

**SCIENTIFIC RESEARCH AND
COLLECTING PERMIT**



Grants permission in accordance with the attached
general and special conditions

**United States Department of the Interior
National Park Service**

Big Bend

Study#: BIBE-00058

Permit#: BIBE-2016-SCI-0057

Start Date: Dec 05, 2016

Expiration Date: Oct 31, 2017

Coop Agreement#:

Optional Park Code:

Name of principal investigator:

Name: Dr Elizabeth Walsh

Phone: 915-747-5421

Email: ewalsh@utep.edu

Name of institution represented:

University of Texas - El Paso

Co-Investigators:

Name: Robert L. Wallace

Phone: (920) 748-8760

Email: WallaceR@Ripon.edu

Study Title:

Survey of the Rotifera occurring in springs and temporary water bodies within Big Bend National Park

Purpose of study:

The purpose of this study is to characterize rotifer assemblages found in springs and temporary aquatic habitats within Big Bend National Park as part of a survey of spring habitats in west Texas and Southern New Mexico. Rotifers collected will be identified to species and any new species found will be described. Rotifers collected may be used for DNA analysis as well.

Subject/Discipline:

Ecology (Aquatic, Marine, Terrestrial)

Locations authorized:

Various springs (Croton Springs, Mule Ear Springs, Grapevine Springs, etc), various tinajas and temporary pools

Transportation method to research site(s):

vehicles on park roads, otherwise by foot

Collection of the following specimens or materials, quantities, and any limitations on collecting:

Name of repository for specimens or sample materials if applicable:

Repository type: Permanently retained in National Park Service collection, maintained in one or more non-NPS repositories identified in attached Appendix A (complete and submit an Appendix A for each proposed repository) (University of Texas, El Paso)

Objects collected:

Specimens to be collected are Rotifera. Approximately 100-300 mls of water will be taken from various aquatic habitats (Croton Springs, Grapevine Springs, Mule Ear Springs, tinajas, temporary pools, for example). Samples will be stored on ice and transported to University of Texas at El Paso for identification. Representatives of all species will be preserved in 70 percent and placed in the invertebrates collection in the Laboratory for Environmental Biology at UTEP. All species will be photographed and videotape as well. Two collecting trip of 5 days each are anticipated.

Specific conditions or restrictions (also see attached conditions):

BIG BEND NATIONAL PARK
SCIENTIFIC RESEARCH AND COLLECTING PERMIT
GENERAL CONDITIONS

THIS PERMIT SERVES AS PARK ENTRANCE FEE WAIVER FOR RESEARCHERS WORKING ON APPROVED PROJECTS

1. Authority - The permittee is granted privileges covered under this permit subject to the supervision of the superintendent, and shall comply with all applicable laws and regulations of the National Park System area. A National Park Service (NPS) representative may accompany the permittee in the field to ensure compliance with regulations.

2. Responsibility - The permittee is responsible for ensuring that all persons working on the project while in the park adhere to permit conditions and applicable NPS regulations.

3.False information - The permittee is prohibited from giving false information that is used to issue this permit. To do so will be considered a breach of conditions and be grounds for revocation of this permit (36 CFR 2.32 (4)).

4.Assignment - This permit may not be transferred or assigned. While they are working in the park, field assistants are to be supervised by the person(s) named in the permit. The principal investigator shall notify the park's Research and Collecting Permit Office when adding or replacing members of the field crew.

5.Revocation - This permit may be terminated for breach of any condition or at the discretion of the superintendent.

6.Collection of specimens - No specimens may be collected unless authorized on the Scientific Research and Collecting permit.

The general conditions for specimen collections are:

- a. Collection of archeological materials without a valid Federal Archeology Permit is prohibited.
- b. Collection of endangered species without a valid U.S. Fish and Wildlife Service endangered species permit is prohibited.
- c. Collected specimens may be used for scientific or educational purposes only, and shall be dedicated to public benefit. Use of any specimens for commercial profit, including natural organisms, is prohibited. Use of components of collected organisms (including but not limited to enzymes, genetic materials, or seeds) for commercial purposes is prohibited without a separate agreement.
- d. Collection methods shall not attract attention or cause unapproved damage to the environment. Specimens must be kept out of view of the public while in the park.
- e. New specimens must be reported to the NPS annually. Minimum information for annual reporting includes specimen classification, number of specimens collected, location collected, specimen status (e.g., herbarium sheet, preserved in alcohol/formalin, tanned and mounted, dried and boxed, etc.), and current location.
- f. Collected specimens that are not consumed in analysis will remain federal property. The NPS reserves the right to designate the repositories of all specimens removed from the park and to approve or restrict reassignment of specimens from one repository to another. Specimens shall not be destroyed or discarded without prior NPS authorization.
- g. Each specimen (or groups of specimens labeled as a group) that is retained permanently must bear NPS labels and must be accessioned and cataloged in the National NPS Catalog. Unless exempted by additional park-specific stipulations, the permittee will complete the labels and catalog records and will provide accession information. It is the permittee's responsibility to contact the park for cataloging instructions and specimen labels as well as instructions on repository designation for the specimens.

7.Reports - The permittee is required to submit an Investigator's Annual Report and copies of final reports or published materials resulting from this permitted activity. Instructions explaining how and when to submit an annual report will be provided by NPS staff.

8.Methods of travel - Travel within the park is restricted to only those methods that are available to the general public unless otherwise specified in additional stipulations associated with this permit.

9.Other permits - The permittee must obtain all other required permit(s) to conduct the specified project. Copies of these additional NPS or other agency and state permits must be submitted to the Research and Collecting Permit Office before this permit is considered valid.

10.Insurance - If liability insurance is required by the NPS for this project, then documentation must be provided that it has been obtained and is current in all respects before this permit is considered valid.

11.Mechanized equipment - No use of mechanized equipment in designated, proposed, or potential wilderness is allowed unless authorized by the park in additional specific stipulations associated with this permit. Most backcountry areas greater than 1/4 mile from a road are in recommended or potential wilderness.

12.NPS participation - The permittee should not anticipate assistance from the NPS unless specific arrangements are made and documented in either an additional stipulation attached to this permit or in other separate written agreements.

13.Permanent markers and field equipment - No site markers or equipment will be left in the field after the permittee has left the park unless authorized in additional park specific stipulations attached to this permit.

