INVESTIGATOR'S ANNUAL REPORT

United States Department of the Interior

National Park Service

All or some of the information you provide may become available to the public.

OMB # (1024-0236)
Exp. Date (02/28/2014)
Form No. (10-226)

Reporting Year: 2015	**Park:** Big Thicket	**Select the type of permit this report addresses:** Scientific Study

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Study Title (maximum 300 characters):
CONTINUED BIOTIC SURVEY: AQUATIC TRUE BUGS (INSECTA: HETEROPTERA: NEPOMORPHA, GERROMORPHA, LEPTOPODOMORPHA) AND AQUATIC BEETLES (INSECTA: COLEOPTERA) OF BIG THICKET NATIONAL PRESERVE, TEXAS, U.S.A.

Park-assigned Sutdy or Activity #:	**Park-assigned Permit #:**	**Permit Start Date:**	**Permit Expiration Date:**
BITH-00120	BITH-2014-SCI-0012	Jul 21, 2014	Jul 20, 2015

Scientific Study Starting Date: May 23, 2014	**Estimated Scientific Study Ending Date:** Mar 31, 2015

For either a Scientific Study or a Science Education Activity, the status is:
Completed

For a Scientific Study that is completed, please check each of the following that applies:

_X_ A final report has been provided to the park or will be provided to the park within the next two years

_X_ Copies of field notes, data files, photos, or other study records, as agreed, have been provided to the park

_X_ All collected and retained specimens have been cataloged into the NPS catalog system and NPS has processed loan agreements as needed

Activity Type:
Inventory

Subject/Discipline:
Invertebrates (Insects, Other)

Purpose of Scientific Study or Science Education Activity during the reporting year (maximum 4000 characters):
Aquatic true bugs (Insecta: Heteroptera: Nepomorpha, Gerromorpha, Leptopodomorpha) constitute the most diverse assemblage of aquatic insects with incomplete metamorphosis (Schuh and Slater 1995). Numbering more than 4,800 species worldwide (Polhemus & Polhemus 2008), aquatic Heteroptera are a dominant component of freshwater ecosystems. Water bug distributions are incompletely known due to lack of exhaustive surveys and few active taxonomic specialists. At present, approximately 409 species of aquatic bugs are known from North America, representing 16 families and 69 genera (Henry and Froeschner 1988).
The most recent catalog (Henry and Froeschner 1988) lists 158 species for Texas, constituting 14 families and 40 genera. This diversity in Texas represents nearly 40% of the water bug fauna for North America. To date, no published checklist of water bugs exists for Texas, as well as Big Thicket National Preserve (BITH). Darville and Harrel (1980) included a list of four genera of aquatic and semiaquatic bugs (Nepomorpha & Gerromorpha) within a report on benthic diversity in Pine Island Bayou, BITH.
Aquatic beetles (Coleoptera) are represented by 30 families, constituting nearly 18,000 species worldwide (Jäch and Balke 2008). This group is a major component of freshwater ecosystems and occupies a variety of habitats including the shoreline and substrate, the

