (Asik watershed), and the Fraser Experimental Forest, a cooperative U.S. Forest Service research site. Each site within the network also has studies underway funded by other programs including the USGS Global Change Program the results of which are summarized elsewhere (Stottlmyer et al., 2001). The program objectives initially were to 1) gain understanding of ecosystem structure and function in little-studied systems, and 2) assess the long-term effects of atmospheric inputs of hydrogen (H⁺), nitrogen (mainly NO₃⁻ and NH₄⁺), and sulfur (SO₄²⁻) in National Park ecosystems receiving a gradient of atmosphere deposition. In recent years, the research objectives have shifted to examine the broader ramifications of global change, in particular the relationships between N inputs, ecosystem C and N cycles, and below-ground microbial functional diversity. This network is also paired with complementary Global Change Research sites at two additional National Parks: the Noland Divide watershed, Great Smoky Mountains National Park, and the Pine Canyon watershed, Big Bend National Park. The design permits comparison of findings between the Great Smoky Mountains site (high precipitation and high N deposition) with Olympic (high precipitation, low N deposition); Big Bend (warm desert) and Asik (cold desert); Asik (northern boreal ecotone) with Isle Royale National Park (southern boreal ecotone); and Rocky Mountain National Park (high elevation, east slope, lower precipitation amount) and the Fraser Experimental Forest (high elevation, west slope, high precipitation amount). Such contrasts in physical factors have a profound effect in regulating the rate and relative importance of ecosystem processes.

573923	Burghardt, E	1996	Bat-compatible closures of abandoned underground mines in National Park System units	Yes(Secure)
--------	--------------	------	--	-------------

Because bat habitat is threatened by increased urban development, deforestation, and exploitation of caves, abandoned mines have become critical to the survival of numerous bats species. The National Park Service (NPS) Abandoned Mineral Lands (AML) Program has amassed 9 years of experience in constructing mine closures to preserve significant bat habitat. The NPS has placed 73 bat-compatible closures in 10 states from the east to west coasts, and is currently working on projects involving another 7 bat closures in Arizona, Nevada, and California. Habitat surveys for bats and other species are an integral part of the AML inventory process. When surveys outside mines slated for closure reveal potential habitat, qualified wildlife biologists accompanied by experienced AML safety personnel conduct internal surveys. Several internal surveys are often useful to determine various species using a mine for different purposes through the seasons of the year. Once the determination is made that a given site merits habitat preservation, gates are designed to suit the specific needs of resident species. This may involve construction of temporary test closures or construction in stages to ensure that the bat colony does not abandon a site in response to the closure. Construction takes place at a season when the mine is uninhabited, or at a time and in a manner that it will cause the least disturbance. Once a site has been gated, follow-up surveys are performed to test the success of the gates, providing useful data on various species' acceptance or rejection of different gate designs. Bat gates are monitored periodically since they are more prone to vandalism than permanent closures such as backfilling. The NPS and Bat Conservation International recently developed an interpretive warning sign which attempts to prevent vandalism by educating the public to the potential hazards inside the mine, the value of bats in ecosystems, and the importance of bat conservation efforts.

Bibkey ID	Author	Year	Title	File attached
573946	Howells, Robert; Garrett, Gary, Allan, Nathan	2003	Declining status of freshwater mussels in the Rio Grande, with comments on other bivalves; Aquatic Fauna of the Northern Chihuahuan Desert	Yes(Secure)

*Freshwater mussels (Family Unionidae) are one of the fastest declining faunal groups in North America due, in part to their sensitivity to environmental degradation and modification. There has been a noteworthy paucity of data on unionid assemblages throughout the Rio Grande drainage despite its being a unique region of zoogeographic overlap between southern and northern faunas. Therefore, selected historic collections, state surveys by Texas Parks and Wildlife (TPW) 1992-1997, and federally-funded work by TPW and New Mexico Department of Game and Fish 1998-2001 were reviewed to provide a better understanding of mussel status in the system. At least 16 species of unionids occurred in the Rio Grande drainage of Texas, New Mexico, and Mexico. All have been dramatically reduced in both abundance and distribution in recent decades. Only six native species have been found alive within the past ten years along with two others that are apparent introductions. Among taxa endemic to the Rio Grande, Salina mucket (*Potamilus metnecktayi*) and Mexican fawnsfoot (*Truncilla cognata*) have not been found alive since 1972 (though recently dead valves of the former collected in the late 1990s suggest it may still survive) and living or recently dead Rio Grande monkeyface (*Quadrula couchiana*) were last documented in 1898. The remaining taxa, including some that may be abundant elsewhere, also appear to have disappeared from the system over the past 10 to 100 years. Factors contributing to this decline include natural and anthropogenic desertification, water and land management practices, habitat modification, pollution, siltation and increased salinity (in some areas). Unfortunately, there is little indication status of unionids in the Rio Grande will improve in the future.*

574003	Onorato, Dave	2004	Phylogeographic patterns within a metapopulation of black bears (<i>Ursus americanus</i>) in the American Southwest; Journal of Mammalogy	Yes(Secure)
--------	---------------	------	---	-------------

*"Natural recolonization by large carnivores has rarely been documented. American black bears (*Ursus americanus*) recently (1988-present) recolonized portions of their former range in western Texas. We used mtDNA sequence data (n=144 bears) from 7 populations of southwestern black bears in New Mexico, Texas, and northern Mexico to test predictions regarding metapopulation structure of the species in this region and the source of recolonization in western Texas. Six variable nucleotides were detected, resulting in 5 mtDNA haplotypes. Although within-site diversity of haplotypes (h) and nucleotides (pi) was low, a high degree of genetic partitioning among sites was detected (/ST=0.6301). Analyses pinpointed northern Mexico as the source of black bears for western Texas. Female-mediated gene flow is proceeding slowly in this system (Nfm=0.4961 individuals/generation), but its occurrence was inferred via field observations. Nested clade analyses indicated that populations of bears in the Mexico-Texas region (area that encompasses mountain ranges within Nuevo Leon and Coahuila, Mexico, northward to smaller ranges located in the Trans-Pecos region of western Texas) were connected via restricted gene flow due to isolation by distance. Long-distance colonization is the likely cause of extant geographical associations between New Mexican and Mexico-Texas populations. The naturally fragmented, xeric environment of the Chihuahuan Desert impedes colonization, but is not a complete barrier to this process. Conservation initiatives concerning recolonization by black bears within the Mexico-Texas mainland-island metapopulation should focus on preventing human-bear interactions and maintaining corridors for dispersal between the mainland populations in Mexico and the island populations in western Texas." (from Abstract)*

574009	Onorato, Dave, Hellgren, Eric, Mitchell, F., Skiles, Raymond	2003	Home range and habitat use of American black bears on a desert montane island in Texas; <i>Ursus</i>	Yes(Secure)
--------	--	------	--	-------------

*American black bears (*Ursus americanus*) have recolonized Big Bend National Park (BIBE), Texas in the past 15 years from adjacent habitat in northern Mexico. Range expansion by the Big Bend bear population across the Chihuahuan desert landscape has considerable consequences for the recolonization of areas north of the park in western Texas (Glass, Del Norte and Davis Mountains). We studied black bear ecology from 1998 to 2001 in BIBE. Thirty bears were marked (15 with radiocollars) during the study, including newborn cubs. Home ranges of bears were larger than in southwestern populations in Arizona and northern Mexico, but smaller than those in the nearby Black Gap Wildlife Management Area (BGMWA). Bears were mainly restricted to the Chisos Mountains and their foothills, with 65% of all radiolocations in the pinyon (*Pinus cembroides*)-oak (*Quercus* spp.)-juniper (*Juniperus* spp.) vegetation association. Selection analyses indicated that bears preferred oak-dominated habitats. Bears were more likely than random to be <100m from anthropogenic features (e.g., roads, trails), but that effect was much stronger in summer when visitor use was low. Denning habitat was located within the higher elevations (>1800m) of the Chisos Mountains. These data provide predictive capability to managers regarding recolonization of other montane islands north of BIBE and provide information that will help managers ensure the persistence of the small island population of black bears in the park.*

585100	Moring, J	2002	Baseline Assessment of Instream and Riparian-Zone Biological Resources on the Rio Grande in and Near Big Bend National Park, Texas; Water-Resource Investigations	Yes(Public)
--------	-----------	------	---	-------------

No Abstract

609324	Bennett, James, Wetmore, Clifford	2005	Lichens of the U.S. National Parks; The Bryologist	Yes(Secure)
--------	-----------------------------------	------	--	-------------