14.Access to park and restricted areas - Approval for any activity is contingent on the park being open and staffed for required operations. No entry into restricted areas is allowed unless authorized in additional park specific stipulations attached to this permit.

15.Notification - The permittee is required to contact the Dispatch Office in Big Bend National Park Headquarter's Building) prior to initiating any fieldwork authorized by this permit.

16.Expiration date - Permits expire on the date listed. Nothing in this permit shall be construed as granting any exclusive research privileges or automatic right to continue, extend, or renew this or any other line of research under new permit(s).

17. Field Work - Disturbance from fieldwork should be minimized.

- a. Fieldwork is to be done out of sight of trails, roads and developed areas within the park, unless specifically authorized on the permit.
- b. Research activities should be done as unobtrusively and discreetly as possible. If a visitor should approach during fieldwork, cease collections until visitor is out of view or explain that you have a research activity permit and describe the project.
- c. Foot trails created as a result of field activities should be eliminated within sight of roads and trails. This may be done by raking the trail, or brushing across the trail with a branch or other object to obscure the path. If you have questions, please ask your contact at Science and Resource Management.

18. Backcountry Permits - Permittee is required to obtain permits for backcountry camping, river use and any other applicable permits in the same manner as other park visitors.

19. Other stipulations - This permit includes by reference all stipulations listed in the application materials or in additional attachments.

Recommended by park staff (name and title):

David H. Lamm

Reviewed by Collections Manager:

Yes No

Approved by park official:

Mary Ott Jones

Date Approved:

12/21/16

Title:

Superintendent

I Agree To All Conditions And Restrictions Of this Permit As Specified
(Not valid unless signed and dated by the principal investigator)

Elizabeth J. Walse

(Principal investigator's signature)

1/9/2017

(Date)

THIS PERMIT AND ATTACHED CONDITIONS AND RESTRICTIONS MUST BE CARRIED AT ALL TIMES WHILE CONDUCTING RESEARCH ACTIVITIES IN THE DESIGNATED PARK(S)

**Energy, Minerals and Natural Resources Department
 State Parks Division
 1220 S. St. Francis Dr.
 Santa Fe, NM 87505
 Telephone 505-476-3355**

Research Permit

Applicant name:	Elizabeth Walsh
Address:	Dept. Biological Sci, 500 W. University Ave, University of Texas at El Paso
City/state/zip code:	El Paso, TX 79968
Telephone number (include area code):	915-747-5421
Facsimile number (include area code):	915-747-5808
E-mail address:	ewalsh@utep.edu
Name of park:	Navajo Lake, Clayton Lake, Heron Lake, Sugarite Lakes – both lakes, Morphy Lake, Storrie Lake, Villanueva Lake, Santa Rosa Lake, Sumner Lake, Bottomless Lakes, Caballo Reservoir, Elephant Butte Reservoir, Ute Lake, Eagle Nest Lake, Conchas Lake
Date of the proposed activity:	July 2016 – June 2017
Detailed description of the proposed research activity (attach additional sheet(s) if needed):	Water and plankton samples will be taken. Plankton will be concentrated through a 64 um net into 250 ml samples. A 250 ml water sample will be collected for water chemistry analysis. At each sampling site the following information will be recorded: date and time of collection, general weather conditions, general sample information (planktonic, littoral, and benthic), GPS coordinates, elevation, water temperature, pH, conductivity, and dissolved oxygen. Water samples were also taken for nutrient determination (e.g., ammonia, nitrate, nitrite, phosphate, sulfate, and silica) and other parameters (e.g., alkalinity, hardness, chloride, turbidity). Depending on the size of the lake, 2-4 plankton samples will be taken. Small amounts of macrophytes (not including stems) may also be collected in 250 ml jars. Zooplankton will be identified in the laboratory and selected species, if present, will be used for DNA sequencing as part of a project funded by the National Science Foundation focused on determining phylogenetic relationships among rotifers. All samples will be taken from shoreline, no watercraft will be used. Any small fishes caught in the plankton net will be returned immediately to the lake. A report will be provided at the end of the study upon request.

Indemnification – Applicable to Non-Governmental Applicants Only

By signing below, Applicant certifies if the EMNRD State Parks Division grants a Research Permit to Applicant, Applicant shall defend, indemnify, and hold harmless EMNRD, the Division, and the State of New Mexico from all actions, proceedings, claims, demands, costs, damages, attorneys' fees, and all other liabilities and expenses of any kind from any source that may arise out of a Research Permit's performance that may arise from this Research Permit Application, caused by the negligent act or failure to act of the Applicant, its officers, employees, servants, subcontractors, or agents, or if caused by the actions of any client of the Applicant resulting in injury or damage to persons or property during the time when the Applicant or any officer, agent, employee, servant, or subcontractor thereof has or is performing services pursuant to the Research Permit. In the event that any action, suit, or proceeding related to the services performed by the Applicant or any officer, agent, employee, servant, or subcontractor under the Research Permit is brought against the Applicant, the Applicant shall, as soon as practicable but no later than two days after it receives notice thereof, notify EMNRD's legal counsel and the Risk Management Division of the New Mexico General Services Department by certified mail. Nothing in this section shall be deemed to be a waiver by the State of New Mexico of the provisions of the Tort Claims Act, NMSA 1978, §§ 41-4-1 *et seq.*

Compliance with Laws and Rules

By signing below, Applicant acknowledges Applicant shall abide by all applicable state and federal statutes and rules or regulations in connection with the permitted activity.

Insurance

Note: If required by the Resource Program for research activities, the Applicant shall also submit proof of insurance in an amount directed by the Resource Manager and which shall name the state, EMNRD, and the Division as additional co-insured.