water column, and water surface. Aquatic beetles vary in size from 0.7-50 mm and due to habitat specialization, require focused collection methods for survey. These include light trapping in aquatic habitats, substrate and sieve sorting, shallow and deeper water dip net sampling, and submerged activity traps (2 liter bottle traps).
No complete catalog exists for worldwide or North American water beetle species, however, recent estimates by Jäch and Balke (2008) and a series of preliminary species checklists by family (e.g. Hansen 1998, 1999, Nilsson 2001, 2005) record ca. 1,419 species for North America. Based on literature records, the PI (Tinerella, unpublished data) estimates more than 700 species of water beetles recorded or possible for Texas; likely at least 50% of the known North American Fauna. Darville and Harrel (1980) included a list of six genera of water beetles within a report on benthic diversity in Pine Island Bayou, BITH. Realzola et al., (2007) recently treated species assemblages of the whirligig beetles (Gyrinidae) of Big Thicket.
The large size of Big Thicket National Preserve (BITH) (>97,000 acres), great diversity of aquatic habitats, and seasonality affecting these lentic and lotic habitats supports a complex, unrivaled diversity of water bugs and water beetles in North America. Several notable elements of the North American water bug and water beetle fauna converge in eastern and southern Texas, including southern, eastern, western, and Plains assemblages. Moreover, perhaps as much as 30% of this fauna is unique to eastern Texas, as some of the known taxa represent the northern-most distributions for these groups in North America. At present, these faunas are largely unknown and in recent years, critically needed biotic inventory in BITH has facilitated preliminary documentation of these dominant biota.
The continued research proposed here will focus on A) further biotic inventory of aquatic true bugs and aquatic beetles throughout all BITH units (seven counties); B) completing up-to-date species checklists of aquatic Heteroptera and aquatic Coleoptera in BITH (2009-present) from the PI's previous survey efforts and recent scientific literature; and C) completion of examination, description, and publishing of undescribed species of aquatic Heteroptera and aquatic Coleoptera collected from BITH.

Findings and status of Scientific Study (including collections made and catalog status of retained specimens and retained material originating from such specimens) or accomplishments of Science Education Activity during the reporting year (maximum 4000 characters):

Introduction

This report summarizes results of continued biotic surveys of aquatic true bugs (Insecta: Hemiptera: Heteroptera) conducted throughout Big Thicket National Preserve (BITH) during 5-12 August 2014. During the survey, one trip was made by the PI, sampling a total of 46 localities throughout all units of Big Thicket National Preserve (BITH) and localities adjacent to BITH in Orange and Tyler counties. Survey throughout Big Thicket National Preserve and adjacent lands included sampling at all BITH units, with accompaniment by Thicket of Diversity Director, Mona Halvorsen.

Methods

During this water bug and water beetle ATBI survey, standard entomological techniques were employed, including aquatic dip nets and aspirators, to collect aquatic true bugs and aquatic beetles. Specimens were collected from the shore and within aquatic habitats. All specimens collected were preserved in 80% ethanol in the field and brought back to the PI's laboratory for processing. Specimens were sorted by taxonomic group, pinned, pointed, or permanently preserved in ethanol (vials) utilizing standard entomological curatorial preparation techniques.
Geospatial coordinates were obtained at all localities with a hand-held GPS unit and coordinate data were associated with all specimens. Map datum was WGS84. Specimens were further sorted and identified to the lowest taxonomic level possible, utilizing published and unpublished taxonomic keys. Additional identifications were confirmed by examination of original species descriptions, comparison of museum specimens, and known biotic distributions.
All specimens are databased and have been deposited in the author's research collection and Sam Houston State University Insect Collection. All deposited material is incorporated into a relational database for tracking and data dissemination. All specimen data, geospatial coordinates, images, and related materials are included with this final report.

Results and Discussion

During this survey, a total of 750 specimens of aquatic true bugs (Heteroptera) and aquatic beetles (Coleoptera) was collected from Big Thicket National Preserve and adjacent areas. A total of 49 species of aquatic true bugs comprising 11 families and 23 genera were collected during this inventory and survey (Appendix 1) and a total of 58 species of aquatic beetles (Coleoptera) comprising 8 families and 22 genera were collected during this inventory and survey (Appendix 2). This checklist consists of 32 new state records, with probable additions as species identifications are resolved. Most of the species are previously unreported for BITH.

For Scientific Studies (not Science Education Activities), were any specimens collected and removed from the park but not destroyed during analysis?

Yes

Funding specifically used in this park this reporting year that was provided by NPS (enter dollar amount):	**Funding specifically used in this park this reporting year that was provided by all other sources (enter dollar amount):**
0	0

List any other U.S. Government Agencies supporting this study or activity and the funding each provided this reporting year:

For Scientific Studies (not Science Education Activities), were any specimens collected and removed from the park but not destroyed during analysis?

Yes

If "Yes", identify where the specimens currently are stored:

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