*Over 26,100 records of lichens present in 144 U.S. national park units were assembled from various sources into a database and analyzed. Within these 144 park units, 2,435 species and 375 genera are reported, representing 63% and 74% of the North American flora, respectively. The park units are located in 41 states and Washington D.C. The average number of species in a park is 104, but the median is 60, indicating there are many parks with a small number of species and a few with high numbers. Isle Royale National Park has the most species, 611, and twelve parks have only one species reported. The number of records of lichens present ranged from one for 25 parks, to 1,623 for Isle Royale. *Physcia aipolia* is the most frequently observed species, being found in 65 parks. One fourth of the park units are classified cultural resource parks, while the remainder are considered natural resource parks. This study was based on 453 sources, including literature citations, park reports, and collections in the University of Minnesota Herbarium.*

Bibkey ID	Author	Year	Title	File attached
619822	Febus, Jeanniemae	2004	2004 Feral hog distribution survey and trapping report, North Rosillos area, Big Bend National Park	Yes(Public)
Water sources in the North Rosillos area of Big Bend National Park, Texas were surveyed between 7/23/2004 and 9/30/2004 to determine the distribution of feral hogs. Twelve hogs were caught in traps between 8/4/04 and 9/30/04.				
619826	Powell, Melissa	2003	2003 Feral hog distribution survey and trapping report	Yes(Public)
Water sources were surveyed in the North Rosillos Area of Big Bend National Park to determine the limits of feral hog distribution. The results are recorded on the attached database spreadsheet (including Instructions for Feral Hog data entry) and a 2003 distribution map (NAD 83). A 2002 distribution map is attached for comparison. An updated list of Tanks/Areas is also attached. Water sources were surveyed for feral hog tracks and sign from 8/21/03 to 12/10/03. Visited water sources are noted as green points and identified feral hog tracks are noted as red points on the attached map of Feral Hog Surveys 2003. Blue points indicate water source locations not visited during 2003 (by 12/16/03). Note that points marked in red may or may not be a tank location. Hog tracks were occasionally seen while walking into an area. Seven hogs were seen at Tank 38 - 2 adults and 5 shoats. Tracks were seen repeatedly at this tank throughout the season. Based on surveys at all water sources, a maximum of 3 adults and 5 young were identified.				
619832	Onorato, Dave, Hellgren, Eric, Bussche, Ronald, Skiles, J.	2004	Paternity and relatedness of American Black Bears recolonizing a desert montane island; Canada Journal of Zoology	Yes(Secure)
<i>"American black bears (Ursus americanus (Pallas, 1780)) are characterized by female philopatry and male-biased dispersal, with predictable consequences for genetic structure of populations. We studied a recolonizing population of black bears on a desert montane island to test genetic-based predictions of bear social behavior. We assessed genetic paternity and relatedness among bears within Big Bend National Park, Texas, from 1998 to 2001 via maternally and biparentally inherited markers and field observations. Data from seven microsatellite loci permitted us to assign paternity for 7 of 12 cubs, and multiple paternity was revealed in one litter. Levels of relatedness in the Park were comparable to those found in a nearby large population in Coahuila, Mexico. Adult female bears in the Park were more closely related to each other than males were to each other. Microsatellite data were consistent with previous analyses of mtDNA sequences that indicated bears in the Mexico-Texas metapopulation exhibit male-biased dispersal. Demographic and genetic data provided a pedigree for 23 of 31 sampled bears and depicted the matriarchal structure of this recently recolonized population. Although females in this insular population are closely related to each other, as predicted by characteristics of ursine social ecology, incoming dispersal by unrelated males results in periodic supplementation of genetic variation."</i> (from Abstract)				
622535	Wondzell, S, Ludwig, J	1995	Community dynamics of desert grasslands: influences of climate, landforms, and soils; Journal of Vegetation Science	Yes(Secure)
<i>Permanently, marked vegetation transects in big bend national par Texas USA were monitored to follow temporal dynamics of desert grassland. Historic records indicate that the park area was severely overgrazed prior to its establishment and our results show that the species present increased in both cover and density after the removal of livestock. Little change was observed between 1955 and 1960, a period dominated by several consecutive years of drought. Unfortunately, we cannot isolate the effects of recovery from grazing from the effects of climate because the design did not include control plots located within grazed pastures.</i>				
625003	Gutzwiller, K., Barrow, W.	2003	Influences of roads and development on bird communities in protected Chihuahuan Desert landscapes; Biological Conservation	Yes(Secure)
<i>"Our objective was to improve knowledge about effects of broad-scale road and development variables on bird communities in protected desert landscapes. Bird species richness and the relative abundance or probability of occurrence of many species were significantly associated with total length of roads within each of two spatial extents (1- and 2-km radii), distance to the nearest road, distance to the nearest development, or the two-way interactions of these variables. Regression models reflected non-linear relations, interaction effects, spatial-extent effects, and interannual variation. Road and development effects warrant special attention in protected areas because such places may be important sources of indigenous bird communities in a region."</i> (from abstract)				
628687	Goode, Matt	2006	Selected bibliography and species list for herpetofauna, Rio Grande Wild and Scenic River	Yes(Public)
<i>"A general herpetological survey was conducted across six of the seven park units located in the Chihuahuan Desert Network (CHDN). These include Amistad National Recreation Area (NRA), Big Bend National Park (NP), Carlsbad Caverns NP, Fort Davis National Historic Site (NHS), Guadalupe Mountains NP, and White Sands National Monument (NM) (Prival and Goode 1995). However, no systematic herpetofaunal survey has been conducted on the Rio Grande Wild & Scenic River (WSR) (Fig. 1). This report was an attempt to compile literature that would be useful for focusing efforts on a field inventory and to develop a preliminary list of species likely to found on the Rio Grande WSR."</i> (from report introduction)				
630174	Gutzwiller,, Kevin, Barrow, Wylie	2003	Bird communities, roads and development: Prospects and constraints of applying empirical models; Biological Conservation	Yes(Secure)

Bibkey ID	Author	Year	Title	File attached
-----------	--------	------	-------	---------------

"Our objectives were to explain the prospects and constraints of applying empirical models that relate bird community metrics to broad-scale characteristics of roads and development. We explored the practical value of regression models that were derived for a large protected area in the Chihuahuan desert. These models related bird species richness, relative abundance, or probability of occurrence to total length of roads within each of two spatial extents (1-and 2km radii), distance to the nearest road, distance to the nearest development, or the two-way interactions of these variables. Empirical models can be used to inform conservation decisions, to parameterise simulation models for conservation planning, to identify threshold levels of road and development variables, and to determine the focus of management experiments for confirmatory hypothesis testing and improvement of model realism." (From Journal Abstract)

630175	Gutzwiller,, Kevin, Barrow,, W	2001	Bird-Landscape relations in the Chihuahuan Desert: Coping with uncertainties about predictive models; Ecological Society of America	Yes(Secure)
--------	--------------------------------	------	---	-------------

"During the springs of 1995-1997, we studied birds and landscapes in the Chihuahuan Desert along part of the Texas-Mexico border. Our objectives were to assess bird-landscape relations and their interannual consistency and to identify ways to cope with associated uncertainties that undermine confidence in using such relations in conservation decision processes. Bird distributions were often significantly associated with landscape features, and many bird-landscape models were valid and useful for predictive purposes. Differences in early spring rainfall appeared to influence bird abundance, but there was no evidence that annual differences in bird abundance affected model consistency. Model consistency for richness (428) was higher than mean model consistency for 26 focal species (mean 30%, range 0-67%), suggesting that relations involving individual species are, on average, more subject to factors that cause variation than are richness-landscape relations. Consistency of bird-landscape relations may be influenced by such factors as plant succession, exotic species invasion, bird species' tolerances for environmental variation, habitat occupancy patterns, and variation in food density or weather. The low model consistency that we observed for most species indicates the high variation in bird-landscape relations that managers and other decision makers may encounter. The uncertainty of interannual variation in bird-landscape relations can be reduced by using projections of bird distributions from different annual models to determine the likely range of temporal and spatial variation in a species' distribution. Stochastic simulation models can be used to incorporate the uncertainty of random environmental variation into predictions of bird distributions based on bird-landscape relations and to provide probabilistic projections with which managers can weigh the costs and benefits of various decisions. Uncertainty about the true structure of bird-landscape relations (structural uncertainty) can be reduced by ensuring that models meet important statistical assumptions, designing studies with sufficient statistical power, validating the predictive ability of models, and improving model accuracy through continued field sampling and model fitting. Uncertainty associated with sampling variation (partial observability) can be reduced by ensuring that sample sizes are large enough to provide precise estimates of both bird and landscape parameters. By decreasing the uncertainty due to partial observability, managers will improve their ability to reduce structural uncertainty." (from Abstract)

630204	Gutzwiller,, Kevin, Barrow, Wylie	2002	Does bird community structure vary with landscape patchiness? A Chihuahuan Desert perspective.; Oikos	Yes(Secure)
--------	-----------------------------------	------	---	-------------