Signed:

Elizabeth Walsh

Date: 7/5/16

Applicant's printed name and title: Elizabeth J. Walsh, Professor

**Energy, Minerals and Natural Resources Department
 State Parks Division
 1220 S. St. Francis Dr.
 Santa Fe, NM 87505
 Telephone 505-476-3355**

Research Permit

For Division use:		Year	Park #	Permit #
<input type="checkbox"/>	Permit is approved.	16	-	-
<input checked="" type="checkbox"/>	Permit is approved with the following conditions:			
<input checked="" type="checkbox"/>	Applicant shall provide Resource Program with report summarizing data or organisms collected as a part of the activity, by the end of the calendar year during which the activity was completed.			
<input checked="" type="checkbox"/>	Insurance is not required.			
<input type="checkbox"/>	The following park fees and their amounts are waived as follows: _____ _____			
<input type="checkbox"/>	The acquisition of comprehensive general liability insurance in which the State, EMNRD, and Division are named as co-insured, in an amount of \$ _____, sufficient to protect the State, EMNRD, and the Division.			
<input checked="" type="checkbox"/>	Other items as specified in the Research Permit Additional Terms and Conditions (as attached). (The permit may contain such conditions as are reasonably consistent with protection and use of the park for the purposes for which it is established or operated. It may also contain reasonable limitations on the equipment used and the time and area within which the special event is allowed.)			
<input type="checkbox"/>	The Park may charge fees to cover costs of additional staff, facilities, etc. needed for the research activities. The Division may enter into an agreement with the Permittee to have the Permittee pay a fee equal to the estimated fees, such as, but not limited to, day use fees, that individuals attending the special event would have paid in fees in lieu of such fees. Amount and type of additional fees required: \$ _____ _____ _____			

RESEARCH PERMIT ADDITIONAL TERMS AND CONDITIONS

This permit is approved under the following additional conditions:

1. You must contact the manager of the park property in advance so he/she knows the timing and purpose of your visit and can discuss any details. Phone numbers for all parks are available at www.nmparks.com.
2. Please carry a copy of the permit with you at all times when you are in the park performing your approved activity.
3. Permission for overnight stays on the property and waiver of any park fees are at the discretion of the park manager.

**Energy, Minerals and Natural Resources Department
 State Parks Division
 1220 S. St. Francis Dr.
 Santa Fe, NM 87505
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Research Permit

Applicant name:	Elizabeth Walsh
Address:	Dept. Biological Sci, 500 W. University Ave, University of Texas at El Paso
City/state/zip code:	El Paso, TX 79968
Telephone number (include area code):	915-747-5421
Facsimile number (include area code):	915-747-5808
E-mail address:	ewalsh@utep.edu
Name of park:	Navajo Lake, Clayton Lake, Heron Lake, Sugarite Lakes – both lakes, Morphy Lake, Storrie Lake, Villanueva Lake, Santa Rosa Lake, Sumner Lake, Bottomless Lakes, Caballo Reservoir, Elephant Butte Reservoir, Ute Lake, Eagle Nest Lake, Conchas Lake
Date of the proposed activity:	January 23– Dec 31 2017
Detailed description of the proposed research activity (attach additional sheet(s) if needed):	Water and plankton samples will be taken. Plankton will be concentrated through a 64 um net into 250 ml samples. A 250 ml water sample will be collected for water chemistry analysis. At each sampling site the following information will be recorded: date and time of collection, general weather conditions, general sample information (planktonic, littoral, and benthic), GPS coordinates, elevation, water temperature, pH, conductivity, and dissolved oxygen. Water samples were also taken for nutrient determination (e.g., ammonia, nitrate, nitrite, phosphate, sulfate, and silica) and other parameters (e.g., alkalinity, hardness, chloride, turbidity). Depending on the size of the lake, 2-4 plankton samples will be taken. Small amounts of macrophytes (not including stems) may also be collected in 250 ml jars. Zooplankton will be identified in the laboratory and selected species, if present, will be used for DNA sequencing as part of a project funded by the National Science Foundation focused on determining phylogenetic relationships among rotifers. All samples will be taken from shoreline, no watercraft will be used. Any small fishes caught in the plankton net will be returned immediately to the lake. A report will be provided at the end of the study upon request.

Indemnification – Applicable to Non-Governmental Applicants Only

By signing below, Applicant certifies if the EMNRD State Parks Division grants a Research Permit to Applicant, Applicant shall defend, indemnify, and hold harmless EMNRD, the Division, and the State of New Mexico from all actions, proceedings, claims, demands, costs, damages, attorneys' fees, and all other liabilities and expenses of any kind from any source that may arise out of a Research Permit's performance that may arise from this Research Permit Application, caused by the negligent act or failure to act of the Applicant, its officers, employees, servants, subcontractors, or agents, or if caused by the actions of any client of the Applicant resulting in injury or damage to persons or property during the time when the Applicant or any officer, agent, employee, servant, or subcontractor thereof has or is performing services pursuant to the Research Permit. In the event that any action, suit, or proceeding related to the services performed by the Applicant or any officer, agent, employee, servant, or subcontractor under the Research Permit is brought against the Applicant, the Applicant shall, as soon as practicable but no later than two days after it receives notice thereof, notify EMNRD's legal counsel and the Risk Management Division of the New Mexico General Services Department by certified mail. Nothing in this section shall be deemed to be a waiver by the State of New Mexico of the provisions of the Tort Claims Act, NMSA 1978, §§ 41-4-1 *et seq.*

Compliance with Laws and Rules

By signing below, Applicant acknowledges Applicant shall abide by all applicable state and federal statutes and rules or regulations in connection with the permitted activity.

Insurance

Note: If required by the Resource Program for research activities, the Applicant shall also submit proof of insurance in an amount directed by the Resource Manager and which shall name the state, EMNRD, and the Division as additional co-insured.

Signed:

Elizabeth Walsh

Date: 1/13/17

Applicant's printed name and title: Elizabeth J. Walsh, Professor

**Energy, Minerals and Natural Resources Department
 State Parks Division
 1220 S. St. Francis Dr.
 Santa Fe, NM 87505
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Research Permit

For Division use:	Year	Park #	Permit #
<input type="checkbox"/> Permit is approved.	17	—	—
<input checked="" type="checkbox"/> Permit is approved with the following conditions:			
<input checked="" type="checkbox"/>	Applicant shall provide Resource Program with report summarizing data or organisms collected as a part of the activity, by the end of the calendar year during which the activity was completed.		
<input checked="" type="checkbox"/>	Insurance is not required.		
<input type="checkbox"/>	The following park fees and their amounts are waived as follows: _____ _____		
<input type="checkbox"/>	The acquisition of comprehensive general liability insurance in which the State, EMNRD, and Division are named as co-insured, in an amount of \$ _____, sufficient to protect the State, EMNRD, and the Division.		
<input checked="" type="checkbox"/>	Other items as specified in the Research Permit Additional Terms and Conditions (as attached). (The permit may contain such conditions as are reasonably consistent with protection and use of the park for the purposes for which it is established or operated. It may also contain reasonable limitations on the equipment used and the time and area within which the special event is allowed.)		
<input type="checkbox"/>	<p>The Park may charge fees to cover costs of additional staff, facilities, etc. needed for the research activities. The Division may enter into an agreement with the Permittee to have the Permittee pay a fee equal to the estimated fees, such as, but not limited to, day use fees, that individuals attending the special event would have paid in fees in lieu of such fees.</p> <p>Amount and type of additional fees required: \$ _____ _____ _____</p>		

**Energy, Minerals and Natural Resources Department
 State Parks Division
 1220 S. St. Francis Dr.
 Santa Fe, NM 87505
 Telephone 505-476-3355**

Research Permit

Permit is denied for the reasons specified below. Check the applicable reason(s).

