**FINAL PROJECT REPORT**

**Colorado Plateau Cooperative Ecosystem Studies Unit**

**(Cooperative Agreement # H1200-004-0002)**

**Park:** Canyon de Chelly National Monument, George Washington Birthplace National Monument

**Project Title:** Developing an All Taxa Biodiversity Inventory (ATBI) program for Canyon de Chelly National Monument project continuation and consult with George Washington Birthplace National Monument

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**Abstract:** In this project we extended the initial ATBI work conducted at CACH in three ways. First, we incorporated CACH specimens with other NAU curated NPS specimens and created a NPS section of the NAU arthropod collection separate from the general collection. Second, we coordinated creation of a database by digitizing data from existing specimens that were housed in regional museums participating in the CP-ATBI program. Third, we initiated an ATBI program at the George Washington Birthplace National Monument that included educational and research activities that were most relevant to the mission and goals of the Monument.

**Incorporating CACH collection within a NAU NPS collection**

We incorporated the 5,000 specimens collected from various surveys conducted at CACH into a larger NPS collection within the Colorado Plateau Museum of Arthropod Biodiversity at Northern Arizona University. Specimens from each of the 12 NPS units are organized by taxonomic order and family but they are color-coded for easy identification in case specimens from an individual NPS unit needs to be separated. The NPS collection occupies 20 twelve-drawer cabinets.

**Greating Regional Database from Legacy Data**

We coordinated the cataloging of over 27,000 specimen/taxa records from 19 National Parks and Monuments within the Colorado Plateau region. All specimens are housed at Colorado State University (CSU), Denver Museum of Nature & Science (DMNS) University of New Mexico (UNM), and/or Northern Arizona University (NAU). These data are tabulated for each park by the level of identification and summarized by holdings for each institution (**Table 1)**. Forty-one percent of the taxa are identified to species, 21% to genus, 31% to family and less than 8% are only identified to order or above. All of the data from CSU and DMNS are from general collection records retrieved from specimen labels as are the data from UNM and NAU except records from GRCA, GLCA, and MEVE, which are from research projects. Research related records in this report do not reflect all the locations and dates collected. We will have well over 100,000 records after incorporating all the data from research projects. We are developing a master list of all localities and dates to include all the research-related records. Currently, 6,270 records have latitude-longitude records and can be entered into ArcGIS. The ultimate goal is to have all specimens identified to species and have latitude-longitude records so that we can create species-level occurrence maps. These can be used for creating species distributions maps for species, which in turn can be used for species or biodiversity modeling and identifying areas for future surveys.