"During the springs of 1995-1997, we studied birds and landscapes at 70 sites in the Chihuahuan Desert to assess relations between bird community structure and landscape patchiness. Within each of two spatial extents (1-km and 2-km radius area centered on each site), we measured the number of patches of individual land-cover types. Mean bird richness, and the mean abundance and probability of occurrence of most bird species were significantly correlated with one or more of these variables. Contrary to evidence from other systems, positive association with landscape patchiness did not increase with the degree to which species were habitat generalist, was not negatively related to body size and did not differ between neotropical migrants and nonimmigrants. For the communities' primary constituent species as a group, the strength of positive and negative associations with patchiness did not differ between landscape extents. Within the 1-k but not the 2-k extent, habitat specialist were more positively and negatively associated with patchiness than were habitat generalist. In general, however, neither habitat breadth, body size, nor migratory status seemed to be responsible for associations with landscape patchiness. Mean richness, and the mean abundance and probability of occurrence of most species were significantly correlated with patchiness within one or both extents and patchiness of all of the most extensive land-cover types was influential. The simplest explanation for most of the bird-patchiness relations we found is that the associations reflected species-specific habitat needs. Through effects on avian richness, abundance and occurrence landscape patchiness affected bird community structure. A more complete understanding of the effects of landscape patchiness on bird community structure is likely to emerge when ecologist study the patchiness of major land-cover types at various spatial extents." (From abstract)

630400	Moring, J.	2005	Status of fish communities in the Rio Grande, Big Bend National Park, Texas-Comparison before and after Spring 2003 period of low flow	Yes(Public)
--------	------------	------	--	-------------

"During 2003-04 the U.S. Geological Survey, in cooperation with the National Park Service, re-evaluated the status of fish communities in three reaches of the Rio Grande in Big Bend National Park that originally were evaluated when the three reaches were established for study in 1999. The objective was to determine whether there were measurable differences between 1999 and 2003-04 (referred to as 2004) fish community status that likely are attributable to a rare 58-day period of low flow (less than 1 cubic meter per second) in spring 2003 at the Johnson Ranch gaging station on the Rio Grande in Big Bend National Park. The total number of fish species collected at all three sites (Boquillas, Johnson Ranch, and Santa Elena) in 1999 was greater than in 2004. The number of fish species collected at the Boquillas site in 1999 (10) was twice that collected in 2004; the number of species collected at the Johnson Ranch site in 1999 (nine) was almost twice that collected in 2004 (five). In contrast, the numbers at the Santa Elena site were nearly the same, 15 species in 1999, 14 in 2004. Percent community similarity for the Boquillas site is 8.04, for the Johnson Ranch site, 6.65, and for the Santa Elena site, 47.6, which indicates considerably more similarity between the 1999 and 2004 fish communities at the Santa Elena site than for the Boquillas and Johnson Ranch sites. At the Boquillas and Johnson Ranch sites, the fish communities shifted from small minnow (Cyprinidae) dominated in 1999 to largely gar (Lepisosteidae) and catfish (Ictaluridae) dominated in 2004. In contrast, no such shift occurred at the Santa Elena site between 1999 and 2004. Differences in flow conditions between the two downstream sites and the Santa Elena site might account for the dissimilar findings. The findings of the study provide some evidence that the spring 2003 period of low flow affected fish communities, but the findings are not definitive as other factors such as increased salinity, algal toxins, bioavailable contaminants, and exotic species can affect fish populations and, ultimately, fish community structure." (from report Abstract)

Bibkey ID	Author	Year	Title	File attached
631739	Cheatham, Jim, Bremer, Sina	1999	North Rosillos Mountains feral hog survey	Yes(Public)

This is a survey of feral hog impact and distribution of Big Bend National Park's North Rosillos area water sources conducted in January of 1999. Feral hog survey data and advice from Rick Taylor, Wildlife Biologist are attached.

632939	Baumgardner, David	2005	Preliminary survey of the mayflies (Ephemeroptera) and caddisflies (Trichoptera) of Big Bend Ranch State Park and Big Bend National Park; Journal of Insect Science	Yes(Secure)
--------	--------------------	------	---	-------------

The mayfly (Insecta: Ephemeroptera) and caddisfly (Insecta: Trichoptera) fauna of Big Bend National Park and Big Bend Ranch State Park are reported based upon numerous records. For mayflies, sixteen species representing four families and twelve genera are reported. By comparison, thirty-five species of caddisflies were collected during this study representing seventeen genera and nine families. Although the Rio Grande supports the greatest diversity of mayflies (n=9) and caddisflies (n=14), numerous spring-fed creeks throughout the park also support a wide variety of species. A general lack of data on the distribution and abundance of invertebrates in Big Bend National and State Park is discussed, along with the importance of continuing this type of research.

632940	Ammerman, Loren	2005	Noteworthy records of the Eastern Pipistrelle, Perimyotis subflavus, and Silver-haired bat, Lasionycteris noctivagans, (Chiroptera: Vespertilionidae) from the Chisos Mountains, Texas; The Texas Journal of Science	Yes(Secure)
--------	-----------------	------	--	-------------

"Twenty species of bats have been documented from Big Bend National Park (Easterla 1973; Higginbotham et al. 1999; Higginbotham & Ammerman 2002), however the occurrence of one of these, Lasiurus borealis, has been questioned (Easterla 1975). Most netting efforts have been conducted at the lower elevations in the park, but a few investigators have examined the bat species occurring in the Chisos Mountains (Borell & Bryant 1942; Easterla 1973). The Chisos Mountains, within Big Bend National Park (BBNP), range up to 7835 ft (2388m) elevation at the highest peak. The vegetation is dominated by a woodland plant association (pinyon/juniper/oak), however some moist canyons support a cypress/pine/oak association (Wauer 1971). This report documents the occurrence of Perimyotis (Pipistrellus) subflavus and Lasionycteris noctivagans in a moist woodland canyon of the Chisos Mountains (Brewster County, Texas) and brings the total diversity of bats in Big Bend National Park to 22 species – one of the highest for any national park." (from Article introductory paragraph)

632942	Williams, Christina	2005	Final report: Black-capped Vireo surveys Big Bend National Park Brewster County, Texas Spring 2005	Yes(Secure)
--------	---------------------	------	--	-------------

"The black-capped vireo (Vireo atricapilla) (BCVI) was Federally listed as endangered in 1987 (52 FR 37423). No critical habitat is designated for this species. The small, neotropical migrant is a 4.5 inch (11.4 centimeters) long, insectivorous songbird. Mature males are olive green above and white below with faint greenish-yellow flanks. The crown and upper half of the head is black with a conspicuous white eye-ring. The iris is brownish-red and the bill is black. The mature females are generally duller in color than the males, and have a dark slate gray head (Graber 1957, Oberholser 1974). Although BCVI habitat throughout Texas is quite variable with respect to plant species, soils, and rainfall, habitat types generally have a similar overall appearance which is patchy shrublands and open woodlands with a distinctive patchy structure (Graber 1961). BCVIs breed from Oklahoma south through central Texas and west to Coahuila, Mexico and Big Bend National Park (BBNP). They arrive from the Pacific slopes of Mexico in late March to mid-April and begin establishing their breeding territories. BCVIs return to their wintering grounds in late August to mid-September (USFWS 1991). OBJECTIVE: To assist BBNP [Big Bend National Park] with their annual BCVI censusing, Christina Williams and an assistant surveyed portions of BBNP from May 8 to 13, 2005." (From Report Introduction)

632944	Border Wildlife Consultants	2006	Aplomado Falcon surveys conducted in Big Bend National Park, Texas, 2006	Yes(Secure)
--------	-----------------------------	------	--	-------------

"As a result of a consultation between the United States Fish and Wildlife Service (USFWS) and Air Combat Command (ACC) concerning the Realistic Bomber Training Initiative (RBTI), ACC is required to survey for the presence of Northern Aplomado Falcons (Falco femoralis septentrionalis) in west Texas beneath Military Training Route (MTR) IR 178 and IR 102/141. These MTR's coincide in some areas. The north part of Big Bend National Park (BBNP) lies under these MTR's...The route was surveyed three times, once each in April, June and August, 2006. All surveys were conducted according to the USFWS Interim Survey Methodology For The Northern Aplomado Falcon In Desert Grasslands protocol...No Aplomado Falcons were seen on BBNP survey routes in 2006." (From Report Background and Results)

632981	Troy, Jeffrey	2006	Black-capped Vireo survey: Big Bend National Park, Brewster County, Texas June 2006	Yes(Secure)
--------	---------------	------	---	-------------

Between 18 and 22 June 2006, Black-capped Vireos (Vireo atricapilla; BCVI) were surveyed in Big Bend National Park, Texas. "This survey was the twentieth annual BCVI census since 1986 (Maresh 2004)...A total of 25 to 27 individuals were detected (17-18 males, 6-7 females, and 2 hatch-year birds). Numbers of adult BCVI detected in 2006 (23-25) shows a marked increase from the number detected in 2005 (9) and is identical to that of 2004. Numbers detected in 2005 may be reflective of earlier survey dates compared to previous censuses (Williams 2005). Numbers of adult males and females differ from numbers detected in 2004 (Maresh 2004). Black-capped Vireos were detected in all areas known to have held territories in recent years." (From Report)

Bibkey ID	Author	Year	Title	File attached
632985	Leavitt, Daniel, Mullett, Timothy, Ritzi, Christopher, Skiles, J.	2007	Hyla cinerea; Herpetological Review	Yes(Secure)

This note reports on the first specimen collection of Hyla Cinerea (green treefrog) in Big Bend National Park, Brewster County, Texas at the Rio Grande Village beaver pond. One froglet found on the evening of 30 September 2006 atop a submersed bunchgrass in thick vegetation. The specimen is stored at Sul Ross State University J. F. Scudday Vertebrate Collection. This is a new county record for this non-native species.