The Resource Program shall deny a Research Permit if such activities would:

Category		Explanation of Denial
<input type="checkbox"/>	cause undue injury or damage to park resources;	
<input type="checkbox"/>	be contrary to the purposes for which the park is established or operated, or unreasonably impair the purposes for which the park is established or operated;	
<input type="checkbox"/>	unreasonably interfere with interpretive, visitor service or other program activities, or with the Division's administrative activities;	
<input type="checkbox"/>	substantially impair the operation of the Division's public use facilities or services of concessionaires or contractors;	
<input type="checkbox"/>	present a danger to the public health and safety;	
<input type="checkbox"/>	result in significant conflict with other existing uses; or	
<input type="checkbox"/>	not comply with the laws or policies of the landowner (e.g. United States Department of the Interior, Bureau of Reclamation; New Mexico Department of Game and Fish; United States Army Corps of Engineers; New Mexico State Land Office; etc.).	

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT, STATE PARKS DIVISION

Signed: *David L. Certain* Date: 1/17/17

Printed name and title: *David L. Certain, Program Support Bureau Chief*

RESEARCH PERMIT ADDITIONAL TERMS AND CONDITIONS

This permit is approved under the following additional conditions:

1. You must contact the manager of the park property in advance so he/she knows the timing and purpose of your visit and can discuss any details. Phone numbers for all parks are available at www.nmparks.com.
2. Please carry a copy of the permit with you at all times when you are in the park performing your approved activity.
3. Permission for overnight stays on the property and waiver of any park fees are at the discretion of the park manager.

Application for a Prohibited Invasive Species Permit

Your legal name: Elizabeth Walsh

Name(s) of designees (others working under this permit): Kevin Floyd

Your affiliation: University of Texas at El Paso (UTEP)

Your address: Dept Biological Sciences, 500 W. University Ave., El Paso, TX 79968

Your daytime phone number: 915-747-5421 Evening phone: 915-342-7630

Your date of birth: 12-05-1961 (if applicant is a corporation, limited partnership, or other business entity, attach a certificate showing that the applicant is qualified to do business in Minnesota)

Species to be covered by permit: (common and scientific name(s)): Rotifers assorted species, other plankton

Purpose of permit: disposal decontamination control research education (mark all that apply)

What activities do you want to do? possess transport propagate purchase (mark all that apply)

Describe the activities you want to do, and when: I would like to collect small samples of macrophytes to look for species of rotifers. I have an NSF grant on the molecular systematics of rotifers in the US. I would like to obtain samples from Minnesota as part of the study

Describe your facilities and transportation equipment and how it will prevent escape or unintended introduction of the prohibited invasive species: Samples (in 250 ml jars) will be collected, seal + placed in a cooler. All samples will be collected by hand (not nets, etc will be used). Samples will be shipped to

Describe your experience handling the same or similar species and knowledge of precautions necessary to prevent spread: I have over 30 years of experience collecting water + macrophyte species throughout the U.S. Mexico as part of my scientific research program which has been mostly funded by NSF. I handled Eurasian watermilfoil as part of my PhD. in 1986 + still work with it on a regular basis.

Contingency plan: Prepare and attach a written contingency plan for eradication or recapture in the event of an unauthorized introduction of a prohibited invasive species.

I agree to comply with the requirements of Minnesota Rules, parts 6216.0100 to 6216.0600, and any permit conditions if I am issued a prohibited invasive species permit.

Signature of applicant Elizabeth J. Walsh

Date 7/18/17

TEXAS PARKS AND WILDLIFE

STATE PARK SCIENTIFIC STUDY PERMIT

Texas Parks and Wildlife Department
Natural Resources Program

Telephone: (512) 389-4897

Email: sppermits@tpwd.texas.gov

Permit Period: From: 01-15-2021 To: 01-14-2022

Permit No: 07-21

Date: 01-12-2021

Permit Scope: The purpose of this project is to assess the impacts of non-native Barbary Sheep (*Ammotragus lervia*, also known as Aoudad) on water resources at Hueco Tanks State Park and Historic Site by monitoring the water quality of select rock pools and larger water bodies. This will be used to determine whether Aoudad scat and urine are altering nutrient levels, oxygen availability, pH, or other water quality parameters that could potentially make changes to the aquatic invertebrate community structure. Permittee(s) will be collecting water and plankton samples from 20 huecos (ten with Aoudad scat present; ten without scat) and six larger temporary waterbodies after rainfall events. Permittee(s) will be conducting research in both the guided and unguided areas of Hueco Tanks State Park and Historic Site.

Study Site(s): Hueco Tanks State Park and Historic Site

Permittee is required to contact park at least 48 hours in advance of site visits.

It is the responsibility of the permittee(s) to possess appropriate endangered species permits.

Permittee(s):

Elizabeth Walsh
University of Texas at El Paso
500 W. University Ave.
Department of Biological Sciences
El Paso, TX 79968
(915) 747-5421
ewalsh@utep.edu

Additional Permittee(s) (Sub-Permittee):

N/A

General Provisions: The permittee agrees to the following provisions (1) discretely conduct such studies so as not to unduly disturb or destroy any physical, natural, or aesthetic features within said parks (other than the specimens collected) or disturb park visitors; (2) to notify the Park Superintendent upon arrival at the site; (3) to abide by any special directives issued by or through the Park Superintendent concerning the area(s) in which studies may be conducted. (4) The permittee understands that no study shall take place in the park before or after the permit period designated above; (5) that all studies be conducted by the requester or by collaborators or assistants as designated above; (6) that none of the specimens may be sold or used for barter or trade; (7) that the permit issued may be revoked by the Texas Parks and Wildlife Department at any time; and (8) a copy of this permit must be available for inspection during field work at park site.