**Table 1**. Numbers of specimens or taxa records that have been recorded for 19 NPS units within the Colorado Plateau region. Table is organized to show the number of specimens curated within each institution (Bold) and for each National Park Service unit (NPS Code). This table also shows the level of identification of the specimens within these collections. The term >Order represents specimens that have not been identified to any significant level.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NPS Code | >Order | Order | Family | Genus | Species | **CSU** | **UNM** | **NAU** | **DMNS** | Sum |
| ARCH | 0 | 0 | 1 | 2 | 15 | 18 | 0 | 0 | 0 | 18 |
| BAND | 0 | 0 | 1 | 28 | 254 | 7 | 276 | 0 | 0 | 283 |
| BRCA | 0 | 0 | 0 | 3 | 66 | 69 | 0 | 0 | 0 | 69 |
| CACH | 0 | 775 | 3611 | 219 | 401 | 0 | 0 | 5006 | 0 | 5006 |
| CANY | 17 | 1152 | 570 | 241 | 478 | 488 | 0 | 1970 | 0 | 2458 |
| CARE | 0 | 0 | 49 | 27 | 415 | 491 | 0 | 0 | 0 | 491 |
| COLM | 0 | 0 | 37 | 260 | 1202 | 1489 | 0 | 0 | 10 | 1499 |
| DINO | 24 | 57 | 276 | 603 | 1611 | 2507 | 0 | 0 | 64 | 2571 |
| FLFO | 0 | 0 | 0 | 0 | 49 | 0 | 0 | 0 | 49 | 49 |
| GLCA | 0 | 6 | 34 | 56 | 87 | 11 | 0 | 172 | 0 | 183 |
| GRCA | 0 | 5 | 417 | 341 | 735 | 7 | 362 | 1129 | 0 | 1498 |
| GRSA | 0 | 0 | 3 | 17 | 267 | 196 | 0 | 0 | 91 | 287 |
| MEVE | 0 | 195 | 710 | 841 | 3481 | 4617 | 0 | 355 | 255 | 5227 |
| YUHO | 0 | 330 | 72 | 306 | 1189 | 1896 | 0 | 0 | 1 | 1897 |
| PETR | 0 | 0 | 0 | 15 | 100 | 0 | 115 | 0 | 0 | 115 |
| ELMA | 0 | 0 | 0 | 91 | 268 | 0 | 359 | 0 | 0 | 359 |
| MOWE | 0 | 0 | 365 | 112 | 143 | 0 | 0 | 620 | 0 | 620 |
| MOCA | 0 | 0 | 587 | 248 | 182 | 0 | 0 | 1017 | 0 | 1017 |
| ZION | 20 | 876 | 1684 | 686 | 527 | 0 | 0 | 3793 | 0 | 3793 |
| **CSU** | 24 | 511 | 1048 | 2143 | 8076 |  |  |  |  | 11802 |
| **UNM** | 0 | 0 | 0 | 249 | 875 |  |  |  |  | 1124 |
| **NAU** | 37 | 2885 | 7387 | 1715 | 2065 |  |  |  |  | 14089 |
| **DMNS** | 0 | 0 | 0 | 1 | 469 |  |  |  |  | 470 |

**Establishing an ATBI program at George Washington Birthplace National Monument.**

The primary goal for this part of the project was to extend the biodiversity discovery theme advanced by the National Park Service and integrate science and education in the development of a biological diversity program in cultural parks. A number of national parks across the country have initiated biodiversity discovery programs following the initial ATBI model from the Great Smokies National Park. Although George Washington Birthplace National Monument (GEWA) is a cultural park it offers a unique mixture of habitats, including: estuarine, sandy seashore, pine forest, deciduous forest, open fields and marshlands. The GEWA All Taxa Biodiversity Inventory program was initiated in large measure to demonstrate that cultural parks have important biological resources worth preserving and documenting those resources does not compromise the management of cultural resources but provides added value to cultural parks. Cultural parks will become increasingly important as biodiversity reserves as land-use change development continues around national monuments and climate change presents additional challenges to ecosystem integrity. The GEW ATBI program was also inspired by George Washington, who as a boy surveyed individual trees and thus was one of our country’s earliest biogeographers.

The GEWA program equally emphasizes both research and education goals. The research includes biological inventories, digitizing legacy data, and identifying important taxa and habitats. Education goals focus on involving non-scientists in BioBlitzes, providing natural history shows that emphasize biodiversity conservation. Both research and education programs involve students, nature groups, and park visitors.

**Goals**

There are two major goals for the implementation of an ATBI (All Taxa Biodiversity Inventory) program at George Washington Birthplace National Monument. Below each of the stated goals below we provide a summary of our activities meant to address the project goals.

1. **Increase the number of known species that occur within the park by ten-fold by the Centennial Anniversary in 2016. Design and implement ATBI inventory. Create a permanent biodiversity collection.**

We identified and mapped all the major habitat types and provided lists of the known vascular plants and vertebrates collected or observed at GEWA <http://www.mpcer.nau.edu/gewa/the_inventory.html> . We collected 1839 specimens in the 2009 survey. Through separate funding GEWA has obtained a 24-drawer cabinet capable of housing over 10,000 specimens. To date we have prepared and identified to at least the taxonomic level of order 1839 specimens (**Table 2**)

**Table 2**. Number of specimens in different invertebrate orders collected from GEWA and part of the permanent reference collection (collected during 2009 survey).