632987	Moore, Betty	2006	2006 Peregrine Falcon status report for Santa Elena Take-Out, Downstream Mariscal, South Rim and Crown Mountain eyeries	Yes(Secure)
--------	--------------	------	---	-------------

This report documents the 2006 survey activities for the peregrine falcon (Falco peregrinus anatum) monitoring of four historic eyeries in Big Bend National Park, Texas. All of the sites monitored this year were inhabited by a pair of adult peregrine falcons. Based on observations, only one pair was successful in producing one fledgling.

632990	Doan-Crider, Diana	2003	Movements and spatiotemporal variation in relation to food productivity and distribution, and population dynamics of the Mexican black bear in the Serranias del Burro, Coahuila, Mexico	Yes(Secure)
--------	--------------------	------	--	-------------

"Black bear habitat use based on available digestible energy was investigated in the Serranias del Burro, Coahuila, Mexico, during 1998-2001. Reproduction, survival, and density of the bear population were also calculated during 1998-2001, and compared to results of a study conducted in the same area during 1991-1994. Production of key bear foods was estimated, and plotted based on a GIS vegetation map. Foods were also analyzed for digestible energy content, and then interpolated onto the GIS map using ArcMap and ERDAS, adjusting for percent canopy cover of species within different vegetation associations. Average digestible energy within female black bear home ranges were compared to digestible energy of seasonal locations for 1999 and 2000. Between 1991-1994 and 1998-2001, density appeared to increase (0.33 bears/km² to 0.56 bears/km²) using a modified Lincoln-Petersen estimator. Density was also estimated using a modified mark-resight technique during the 1998-2001 study, and was found to be 0.84 bears/km², which is one of the highest published densities in North America. Cub survival decreased from 0.80 to 0.32 between the 2 studies, and it is suspected that mortality was due to intraspecific predation by adult males. Reproduction was similar between both studies until a mast failure in 2000-2001, which resulted in low reproduction. Adult females used areas that contained 27% more digestible energy than areas not used within their overall home ranges during fall 1999, and 20% more than areas not used during fall 2000. Patterns of food production across a landscape may influence effective density of bears within food patches, thus exposing adult females and cubs to high risk of mortality from other bears. Density dependence of bears may be directly affected by food availability through altered social dynamics, particularly in a desert environment where vegetation fluctuates with weather patterns." (from Abstract)

633014	Cox, Alan, Deckert, Frank, Scott, Mary, Yarbrough, Jerry, Richard, Ellis, Mack, Jim	2002	Amendment to the full study plan for vertebrate and vascular plant inventory of the Chihuahuan Desert Network	Yes(Public)
--------	---	------	---	-------------

This amendment to the "Full study plan for vertebrate and vascular plant inventory of the Chihuahuan Desert Network" (2001) provides for 1) the addition of a 'Schedule of Project Completion'; 2) changes to 'APPENDIX D. Project Statements for Studies Proposed for Inventory Funding (IM)'; and 3) a note stating: "The superintendents note that the Rio Grande Wild and Scenic River (RIGR), administered by Big Ben National Park, was included in resource considerations while developing the Study Plan. Aquatic resources of the RIGR are significant, and they are also of significance to restoring, protecting, and enhancing the resources of both Big Bend National Park and Amistad National Recreation Area."

633167	Onorato, Dave, Hellgren, Eric, Van Den Bussche, Ronald, Doan-Crider, Diana, Skiles, J.	2006	Genetic structure of American black bears in the desert southwest of North America: Conservation implications for recolonization; Conservation Genetics	Yes(Secure)
--------	--	------	---	-------------

"American black bears (Ursus americanus) have recolonized parts of their former range in the Trans-Pecos region of western Texas after a >40-year absence. Assessment of genetic variation, structuring, gene flow, and dispersal among bear populations along the borderlands of Mexico and Texas is important to gain a better understanding of recolonization by large carnivores. We evaluated aspects of genetic diversity and gene flow for 6 sampling areas of black bears in southwestern North America using genotypic data from 7 microsatellite loci. Our results indicated that genetic diversity generally was high in the metapopulation of black bears in northern Mexico and western Texas. The episodic gene flow occurring via desert corridors between populations in northern Mexico and those in western Texas has permitted the establishment of only moderate levels of genetic structuring. Bayesian clustering analyses and assignment testing depicted the presence of 3 subpopulations among our 6 sampling areas and attested to the generally panmictic nature of bear populations in the borderlands region. The potentially ephemeral nature of the small populations in western Texas and genotypic characteristics of bears recolonizing these habitats attest to the importance of linkages along this portion of the borderlands of the United States and Mexico to effectively conserve and manage the species in this part of its range." (from Abstract)

Bibkey ID	Author	Year	Title	File attached
633175	Holdermann, David	2004	Texas black bear status report - 2003	Yes(Secure)

"Texas lists the black bear (*Ursus americanus*) as threatened. The Louisiana black bear (*U. a. luteous*), a subspecies formerly native to eastern Texas, is federally listed as threatened. Historically, black bears were widespread, and even abundant, in Texas. By 1900, black bears were in decline in the east, and extirpated statewide by the 1960s. In the 1990s, a small resident bear population became reestablished in Big Bend National Park through ingress from nearby Coahuila, Mexico. The Texas Parks and Wildlife Department (TPWD) documents bear sightings and responds to bear-caused depredation. During the past 5 years, bears have been reported near the New Mexico, Oklahoma, Arkansas, and Louisiana borders. In the Deadhorse Mountains area, field studies indicated cub survival was 80% and bear density was 1 bear/142 km². Natural recolonization in Texas likely will be slow because of low female dispersal rates and the vast expanses of desert separating islands of suitable habitat. Beginning in 2003, TPWD will identify and characterize potential bear habitats and construct a conceptual framework to explain potential black bear metapopulation dynamics in the Trans-Pecos region. Comprehensive black bear planning is needed for the orderly reintegration of black bears in Texas." (from Abstract)

633178	Shumate, Jason	2006	Home range and movement of nutria (<i>Myocastor coypus</i>) along a stretch of the Rio Grande River, Big Bend National Park, Texas	Yes(Secure)
--------	----------------	------	--	-------------

"I investigated the home range and movement patterns of nutria (*Myocastor coypus*) along a section of the Rio Grande River in Big Bend National Park (BBNP). Nutria, an exotic semi-aquatic South American rodent, currently are found mainly in the southcentral, southeastern and Atlantic coastal areas of the United States where they are known to damage wetland ecosystems. This introduced species continues to expand its range in the United States. Nutria first appeared in BBNP in the mid 1990s. Since that time, they have continued to move upriver and into adjacent wetland habitats. The study site was centered at the beaver pond near the Rio Grande Village campground and includes the areas between the pond and the river as well as a ~4.5 km corridor along the river from Daniel's Ranch to the Boquillas Crossing area. The beaver pond and surrounding spring ponds are home to populations of the federally endangered Big Bend Mosquitofish (*Gambusia gaigei*). Seven adult nutria were captured, sedated, measured, marked, collared, and released during seven data collecting trips during the summers from May 2004 to June 2005. Collared nutria were tracked by radio telemetry techniques, and GPS coordinates were taken of their locations. An average of 27 locations per animal was used to calculate minimum convex polygon (MCP) home ranges and daily movement distances for five nutria (3 male and 2 female) using ArcMap software. The average home-range sizes were 10.05 ha (14.81 ha for males, 2.91 for females), and the mean maximum daily distance moved was 637.4 m (738.3 m for males, 486 m for females). Poor trap success and low sample size resulted in limited data. Data resulted in larger home ranges for males than females. This was comparable to other studies. Home range sizes for males were larger than other documented estimates. Mean daily movement distances of nutria in BBNP were similar to nutria in other locations." (from thesis Abstract)