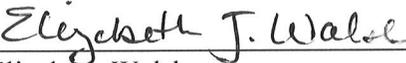
Special Provisions: (1) The permittee will provide Texas Parks and Wildlife Department a report summarizing

project activities and detailing all collections associated with this permit (if applicable) at the conclusion of permit activities or immediately following permit expiration, whichever is first. Subsequent permit issuance is contingent on report submittal. (2) The permittee agrees to furnish the Texas Parks and Wildlife Department a copy of a summary of the studies conducted under the provisions of this permit by March of the year following this permit and any published account resulting from investigations authorized by this permit, (3) the permittee agrees to furnish the Department with the name and location of the institution or collection in which the specimens are deposited (if applicable), and (4) the permittee shall acknowledge the Texas Parks and Wildlife Department in any published article regarding research carried out under the terms of this permit. The acknowledgement shall include the appropriate permit number(s). **Please refer to permit number in all correspondence.**

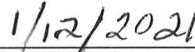
Permittee(s) are subject to all entrance and facility use fees. Please contact the Park Superintendent(s) prior to your visit to determine acceptable collecting location(s).

Ruben Ocampo
Hueco Tanks State Park and Historic Site
(915) 857-1135
ruben.ocampo@tpwd.texas.gov

By affixing signature hereon, the permittee agrees to all terms and conditions of this permit.



Elizabeth Walsh



Date

Approved by Texas Parks and Wildlife Department Natural Resources Program

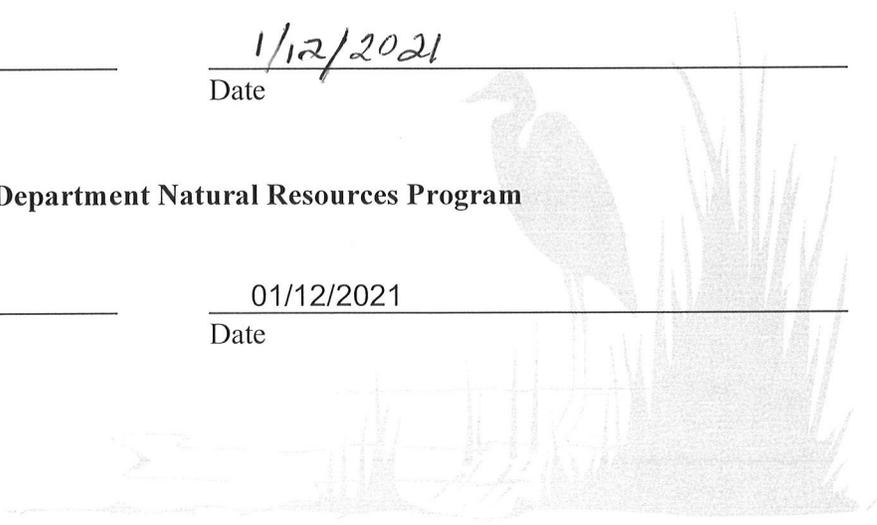


Jeff Sparks on Behalf of Greg Creacy

Digitally signed by Jeff Sparks
DN: cn=Jeff Sparks, o=Texas Parks and Wildlife Department,
ou=State Parks Wildlife and Fire Program,
email=jeff.sparks@tpwd.texas.gov, c=US
Date: 2021.01.12 15:14:58 -0600



Date



STATE PARK SCIENTIFIC STUDY PERMIT APPLICATION

Texas Parks and Wildlife Department
Natural Resources Program

Date of Application: Click or tap to enter a date.
Title of Project/Study: Click or tap here to enter text.
Identify Project Scope/Subject: Click or tap here to enter text.

Applications should be emailed to sppermits@tpwd.texas.gov once completed.

I. Background and Contact Information

Applicant/Principal Investigator Name: Elizabeth Walsh	
Address: 500 W. University Ave., Dept of Biological Sciences, UTEP, El Paso, TX 79968	
Phone Number: (915) 747-5421	E-Mail Address: ewalsh@utep.edu
Affiliation: UTEP, Biological Sciences	Occupation: Professor of Biological Sciences

If Student, Major Professor's Name: Click or tap here to enter text.	
Address: Click or tap here to enter text.	
Phone Number: Click or tap here to enter text.	E-Mail Address: Click or tap here to enter text.

Additional Investigators to be Authorized Under Permit

Name: Click or tap here to enter text.	
Phone Number: Click or tap here to enter text.	E-Mail Address: Click or tap here to enter text.

Name: Click or tap here to enter text.	
Phone Number: Click or tap here to enter text.	E-Mail Address: Click or tap here to enter text.

Name: Click or tap here to enter text.	
Phone Number: Click or tap here to enter text.	E-Mail Address: Click or tap here to enter text.

Name: Click or tap here to enter text.	
Phone Number: Click or tap here to enter text.	E-Mail Address: Click or tap here to enter text.

Name: Click or tap here to enter text.	
Phone Number: Click or tap here to enter text.	E-Mail Address: Click or tap here to enter text.

Have you or any of the investigators above previously had a TPWD State Parks Scientific Study Permit? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
If yes, give permit number(s): 12-20; 2020 R1 1; 2013-01, 2014-01, 2015-03, 2011-13, 2017-R1-19, and many others	

Qualifications; provide background summary or curriculum vitae for principal and additional investigators. Identify qualifications and training relevant to the proposed project, including previous research projects. See attached curriculum vitae

Are any other state or federal permits required for this activity? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>

If yes, please explain: Click or tap here to enter text.

II. Scientific Research Information *(Please answer all questions. A scientific research proposal may be attached and referenced to provide additional details.)*

Please list all state parks and natural areas to be included in this permit: Hueco Tanks State Park and Historic Site

Activity Type *(Check all that apply.)*

Research:

- Monitoring or inventory that does not include handling or collection of natural objects/ specimens
- Temporary capture and handling/marketing of specimens and release in place undamaged
- Temporary examination of natural objects and replaced undamaged

Collection:

- Natural objects/specimens will be collected and vouchered at a museum or scientific institution
- Natural objects/specimens will be collected and destroyed through analysis or discarded after analysis

Other: Click or tap here to enter text.