|  |  |
| --- | --- |
| **ORDER** | # Specimens |
| Diplopoda | 6 |
| Chilipoda | 7 |
| Aranae | 99 |
| Acari | 13 |
| Opiliones | 13 |
| Collembola | 3 |
| Diplura | 4 |
| Protura | 1 |
| Odonata | 19 |
| Ephemeroptera | 7 |
| Thysanura | 2 |
| Microcoryphia | 3 |
| Orthoptera | 81 |
| Mantodea | 14 |
| Blattodea | 15 |
| Phasmatodea | 4 |
| Dermaptera | 16 |
| Isoptera | 23 |
| Zoraptera | 2 |
| Thysanoptera | 15 |
| Hemiptera | 213 |
| Neuroptera | 46 |
| Coleoptera | 396 |
| Hymenoptera | 233 |
| Lepidoptera | 234 |
| Phthiraptera |  |
| Siphonaptera | 2 |
| Diptera | 298 |
|  |  |
| Isopoda | 14 |
| Amphipoda | 12 |
| Decapoda | 12 |
|  |  |
| Pulmonata | 11 |
|  |  |
| Oligochaeta | 7 |
| Polycheata | 14 |
| **Total** | **1839** |

1. **Integrate and involve regional schools in ATBI research and education, develop network of scientists, agencies, and educators and draft plan for a GEWA-based biodiversity program.**

We have included schools in education programs and have collaborated with Art Evans (Smithsonian and Virginia Natural History Museum) in both Bioblitzes and help with insect identifications. Rijk Morawe has solicited the involvement of the regional amateur naturalists in both educational and research activities. We are still working towards formally involving regional k-12 schools and researchers who can extend the GEWA ATBI program beyond the timeline of the project. We offered a number of educational activities in 2009 involving 157 participants that included general; these activities are listed in **Table 3** below. We also established a live invertebrate collection (**Table 4**), consisting of larger invertebrates that could be used for biodiversity presentations at GEWA. At the request of the park we did not include any non-native species that did not occur within the ecosystems represented at GEWA. We have established a website for the GEWA biodiversity program <http://www.mpcer.nau.edu/gewa> and at the conclusion of our work at GEWA after the summer of 2011 we will finalize the website, including all data collected and educational materials.

**Table 3.** Educational activities and the number of participants

|  |  |  |
| --- | --- | --- |
| **Event** | **Date** | **# of Participants** |
| Family Friday | 5/29/2009 | 6 |
| Birding Workshop | 5/30/2009 | 2 |
| Saturday Bug Show | 5/30/2009 | 6 |
| Family Friday | 6/5/2009 | rain cancellation |
| Seashore Workshop | 6/6/2009 | 5 |
| Seashore Workshop | 6/7/2009 | 2 |
| Saturday Bug Show | 6/6/2009 | 8 |
| Family Friday | 6/12/2009 | 13 |
| Saturday Bug Show | 6/13/2009 | 6 |
| Family Friday | 6/19/2009 | 17 |
| Saturday Bug Show | 6/20/2009 | 18 |
| NPS Staff Tour | 6/17/2009 | 20 |
| Family Friday | 6/20/2009 | 0 |
| Saturday Bug Show | 6/21/2009 | 15 |
| Family Friday | 7/10/2009 | 12 |
| Saturday Bug Show | 7/11/2009 | cancelled |
| Family Friday | 7/17/2009 | 4 |
| Saturday Bug Show | 7/18/2009 | 23 |
| TOTAL Participants |  | 157 |

**Table 4**. List of local invertebrate species used for educational presentations

|  |  |
| --- | --- |
| **Live Specimen Description** | **Count** |
| Leech | 1 |
| Crayfish | 3 |
| Large Wolf spider | 1 |
| Fishing Spider | 1 |
| Trap Door Spider | 1 |
| Large Milipede | 2 |
| Leaf Footed bugs | 2 |
| Carabids | 4 |
| Large Bess Beetle | 3 |