633215	Leavitt, Daniel	2006	Entomological research	Yes(Public)
--------	-----------------	------	------------------------	-------------

Big Bend NP is an ideal location for entomological research with an emphasis on collecting in July and early August. The research goal was to collect as many orders of Class Hexapoda (a few orders outside Hexapoda were collected mainly Arachnida) and families therein possible throughout the park. Typical sampling methods included pit fall traps, black light traps, sweep netting, dip netting, hand capture and baiting. Total orders collected 22: families collected 81: species collected 154. (copy from report)

633439	Gray, John, Hines, Mark, Biester, Harald	2006	Mercury methylation influenced by areas of past mercury mining in the Terlingua district, Southwest Texas, USA	Yes(Secure)
--------	--	------	--	-------------

Speciation and microbial transformation of Hg was studied in mine waste from abandoned Hg mines in SW Texas to evaluate the potential for methyl-Hg production and degradation in mine wastes. In mine waste samples, total Hg, ionic Hg²⁺, Hg⁰, methyl-Hg, organic C, and concentrations were measured, various Hg compounds were identified using thermal desorption pyrolysis, and potential rates of Hg methylation and methyl-Hg demethylation were determined using isotopic-tracer methods. These data are the first reported for Hg mines in this region. Total Hg and methyl-Hg concentrations were also determined in stream sediment collected downstream from two of the mines to evaluate transport of Hg and methylation in surrounding ecosystems. Mine waste contains total Hg and methyl-Hg concentrations as high as 19,000 lg/g and 1500 ng/g, respectively, which are among the highest concentrations reported at Hg mines worldwide. Pyrolysis analyses show that mine waste contains variable amounts of cinnabar, metacinnabar, Hg⁰, and Hg sorbed onto particles. Methyl-Hg concentrations in mine waste correlate positively with ionic Hg²⁺, organic C, and total S, which are geochemical parameters that influence processes of Hg cycling and methylation. Net methylation rates were as high as 11,000 ng/g/day, indicating significant microbial Hg methylation at some sites, especially in samples collected inside retorts. Microbially-mediated methyl-Hg demethylation was also observed in many samples, but where both methylation and demethylation were found, the potential rate of methylation was faster. Total Hg concentrations in stream sediment samples were generally below the probable effect concentration of 1.06 lg/g, the Hg concentration above which harmful effects are likely to be observed in sediment dwelling organisms; whereas total Hg concentrations in mine waste samples were found to exceed this concentration, although this is a sediment quality guideline and is not directly applicable to mine waste. Although total Hg and methyl-Hg concentrations are locally high in some mine waste samples, little Hg appears to be exported from these Hg mines in stream sediment primarily due to the arid climate and lack of precipitation and mine runoff in this region. (from report Abstract)

633511	Sirotnak, Joe	2006	Botanical resource survey - proposed Emory Peak trail re-route	Yes(Public)
--------	---------------	------	--	-------------

In September, 2006, a botanical resource survey in support of NEPA work on the proposed Emory peak trail re-route was performed. No T&E or candidate species were found. Populations of 11 park-listed sensitive species were mapped.

633528	Frey, Jennifer, Caccamise, Don	2005	Phase I workshops and assistance in the development of the Phase I report: Amendment to data mining and data entry for Chihuahuan Desert I&M Network and Development of a vital signs monitoring plan - final report	Yes(Secure)
--------	--------------------------------	------	--	-------------

Bibkey ID	Author	Year	Title	File attached
-----------	--------	------	-------	---------------

"A cooperative agreement (CA-1248-00-002) was entered between the Chihuahuan Desert Inventory and Monitoring Network (CHDN) and New Mexico State University (NMSU) on 1 September 2003 for the purpose of "Data mining and data entry for the Chihuahuan Desert I&M Network and development of a Vital Signs Monitoring Plan". The overall purpose of this cooperative agreement was for NMSU to lend expertise and support to CHDN for the purposes of information gathering and Phase I report preparation. Activities during the first year of the project primarily dealt with Part I of the overall project. Part I consisted of data mining and data entry activities and results were detailed in the Annual Report submitted to CHDN on 31 August 2004 (see Appendix I). In September 2004, CHDN and NMSU entered into a continuation and amendment of the original task agreement titled: "Phase I Workshops and Assistance in the Development of the Phase I Report". The amendment stipulated a 1 September 2004 project initiation with an emphasis on NMSU assisting CHDN with development of a Vital Signs Monitoring Plan including 1) data compilation, synthesis and review, 2) literature searches, and 3) vital signs workshops. During year 2, work was accomplished concurrently on objectives associated with both Part 1 and Part 2 of the overall project. This report details those activities completed during the second (i.e., final) year of the project, including 1) data mining and data entry, 2) park species checklists, and 3) vital signs workshops." (from report Background)

633689	Mitchell, F., Onorato, Dave, Hellgren, Eric, Skiles, J., Harveson, Louis	2005	Winter ecology of American black bears in a desert montane island; Wildlife Society Bulletin	Yes(Secure)
--------	--	------	--	-------------

"American black bears (*Ursus americanus*) have recolonized western Texas following extirpation in the mid-1900s. Knowledge of winter ecology of black bears is important for conservation and management because denning, parturition, and early cub development occur during this period. We monitored 13 radiocollared black bears for 22 den-years in Big Bend National Park (BBNP) during 1998-2003. All pregnant females (n=6), 2 females with yearlings, 7 subadults, and 1 adult male denned. Three females with yearlings remained active during winter 1998-1999. We located 4 cave dens, 5 ground dens, and 6 rock-pile dens. Volume and elevation of den sites averaged 2.00 m³ (SD=1.51) and 1,800 m (SD=346), respectively. Mean (SD) dates of den entrance and emergence for 5 pregnant females were 30 December'17 days and 27 April'21 days, respectively, producing a mean denning period of 118'29 days. Pregnant females exited dens later (P= 0.003) and denned longer (P=0.02) than solitary females and males. Black bears in western Texas used den sites located in higher elevations that were remote and highly defensible. A den-habitat model described less than 56 km² of suitable denning habitat within and bordering BBNP. Resource managers should reduce visitor and management activities in and around potential denning areas during winter." (from journal Abstract)

633690	Malone, John	No Date	Species status of <i>Syrrhaptes guttilatus</i> and <i>S. marnocki</i>	Yes(Secure)
--------	--------------	---------	---	-------------

"Mitochondrial sequence data were used to examine relationships of *S. guttilatus* and *S. marnocki*. In all types of phylogenetic analysis, populations in the Chisos Basin of Big Bend National Park form a distinct monophyletic unit separate from a clade containing *S. marnocki* and *S. guttilatus* in Mexico. These results suggest that it is appropriate to resurrect the name *S. gaigae* for the populations in Big Bend National Park as they form a distinct species separate from *S. guttilatus* in Mexico. Mexican *S. guttilatus* group with *S. marnocki* suggesting that these taxa are conspecific but more data are needed to resolve this issue. Populations of *S. marnocki* in the Edwards Plateau show a surprising high degree of divergence (4% uncorrected p) and perhaps additional cryptic taxa in the Edwards Plateau await discovery." (from report Abstract)

633691	Weber, James, Weber, Lynne	2005	Colima Warbler census – 2005 report	Yes(Public)
--------	----------------------------	------	-------------------------------------	-------------

"During the 2005 census of Colima warblers (*Vermivora crissalis*) in the Chisos Mountains of Big Bend National Park a total of 75 warbler territories were observed. Over a three day period twelve volunteers surveyed the original ten count areas established in the first census (Wauer, 1967) and an additional six areas used in subsequent surveys (Table 1). The total number of warbler territories by count area over the eleven surveys conducted to date is found in Table 2. The objective of the census was to monitor population stability for this highly localized American visitor." (from report Abstract)

633693	Mueller, James	2005	Interim report: 2005 Texas horned lizard density survey	Yes(Secure)
--------	----------------	------	---	-------------

This project was designed to establish baseline densities for long-term monitoring of Texas horned lizard populations in Big Bend National Park. An interim report of activities is provided, including objectives, preparations, parameters, and future work.