Project start date: 1/15/2021

Project end date: 1/14/2022

Objectives of the study: The purpose of this project is to assess the impacts of non-native Barbary Sheep (*Ammotragus lervia*, also known as Aoudad) on water resources at Hueco Tanks State Park and Historic Site by monitoring the water quality of select rock pools and larger water bodies. This will be to determine whether Aoudad scat and urine are altering nutrient levels, oxygen availability, pH, or other water quality parameters that could potentially make changes to the aquatic invertebrate community structure. Water and plankton samples will be collected from approximately 20 hueco (10 with scat/10 without) and 6 larger temporary waterbodies after rainfall events. Sites are located in both guided and unguided areas of Hueco Tanks State Park and Historic Site.

Describe the importance or contributions of this project to conservation/science: This project will inform how a non-native species can alter water resources in aridlands, where high quality water for wildlife is extremely limited.

Describe the return benefits this project will provide to TPWD: This project will help the park managers determine impacts on Aoudad and what measures, if any, are needed to manage their impact on water resources of the Park.

Scientific Methods and/or Procedure *(Describe each in detail where applicable.)*

Proposed design study: Hueco Tanks State Park and Historic Site (HTSPHS), a 348-ha park in El Paso Co. (TX, USA) approximately 51 km north east of the city of El Paso is dominated by three, massive, undivided intrusions of syenite, porphyritic, granite domes that formed some 35 mya; much of the rest of the park comprises Quaternary erosional deposits (Henry and Gluck, 1981). The granite domes undergo exfoliation due to wide diel fluctuations in the temperature of the rock face. As the spall falls away shallow cups remain, which slowly enlarge over the years. The resulting rock pools can apparently last for decades. Other low-lying basins in the park result from deposition of sediments that wash off the rock face during monsoons or have an anthropogenic origin. Thus, the aquatic habitats in the Park comprise both artificial and natural basins, including large, low-lying areas, several smaller temporary ponds, and numerous, small rock pools (huecos), all having similar edaphic conditions. Aquatic sites are the Park isolated as the nearest semi-permanent water body is the Rio Grande lying 39 km to the west-southwest. The local aquatic communities within the Park are not connected to a common regional species pool via hydrochory, and

zoochory is probably limited to seasonal migratory birds or adult aquatic insects. Additionally, hydrochory is limited to surface flow among small groups of rock pools and the basin into which they drain. Wind dispersal is likely the major source of freshwater colonists (Rivas et al. 2018, 2019). Subsequently, the rock pools are inhabited by a very stable and unique assemblage of invertebrates including ostracods, tardigrades, flatworms (*Gieysztoria* sp.), nematodes, mosquito, chironomid and ceratopogonid larvae, fairy shrimp (*Branchinecta packardii*), and a clam shrimp (e.g., *Leptestheria compleximanus*), rotifers (*Pleuretra lineata*, *Epiphanes chihuahuensis*, *Hexarthra* sp.). The temporary playas in the Park have a different and much more diverse assemblage of aquatic invertebrates. Several new species of rotifers have been described from the park (*Epiphanes chihuahuensis* [Schröder & Walsh, 2007], *Rhinoglena texana* [Segers & Walsh, 2017], *Hexarthra* [Schröder et al. 2007; Walsh et al, in revision]). Aquatic habitats at HTSPSH not only house unique and diverse aquatic life but also provide drinking water for many native wildlife and bird species. The goal of this proposed project is to monitor water quality of select rock pools and larger water bodies at HTSPHS to determine whether aoudad scat and urine is altering nutrient levels, oxygen availability, pH, or other water quality parameters that could potentially changes to the aquatic invertebrate community structure.

Methods: Water and plankton samples (64 µm, Nitex mesh) and whole water (grab) samples will be taken from 20 huecos (10 with aoudad scat present; 10 without scat) and 6 larger temporary waterbodies (e.g., Laguna Prieta, the ponds behind the Ranch House and behind the artificial dams) after rainfall events. Scat will be categorized on a scale from 1–5 (increasing number of pellets). GPS coordinates will be recorded to relocate the sites. Maximum lengths, widths, and depths will be recorded at each sampling, and the maxima used to calculate surface areas and volumes. We will match the volume of huecos with and without scat as best as possible.

Equipment to be used: Plankton nets, YSI multiparameter probe, Turner Aquaflor

Will methods of this project require the disturbance of any soil (use of pitfall traps, drift fences, etc.)?

Yes No

If yes, please explain: Click or tap here to enter text.

Number of study sites in EACH PARK: 16 sites (10 rock pools, 6 temporary playas) all at HTSPHS

Location of study sites within EACH PARK (latitude/longitude): Rock pools to be determined based on rainfall; temporary playas: 31.9246388/-106.046675; 31.9246611/-106.045825; 31.927081/-106.041142; 31.919195/-106.041106; 31.9188166/-106.0403666; one TBD

Safety or procedural protocols: Walsh is a certified guide at HTSPHS

Describe the analytical techniques/data analysis that will take place: Water chemistry will be determined using pre-calibrated YSI multiprobe and YSI test kits. Chlorophyll a and phycoyanin concentrations will be determined using a Turner Aquaflor instrument. Aquatic invertebrates will be identified using the appropriate keys using microscopy.

III. Scientific Collection Information *(Complete this section if project will include handling or collection of natural objects/specimens.)*

Describe why handling or collecting of natural objects/specimens is necessary in lieu of filed observation/photography: Most aquatic invertebrates must be identified using characters that are only apparent under a microscope.

Description of Samples/Species to be Collected *(Describe each in detail where applicable.)*

Taxonomic name or group for each species: Zooplankton (rotifers, cladocerans, copepods, ostracodes), tardigrades, macroinvertebrates (fairy shrimp, clam shrimp, tadpole shrimp, insect larvae)

Number of samples/specimens of each natural object/species for EACH PARK: 1 sample from each rock pool following a rainfall event.

Frequency of sampling in each park during the permit period: Periodically after rainfall events

Percent of each park's overall population to be sampled: <1% of rock pools, all large waterbodies; total percent ~5%

Quantity of each sample/specimen: 250 ml of water from small sites, 4 L from larger sites

Other parameters that will provide information for review purposes: general weather conditions, chlorophyll a, phycocyanin will also be recorded along with size and depth of sampling sites.
Mitigation measures for collection involving the potential for non-target lethal by-catch or negative consequences related to impacting non-target species: N/A

Please Complete for Each Institution Receiving and Permanently Retaining Samples/Specimens

Institution Name: University of Texas at El Paso, Biodiversity Collection	
Address: 500 W. University Ave, Dept of Biological Sciences, UTEP, El Paso, TX 79968	
Responsible Official Name/Title: Elizabeth Walsh, Curator of Invertebrates	
Phone Number: (915) 747-5421	E-Mail Address: ewalsh@utep.edu
Website: https://www.utep.edu/biodiversity/	

Institution Name: Click or tap here to enter text.	
Address: Click or tap here to enter text.	
Responsible Official Name/Title: Click or tap here to enter text.	
Phone Number: Click or tap here to enter text.	E-Mail Address: Click or tap here to enter text.
Website: Click or tap here to enter text.	