633694	Leavitt, Daniel	No Date	Reassessing lizard community assemblages in Big Bend National Park	Yes(Secure)
--------	-----------------	---------	--	-------------

"A lizard census established in 1955 by Dr. William G. Degenhardt in Big Bend National Park, Texas was reinvestigated in 2005. Using the original study quadrats and methods established by Degenhardt, a lizard/acre index was determined and compared to previous survey years. Overall, the lizard/acre numbers were lower in 2005 when compared to the last time the quadrats were run in 1969. Within quadrats where *Cophosaurus texanus* had been present up to 1969, there has been a decrease to the point of absence for some quadrats. The *Aspidoscelis septemvittata* per-acre index number increased on both high elevation quadrats (Green Gulch 1, Green Gulch 2). Lizard assemblage similarity is highest in the Tornillo quadrat and lowest in the Green Gulch 1 quadrat, when comparing 2005 to previous surveys. Percent vegetative cover was measured and found to have increased with all quadrats. The data suggests lizard composition and density are both at least partially dependant upon changes in vegetative cover." (from report Abstract)

633697	Ammerman, Loren	2006	A new census method to count <i>Leptonycteris nivalis</i>	Yes(Secure)
--------	-----------------	------	---	-------------

"The objective of this project was to use non-invasive thermal imaging methods to census *Leptonycteris* as they emerge from Emory Cave, Big Bend National Park, Texas. Following the emergence, surface area estimates were made the next morning for comparison. The objectives of our study directly addressed two of the goals of the North American Bat Conservation Plan and the Texas Parks and Wildlife Bat Action Plan for establishing baseline population and trends: 1) to develop and evaluate new population monitoring techniques and 2) establish and monitor bat numbers." (from report Background)

Bibkey ID	Author	Year	Title	File attached
642119	Wallace, Robert, Walsh, Elizabeth, Arroyo, M., Starkweather, Peter	2005	Life on the edge: Rotifers from springs and ephemeral waters in the Chihuahuan Desert, Big Bend National Park (Texas, USA)	Yes(Secure)

Here we describe an on-going study of the rotifers inhabiting a sampling of springs (seeps), streams, ponds, tanks (diked ephemeral streams), and huecos and tinajas (small and large rock pools) of Big Bend National Park, a 3.23 • 105 ha region of the northern Chihuahuan Desert located in southwestern Texas (USA). We collected samples from planktonic, littoral, and benthic habitats comprising 92 sites representing 23 different aquatic systems. We documented 19 rotifer families (17 monogonont; 2 bdelloid) comprising 32 genera and 94 taxa. Of these, 70 were identified to species; 24 taxa (14 monogononts and 10 bdelloids) remain unidentified; several may be new to science. Redundancy Analysis revealed significant associations between environmental parameters and species distributions among water sources. Highest species richness was found in more permanent habitats such as ponds and stream fed springs while species associated with rock pools grouped with high conductivity and temperature.

642177	Hart, Charles, White, Larry, McDonald, Alyson, Sheng, Zhuping	2004	Saltcedar control and water salvage on the Pecos river, Texas, 1999–2003; Journal of Environmental Management	Yes(Secure)
--------	---	------	---	-------------

A large scale ecosystem restoration program was initiated in 1997 on the Pecos River in Western Texas. Saltcedar (*Tamarix* spp.), a nonnative invasive tree, had created a near monoculture along the banks of the river by replacing most native vegetation. Local irrigation districts, private landowners, federal and state agencies, and private industry worked together to formulate and implement a restoration plan, with a goal of reducing the effects of saltcedar and restoring the native ecosystem of the river. An initial management phase utilizing state-of-the-art aerial application of herbicide began in 1999 and continued through 2003. Initial mortality of saltcedar averaged about 85–90%. Monitoring efforts were initiated at the onset of the project to include evaluating the effects of saltcedar control on salinity of the river water, efficiency of water delivery down the river as an irrigation water source, and estimates of water salvage. To date, no effect on salinity can be measured and irrigation delivery was suspended in 2002–2003 due to drought conditions. Water salvage estimates show a significant reduction in system water loss after saltcedar treatment. However, a flow increase in the river is not yet evident. Monitoring efforts will continue in subsequent years. (copy from report)

642191	Miyamoto, S., Yuan, Fasong, Anand, Shilpa	2006	Influence of tributaries on salinity of Amistad International Reservoir	Yes(Public)
--------	---	------	---	-------------

"Amistad International Reservoir is located at the Texas–Mexico border, and is fed by four main tributaries: the middle Rio Grande (MRG), the Pecos, the Devil's, and the Rio Conchos from Mexico (Fig. 1). This reservoir is among the largest reservoirs in the western US, and it was built to hold 6.7 billion m³ (5.5 million acre-ft.) of water. The structure was completed in 1968, and the Reservoir was filled near its capacity by 1972 (Fig. 2b). The storage declined to 3.1 billion m³ by 1985, backed up to over 4.0 billion m³ for much of 1986 through 1992, then depleted to as low as 1.5 billion m³ during the last decade, following the drought which started in 1994. Salinity of the Rio Grande at Amistad prior to reservoir construction averaged 560 mg L⁻¹ (Fig. 2a). Starting in 1975, salinity reached 700 mg L⁻¹, and remained at that level through 1983. This was followed by a steep increase in salinity which peaked in 1988, and again in 1996. Salinity of the outflow increased to 945 mg L⁻¹ during 1988, and during February of that year, it reached the federal secondary drinking water standard of 1,000 mg L⁻¹. There is a concern that salinity may exceed the limit with a greater frequency in the future. This problem of salinity increase at Amistad was noted a decade ago (Miyamoto et. al., 1995). This study was conducted to identify the influence of tributaries on salinity fluctuation at Amistad Reservoir. This type of assessment may be useful for developing salinity control and water management strategies. The data shown in Fig. 2 indicate that the first salinity peak appeared during the high storage period under a seemingly normal inflow situation; and this will be the focus of this study. The second peak appeared in 1996 during a low flow and low storage period. In this instance, the increase in salinity is certainly drought-related." (from Report Introduction)

642651	Poulos, Helen	2007	Top down and bottom up influences on fire regimes, diversity, vegetation patterns in the Chihuahuan Desert borderlands	Yes(Secure)
--------	---------------	------	--	-------------

"Understanding the underlying spatio-temporal mechanisms responsible for species distribution patterns across landscapes is a fundamental challenge in ecology. Species organization patterns are the product of species' responses to fluctuations in environmental conditions, and community structure is considered a product not only of local physical conditions and interactions among species, but also of historical processes including disturbance and climatic variability. This dissertation emphasized the importance of abiotic environmental heterogeneity across landscapes in shaping tree dominance and diversity patterns. The four major findings of this study were that; 1) topographic variability across the landscapes of the Chihuahuan Desert Borderlands was responsible for the differentiation of tree species in accord with their ecophysiological tolerances and competitive abilities; 2) the distribution of fuels was similarly influenced by physiographic heterogeneity across the landscapes of the three study sites; 3) historical fire regimes, climatic influences on fire regimes, and recent human activities have played major roles in shaping forest structure and function in these landscapes; and 4) the integration of field-based forest inventory data, topographic information, and remotely sensed imagery was an effective technique for producing high quality and spatially explicit fuels and vegetation maps for natural resources management. Elevation, solar radiation, soil moisture, and topographic position were the major influences on tree dominance, diversity, and fuel distribution patterns. Fire and climatic variability also played major roles in shaping contemporary forest stand structure. Frequent, low intensity fires were common features of the landscape historically. Climate affected fire frequency and extent, and extreme climatic anomalies contributed to regionally synchronous fire events. Recent changes in fire regimes in response to fire exclusion and fire suppression have resulted in dramatic changes in forest stand structure and fuel bed characteristics in the Chihuahuan Desert Borderlands, signaling the need for the reintroduction of the ecological process of fire to these forest. Information from this study about the topographic influences on forest structure, the range of historical natural variability of fire, climate, and vegetation in the Chihuahuan Desert Borderlands have the potential to assist managers in developing management strategies for maintaining sustainable vegetation patterns and stand structures that closely mimic natural conditions." (from dissertation Abstract)

Bibkey ID	Author	Year	Title	File attached
646797	Milholland, Matthew, Simpson, Thomas, Manning, Richard, Skiles, J.	No Date	Habitat use and food habits of nutria (Myocastor coypus) in the Rio Grande Village area of Big Bend National Park, Texas	Yes(Secure)

"Nutria are large, semi-aquatic rodents introduced into the United States from South America as a fur resource during the early 1900s. The feeding activities of this invasive exotic species is destructive to wetland habitats and competitive with native species. Nutria first were reported at Rio Grande Village (RGV), Big Bend National Park, in 1993. They inhabit the Rio Grande River and adjacent wetlands including the Rio Grande Village Beaver Pond, which sustains a population of the endangered Big Bend gambusia (*Gambusia gaigei*) and the endangered Mexican beaver (*Castor canadensis mexicanus*). The National Park Service (NPS) is concerned that nutria and their associated activities may negatively impact these wetland habitats and endangered species. We surveyed the Rio Grande River from Gravel Pit, near Hot Springs, to the mouth of Boquillas Canyon, including the Beaver Pond and Daniel's Ranch within RGV for nutria activity sites and possible food sources. We documented and recorded approximately 30 locations of nutria activity along the Rio Grande River. We captured, marked, and released 24 nutria. Using the Schnabel and Chapman methods, we estimated that 38-74 nutria inhabit the RGV area. We collected stomach contents from 14 nutria for food habit analysis. To identify and quantify the plant species in the stomach contents, we made reference slides of resident plant taxa for microhistological comparison of plant epidermal tissue and stomach contents. Stomach contents contained common cane (*Phragmites australis*) (59.86%), water pennywort (*Hydrocotyle umbellata*) (12.71%), giant reed (*Arundo donax*) (6.3%), spikerush (*Eleocharis caribaea*) (6.14%), bermudagrass (*Cynodon dactylon*) (4.79%), water hyssop (*Bacopa monnieri*) (2.0%), foxtail (*Alopecurus* sp.) (0.93%), and flatsedge (*Cyperus* sp.) (0.71%), with 6.43% containing unidentifiable fragments. The Beaver Pond vegetation was composed primarily of *Arundo* and *Phragmites*. The United States side of the Rio Grande River was composed of high densities of *Arundo*." (from report Abstract)

649237	Davey, C, Redmond, K, Simeral, D	2007	Weather and climate inventory, National Park Service, Chihuahuan Desert Network.; Natural Resource Technical Report	Yes(Public)
--------	----------------------------------	------	---	-------------

"Climate change is an issue of much concern for the CHDN. Of all the possible effects of future climate changes across the CHDN, global warming in particular is viewed as a likely future threat to the integrity of park ecosystems. Such changes may affect vegetation at the individual, population, or community level and precipitate changes in ecosystem function and structure, with corresponding management concerns. Because of its influence on the ecology of CHDN park units and the surrounding areas, climate was identified as a high-priority vital sign for CHDN and is one of the 12 basic inventories to be completed for all National Park Service (NPS) Inventory and Monitoring Program (I&M) networks. This project was initiated to inventory past and present climate monitoring efforts in the CHDN. In this report, we provide the following information: Overview of broad-scale climatic factors and zones important to CHDN park units. Inventory of weather and climate station locations in and near CHDN park units relevant to the NPS I&M Program. Results of an inventory of metadata on each weather station, including affiliations for weather-monitoring networks, types of measurements recorded at these stations, and information about the actual measurements (length of record, etc.). Initial evaluation of the adequacy of coverage for existing weather stations and recommendations for improvements in monitoring weather and climate." (from report Executive Summary)

649305	Bean, Megan, Skerikova, Andrea, Bonner, Timothy, Scholz, Tomas, Huffman, David	2007	First record of <i>Bothriocephalus acheilognathi</i> in the Rio Grande with comparative analysis of ITS2 and V4-18S rRNA gene sequences; Journal of Aquatic Animal Health	Yes(Secure)
--------	--	------	---	-------------

"*Bothriocephalus acheilognathi* is an introduced tapeworm in North America often reported as a serious ecological threat to native fishes. In this paper, we report the first record of *B. acheilognathi* in the Big Bend region of the Rio Grande in Texas (known as the Río Bravo del Norte in Mexico). Identification of *B. acheilognathi* was confirmed by morphologic and genetic techniques (sequences of ITS2 and V4-18S rRNA genes). Its prevalence was 27% and its intensity ranged from 1 to 5 individuals in a January 2006 collection of 115 red shiners *Cyprinella lutrensis*. In addition, it was found in the Tamaulipas shiner *Notropis braytoni*, a Rio Grande endemic and a new host record. The occurrence of *B. acheilognathi* might have negative ecological impacts on endemic fishes in the Rio Grande. Several of the fishes that could serve as definitive hosts are of conservation concern. Its occurrence also might affect the success of reintroducing the Rio Grande silvery minnow *Hybognathus amarus*, which is federally listed as endangered, in this portion of the Rio Grande." (from report abstract)

649314	Donlan, C., Berger, Joel, Bock, Carl, Bock, Jane, Burney, David, Estes, James, Foreman, Dave, Martin, Paul, Roemer, Gary, Smith, Felisa, Soule, Michael, Greene, Harry	2006	Pleistocene rewilding: an optimistic agenda for twenty-first century conservation; The American Naturalist	Yes(Secure)
--------	--	------	--	-------------

"Large vertebrates are strong interactors in food webs, yet they were lost from most ecosystems after the dispersal of modern humans from Africa and Eurasia. We call for restoration of missing ecological functions and evolutionary potential of lost North American megafauna using extant conspecifics and related taxa. We refer to this restoration as Pleistocene rewilding; it is conceived as carefully managed ecosystem manipulations whereby costs and benefits are objectively addressed on a case-by-case and locality-by-locality basis. Pleistocene rewilding would deliberately promote large, long-lived species over pest and weed assemblages, facilitate the persistence and ecological effectiveness of megafauna on a global scale, and broaden the underlying premise of conservation from managing extinction to encompass restoring ecological and evolutionary processes. Pleistocene rewilding can begin immediately with species such as Bolson tortoises and feral horses and continue through the coming decades with elephants and Holarctic lions. Our exemplar taxa would contribute biological, economic, and cultural benefits to North America. Owners of large tracts of private land in the central and western United States could be the first to implement this restoration. Risks of Pleistocene rewilding include the possibility of altered disease ecology and associated human health implications, as well as unexpected ecological and sociopolitical consequences of reintroductions. Establishment of programs to monitor suites of species interactions and their consequences for biodiversity and ecosystem health will be a significant challenge. Secure fencing would be a major economic cost, and social challenges will include acceptance of predation as an overriding natural process and the incorporation of pre-Columbian ecological frameworks into conservation strategies." (abstract from report)

Bibkey ID	Author	Year	Title	File attached
649322	Dayton, Gage	2005	Community assembly of xeric-adapted anurans at multiple spatial scales	Yes(Secure)
<i>The goal of this dissertation was to determine the distribution of anurans (frogs and toads) in the Big Bend region of the Chihuahuan Desert and to examine how abiotic and biotic factors shape the composition and structure of anuran communities at multiple spatial scales. The approach relied on extensive field surveys, laboratory and field experiments, and GIS modeling. Surveys were conducted in the summers of 1998-2004 in Big Bend National Park, Texas, Cañon de Santa Elena Protected Area, Mexico, and the Maderas del Carmen Protected Area, Mexico. Results were as follows: Big Bend National Park - Red-spotted Toads (Bufo punctatus), Western Green Toads (B. debilis), Texas Toads (B. speciosus), Narrow-mouthed Toads (Gastrophryne olivacea), Couch's Spadefoots (Scaphiopus couchii), Rio Grande Leopard Frogs (Rana berlandieri), Bullfrogs (Rana catesbeiana), Canyon Treefrogs (Hyla arenicolor), and Spotted Chirping Frogs (Syrrhophus guttillatus); Cañon de Santa Elena Protected Area - B. debilis, B. punctatus, B. speciosus, G. olivacea, S. couchii, R. berlandieri, R. catesbeiana, S. guttillatus and H. arenicolor; and Maderas del Carmen Protected Area - B. punctatus, B. debilis, B. speciosus, G. olivacea, S. couchii, R. berlandieri, and H. arenicolor.</i>				
649328	Camp, Ann, Poulos, Helen, Gatewood, Richard, Sirotnak, Joe, Karges, John	2006	Assessing of top down and bottom up controls on fire regimes and vegetation abundance and distribution patterns in the Chihuahuan Desert borderlands: a hierarchical approach.	Yes(Public)
<i>"The goal of this report is to quantify historical fire regimes, climate forcing of fire events, plant population dynamics, and fuel abundance and distribution patterns in the Chihuahuan Desert Borderlands. The results provide information about recent exclusion (grazing) and direct fire suppression. This study area straddled the US-Mexico border, and included Big Bend National Park (BIBE), and the Davis Mountain Preserves of the Nature Conservancy (DMTNC) in Texas, and the Maderas del Carmen Protected Area (MCPA) in Coahuila, Mexico (Fig. 1). These preserves were chosen for this study because they comprise a regional-scale representation of the variation in fire regime characteristics and forest vegetation types in a region where no fire or forest inventory data existed. Furthermore, they represented understudied pinyon-juniper and pine-oak vegetation assemblages in southwester North America. Data from this study provide critically needed reference conditions and targets for ecological restoration to lower the risk of future high intensity fire" (from General Summary).</i>				
649330	Leavitt, Daniel, Mueller, James, Ritzi, Christopher	2007	Phrynosoma cornutum (Texas Horned Lizard) winter activity; Herpetological Review	Yes(Secure)
<i>This article notes hibernation patterns among three Phrynosoma cornutum (Texas Horned Lizard). One female P. cornutum moved hibernation locus once mid-winter, perhaps due to low temperatures. This is the first record of movement among the Texas Horned Lizard during hibernation. Given new tracking methods, future observations may indicate movement for reasons other than climatic.</i>				
649332	Leavitt, Daniel	2007	Reassessing a lizard survey in Big Bend National Park, Brewster County, Texas	Yes(Secure)
<i>"Long-term surveys of species density and community composition are essential to understanding and interpreting ecological changes. The goal of this research was to reinvestigate a lizard survey conducted in Big Bend National Park, Brewster County, Texas, from 1955 through 1960 and from 1968 through 1969. The original study quadrats and methods established by Degenhardt (1960), lizard/acre index, percent vegetative cover, and plant species composition for 2005 and 2006 were compared to previous survey years. Laboratory methods were used to investigate dietary overlap of the two most dominant lizards (Aspiloscelis marmorata and A. septemvittata) found in the quadrats to assess competition between the two species. New methods were introduced for assessing abundance of termites (Isoptera) and recording species specific vegetative cover. Lizard/acre numbers were compared to rainfall totals for all years of study using both pre-existing and newly acquired data. Gross vegetation compositions were compared using before and after photograph sets, cover percentages, species lists and published quadrat descriptions. Results suggest an overall vegetative increase from quadrat to quadrat. Moreover, certain plant species have changed in their overall abundance. Of these it is important to note that Eragrostis lehmanniana is becoming a dominant grass in the Green Gulch 2 and Tornillo Flat quadrats. Jatropha dioica, Rhus trilobata, Florensia cernua, Atriplex canescens, Celtis palida and Glandularia wrightii have either disappeared from all or some quadrats where they were previously recorded. A rapid increase in Gymnosperma glutinosum, covering nearly 20% of the Burnham Flat quadrat, was also observed in 2005, the following year none of this species was recorded on this quadrat. These data suggest that the notable increase in vegetation density in all quadrats has apparently caused a shift in lizard diversity. High vegetation densities (primarily shrub density) on the Green Gulch 1 quadrat appears to have excluded A. marmorata and replaced it with A. septemvittata, which were previously found at this elevation. Increased vegetation density is also the likely reason for the continued disappearance of Cophosaurus texanus from all quadrats where it was either the most common or second most common lizard found in the 1950s." (From thesis abstract)</i>				
649352	Troy, Jeff	2007	Black-capped vireo survey, Big Bend National Park, Brewster county, Texas, May 2007	Yes(Secure)
<i>This unpublished report contains results of the annual survey of endangered Black-capped vireos in Big Bend National Park. The investigator and author detected between 25 and 27 adult Black-capped vireos during this 2007 survey.</i>				
649381	Yancey, Franklin, Manning, Richard, Jones, Clyde	2006	Mammals of the Harte Ranch area of Big Bend National Park, Brewster County, Texas; Museum of Texas Tech University Occasional Papers	Yes(Secure)