Institution Name: Click or tap here to enter text.	
Address: Click or tap here to enter text.	
Responsible Official Name/Title: Click or tap here to enter text.	
Phone Number: Click or tap here to enter text.	E-Mail Address: Click or tap here to enter text.
Website: Click or tap here to enter text.	

The above organization(s) has agreed to accept all collected specimens described above and will be deposited and maintained in their collection. Yes No

If no, please explain: Click or tap here to enter text.

IV. Products and Deliverables

Describe the expected publications, materials, and reports; include information regarding whether or not GIS maps/shapefiles, GPS coordinates, photographs, models, raw data, voucher numbers, etc. will be generated as part of this study and list which ones will be made available as part of the required final report for this permit. (Be specific and thorough.) Raw data on water quality parameters and scat presence will be provided to the Park including GPS coordinates of sampled rock pools. A final report will be submitted that summarizes the findings.

V. Additional Permits

If research includes the handling of migratory birds (banding or scientific collecting of migratory bird species) or endangered/threatened species, application for a federal permit will also be required. Federal applications and additional information on permits can be found at [U.S. Fish and Wildlife Service Permits](#).

Does research include the handling of migratory birds or endangered/threatened species? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
If yes, please explain (include permit numbers): Click or tap here to enter text.

Permits issued from this application will only be valid on the above listed state park and natural area boundaries. Texas statewide application for research and collection permits can be found at [Texas Wildlife Diversity Permits](#).

VI. Provisions *(The permittee must agree to and follow the following provisions.)*

1. Discretely conduct such studies so as not to unduly disturb or destroy any physical, natural, or aesthetic features within said parks (other than the specimens collected) or disturb park visitors
2. Notify the Park Superintendent upon arrival at the site
3. Abide by any special directives issued by or through the Park Superintendent concerning the area(s) in which studies may be conducted.
4. No study shall take place in the park before or after the permit period.
5. All studies shall be conducted by the requester or by collaborators or assistants.
6. None of the specimens may be sold or used for barter or trade.
7. The permit issued may be revoked by the Texas Parks and Wildlife Department at any time.
8. A copy of the permit must be available for inspection during field work at park site.
9. The permittee will provide Texas Parks and Wildlife Department a report summarizing project activities and detailing all collections associated with this permit (if applicable) at the conclusion of permit activities or immediately following permit expiration, whichever is first. Subsequent permit issuance is contingent on report submittal.
10. The permittee agrees to furnish the Texas Parks and Wildlife Department a copy of a summary of the studies conducted under the provisions of this permit by March of the year following this permit and any published account resulting from investigations authorized by this permit
11. The permittee agrees to furnish the Department with the name and location of the institution or collection in which the specimens are deposited (if applicable)
12. The permittee shall acknowledge the Texas Parks and Wildlife Department in any published article regarding research carried out under the terms of this permit. The acknowledgement shall include the appropriate permit number(s).

Elizabeth J. Walsh, Professor
Biological Sciences, University of Texas at El Paso

EDUCATION

B.S., Animal Biology, University of Nevada, Las Vegas, December 1983.

Ph.D., Environmental Biology, University of Nevada, Las Vegas, Las Vegas, Nevada, May, 1992.

PROFESSIONAL EXPERIENCE - UTEP

September 2014 – present	Director Ecology and Evolutionary Biology Program
June 2013 – Sept 2014	Interim Department Chair
September 2008 – present	Professor of Biological Sciences
September 2000 – August 2008	Associate Professor of Biological Sciences
September 1994 – August 2000	Assistant Professor of Biological Sciences

PROFESSIONAL EMPLOYMENT – PRIOR TO UTEP

July 1993 – September 1994	Postdoctoral Associate, Dept. of Zoology, Brigham Young University
September 1992 – December 1992	Lecturer, Rutgers University, Population Ecology (Graduate level)
December 1991 – June 1992	Gallagher Postdoctoral Fellow, Academy of Natl. Sci. of Philadelphia

LEADERSHIP POSITIONS

Interim Chair (June 2013 – Sept 2014)
Director of Ecology and Evolutionary Biology Program (Oct 2014 – present)
Chair Search Committee Chair (2013 – 2014)
Director, Toxicology Unit of the BBRC (2001 – 2019)
Departmental Advisory Committee (2006 – 2012)
Ecology and Evolutionary Program Advisory Committee (2011 – present)
College of Science Tenure and Promotion Committee (2014 – 2018)
Environmental Science Program Advisory Committee (inception – 2010)
Bioinformatics Advisory Committee (2002 – 2004)
Biological Sciences Chair Search Committee (2004 – 2005; 2013 – 2014)

LEADERSHIP OTHER THAN UTEP

National Sierra Club: Board of Directors (2012 – 2018), Executive Committee Fifth Officer (2015 – 2016), Treasurer (2016 – 2018); Wildlife and Endangered Species Committee, Chair; El Paso Regional Group of the Sierra Club, Executive Committee member (2004 – present)
Vegetarian Society of El Paso - Board member (2004 – present), President (2012 – present)
Chihuahuan Desert Education Coalition: Board Member (2012 – 2014)
Keystone Heritage Park: Board Member (2005)

LEADERSHIP PROFESSIONAL SERVICE

Organized & Hosted 15th International Rotifer Symposium (~100 participants from 11 countries)
American Microscopical Society: Board Member (2011–2014)

SELECTED SERVICE

UNIVERSITY

Faculty Senate Teaching Effectiveness and Development Committee (2016–2018), Secretary
Faculty Senate Student Welfare and Grievance Committee (2002 –2006)
Emeritus Professor Committee (2006)
Provost Search Committee (2004)
Senior Year Experience Committee (2002–2003)
Undergraduate Scholarship Committee (1998–2003)
UTEP Rio Bosque Scientific Advisory Committee (1998–2000)
MIE Undergraduate Professional Enrichment Task Force (1996–2000)
Faculty Senate, Biology Senator (1996–1998)