Bibkey ID	Author	Year	Title	File attached
-----------	--------	------	-------	---------------

"A three-year study (1990-1992) on the mammals of the Harte Ranch area of Big Bend National Park was conducted. Forty-two species of mammals were documented to occur in this area. Descriptive accounts are presented for each species, which include comments regarding distribution, relative abundance, habitat preference, and reproductive biology. The mammalian diversity of the Harte Ranch area in comparison to other areas in the region is discussed." (from report Abstract)

650565	Bailey, L., Jackson, J., Ferguson, A., Forstner, M., Dixon, J.	2005	Geographic distribution. Brewster County, Texas. Pseudemys gorzugi; Herpetological review	Yes(Secure)
--------	--	------	---	-------------

This note documents the capture of *Pseudemys gorzugi* in the Beaver pond at Big Bend National Park. Photographic voucher, and DNA samples were retained. Animals were marked and released. Researchers trapped the same areas extensively in 1998-1999, no *Pseudemys gorzugi* suggested this area as a potentially new northwestern expansion for the species, potentially associated with low water in the lower canyons during 2003 summer, etc.

650779	Yancey, Franklin, Jones, Clyde	2006	Changes in distributions of bats in Texas; Occasional Papers, Museum of Texas Tech University	Yes(Secure)
--------	--------------------------------	------	---	-------------

"Recent changes in geographic distributions of bats in Texas is discussed. Relationships between distributions and changing land-use practices, changes in climate, and global warming are presented also." (from report Abstract)

650797	Big Bend National Park	1996	The vascular flora of Big Bend National Park, Texas	Yes(Public)
--------	------------------------	------	---	-------------

The Big Bend National Park Vascular Plant Species list consists of over 1200 species. The creation of this extensive list can be attributed to the work of many botanists from pre-park days to the present. Although an excellent working list, periodic editing and updating is necessary to stay current with new information. Many taxonomic groups lack clarity such as in the Cactaceae. The list is based upon Correll and Johnston (1979). More information concerning each taxon is available in a Microsoft Access 2.0 data base including vegetation community, life form, deposition in regional herbaria, location data, and abundance. Listed below is a key to symbols used in the data base.

650857	Bryan, Kelly, Lockwood, Mark	2000	Gray vireo in Texas; Texas Birds	Yes(Secure)
--------	------------------------------	------	----------------------------------	-------------

"The Gray Vireo (*Vireo vicinior*) is a relatively recent addition to the avifauna of Texas. Although the latest popular bird guides identify places for birders to find and observe this little-known species in western Texas, its exact range and habitat requirements have never been well understood. A rather nondescript vireo, plain gray but slightly darker above with indistinct wing bars and a narrow eye ring, it is best detected by its melodious songs." (From report abstract)

650859	Horvath, Eric, Karges, John	2000	First Texas record of May 3, 1999; Texas Birds	Yes(Secure)
--------	-----------------------------	------	--	-------------

A trip to the Davis Mountains proves to be a great place to observe various birds at varying elevations that are typical to this area. However, during this trip they observed a rarity for Texas and that was a Buff-breasted Flycatcher (*Empidonax fulvifrons*). The bird was initially observed on May 3, 1999 and were observed again in June 1999 where they had nested successfully.

650912	Big Bend National Park	2000	Mammal checklist: Big Bend National Park, Rio Grande Wild and Scenic River; Revised, August 2000	Yes(Secure)
--------	------------------------	------	--	-------------

Revised checklist of mammals that occur within the boundaries of Big Bend National Park. Gives park status, abundance, and status information.

651550	Clark, William	2005	Biodiversity of desert ants (Hymenoptera: Formicidae) at Big Bend National Park, Brewster County, Texas, A preliminary assessment; Journal of the Idaho Academy of Science	Yes(Secure)
--------	----------------	------	--	-------------

The desert ants (Hymenoptera: Formicidae) of Big Bend National Park, Brewster County, Texas are not well known. The objectives of this research are to document the ant species present in the desert and note ecological relations (copied from database abstract).

652130	Young, Kendal, Schrader, T., Boykin, Kenneth, Caldwell, Colleen, Roemer, Gary	2007	Early detection of invasive species in Big Bend National Park: Remote sensing and GIS strategies	Yes(Public)
--------	---	------	--	-------------

Researchers evaluated the efficacy of using remotely sensed and GIS data as tools to support early detection of invasive plants in Big Bend National Park (BIBE). Four objectives for this study are to: 1) identify a subset of invasive plant species that occur within BIBE that may be useful for landscape scale modeling, 2) create spatially explicit models of predicted distributions of targeted species using remotely sensed and GIS data, 3) conduct a risk assessment of areas for invasive plant incursion, and 4) conduct computer simulations of common field sampling designs to evaluate efficient ground survey methods to detect invasive species in BIBE. Eight invasive plant species were chosen for predictive modeling: giant reed (*Arundo donax*), Bermuda grass (*Cynodon dactylon*), Lehmann's lovegrass (*Eragrostis lehmanniana*), horehound (*Marrubium vulgare*), buffelgrass (*Pennisetum ciliare*), Russian thistle (*Salsola kali*), Johnson grass (*Sorghum halepense*), and saltcedar (*Tamarix* sp.).

Bibkey ID	Author	Year	Title	File attached
653870	Walsh, E., Schroder, T., Arroyo, M., Wallace, R.	2007	How well do single samples reflect rotifer species diversity? A test based on interannual variation of rotifer communities in Big Bend National Park (Texas, USA); Hydrobiologia	Yes(Secure)
<i>Researchers examined interannual variation of rotifer species richness and monogonont community structure in Big Bend National Park from 2001-2005. The study area consisted of ten aquatic systems comprising four habitat types - springs, rock pools (tinajas), former cattle tanks, and artificial ponds. Results indicate that rotifer community composition fluctuates greatly over time, and that rotifer community structure may be readily changing more than is generally believed.</i>				
653926	Hartley, Christopher, Andrews, Fred, McHugh, Joseph	2007	A taxonomic revision of the Genus Akalyptoischion Andrews (Coleoptera: Latridiidae); The Coleopterists Society Monographs: Patricia Vaurie Series	Yes(Secure)
<i>A new beetle (Akalyptoischion texas) found in Big Bend National Park is described.</i>				