COLLEGE OF SCIENCE

Tenure and Promotion Committee (2014 – 2018)
Environmental Science Advisory Committee (inception to 2010)
Search Committee for Environmental Science Coordinator (2003; 2007)
Bioinformatics Advisory Committee (2002–2004)
Biological Sciences Chair Search Committee (2004–2005; 2013 – 2014)
Data Science Search Committee (2018 – 2019)
Computational Science Search Committee (2016 – 2017)
Staff Statistician Search Committee (2015 – 2016)
Bioinformatics Search Committee (2015 – 2016)
MPS/MATS Admissions Committee (2005)
Bioinformatics Admissions Committee (2002 – 2003)

DEPARTMENT OF BIOLOGICAL SCIENCES

Doctoral Graduate Advisor (2004 – present)
Advisory Committee (2020 – present)
Ad hoc Advisory Committee (2015 – 2018)
Big Data/Computational Biologist Search Committee Chair (2018 – 2019)
Population Geneticist Search Committee Chair (2015 – 2016)
Statistical Bioinformatician Search Committee (2014 – 2015)
Ecologist Search Committee Chair (2012)
Toxicologist Search Committee (1995 – 1996; 2004 – 2005, 2006 – 2011)

PROFESSIONAL SERVICE

Panelist for NIH: IPERT (2018 – 2020)
Reviewer: L'Oreal/AAAS Women in Science Postdoctoral fellowship (2010-2019)
American Microscopical Society: Board Member (2011 – 2014)
Panelist for NSF: PIRE, IOS, CCL
Ad hoc reviewer for NSF panels: Genomics, Collections, IOS, Systematics

SIGNIFICANT COMMUNITY SERVICE RELATED TO PROFESSION

Developed museum exhibit on invertebrate jaws. Centennial Museum, UTEP (2015)
Developed museum exhibit on the Rio Grande: a river interrupted. Centennial Museum, UTEP (2010 – 2011)
Hueco Tanks State Park and Historic Site Planning Taskforce. (2015 – 2016)

FACULTY DEVELOPMENT EXPERIENCE

Faculty Mentoring Program for Women (2000 – 2003) – Mentored incoming and junior women faculty
NSF ADVANCE (2003-2008)
NSF ADVANCE Faculty Fellow (2007)
CETAL Faculty Mentoring and Development (2008 – 2014)
Biological Sciences – Mentored numerous junior faculty through Biological Sciences mentoring program

SELECTED AWARDS

University Faculty Marshals of Students (May 2019, December 2019)
Graduate School Faculty Marshal of Students (May 2017)
UTEP Distinguished Teaching Professor (Sept 2019)
CoS BUILD Mentoring Award (2017)
University of Texas Regents' Outstanding Teaching Award (2015)
Tech20 Partner of the Year, El Paso Water Utility (2014)
Minnie Stevens Piper Teaching Award nominee: University Awards Committee (2008); Departmental nominee (2012)
UTEP CoS Distinguished Service Award for Service to Students by Faculty (2008)
UTEP CoS Distinguished Achievement Award for Service to Students by Professional Staff (2006)
Texas Parks and Wildlife Volunteer of the Year Award Hueco Tanks State Park (2008)

PUBLICATIONS (STUDENT CO-AUTHORS IN BOLD)

1. Rios Arana, J.V., L. del C. Agüero Reyes, R.L. Wallace & E.J. Walsh. 2019. Limnological characteristics and rotifer community composition of Northern Mexico Chihuahuan Desert Springs. *Journal of Arid Environments* 160:32-41. <https://doi.org/10.1016/j.jaridenv.2018.09.005>
2. **Brown, P.D.** & E.J. Walsh. 2019. Genome size and lifestyle in gnesiotrochan rotifers. *Hydrobiologia* 844:105-115. DOI :10.1007/s10750-018-3873-8
3. Wallace, R.L. & E.J. Walsh. 2019. Evidence does not support that *Hexarthra intermedia* (Rotifera; Monogononta; Gnesiotrocha; Flosculariaceae) preys upon *Bosmina longirostris* (Cladocera; Diplostraca; Branchiopoda)? *Limnetica* 38:147-157
4. Hochberg, R., H. Yang, & E.J. Walsh. 2019. Fine structure of the subitaneous eggshell of the sessile rotifer *Stephanoceros millsii* (Monogononta) with observations on vesicle trafficking in the integument during ontogeny. *Invertebrate Reproduction and Development* 69:122-134. <https://doi.org/10.1080/07924259.2019.1581097>
5. **Kordbacheh, A., A.N. Shapiro** & E.J. Walsh. 2019. Reproductive isolation, morphological and ecological differentiation among cryptic species of *Euchlanis dilatata*, with description of four new species. *Hydrobiologia* 221-242. <https://doi.org/10.1007/s10750-019-3892-0>
6. **Rivas, J.A., Jr.**, T. Schröder, T.E. Gill, R.L. Wallace & E.J. Walsh. 2019. Anemochory of diapausing stages of microinvertebrates in North American drylands. *Freshwater Biology* 64: 1303-1314. <https://onlinelibrary.wiley.com/doi/abs/10.1111/fwb.13306>
7. Jin, L., D. Doser, V. Lougheed, E. J. Walsh, L. Hamdan, M. Zarei & G. Corral. 2019. Experiential learning and close mentoring improve recruitment and retention in the undergraduate environmental science program at an Hispanic-serving institution, *Journal of Geoscience Education* 67: 384-399. DOI: 10.1080/10899995.2019.1646072
8. Hochberg, R., **Yang, H.**, Hochberg, A., Walsh, E.J. & R.L. Wallace. 2019. When heads are not homologous: the case of Order Collothecaceae (Rotifera). *Hydrobiologia* 844:191-207. <https://doi.org/10.1007/s10750-018-3760-3>
9. Young, A., R. Hochberg, E.J. Walsh & R.L. Wallace. 2019. Modeling the life history of sessile rotifers: larval substratum selection through reproduction. *Hydrobiologia* 844:67-82. <https://doi.org/10.1007/s10750-018-3802-x>
10. Yang, H., Hochberg, R., Walsh, E.J. & R.L. Wallace. 2019. Systematic distribution of birefringent bodies in Rotifera and first evidence of their ultrastructure in *Acyclus inquietus* (Gnesiotrocha: Collothecaceae). *Hydrobiologia* 844:209-219. <https://doi.org/10.1007/s10750-018-3784-8>
11. **Kordbacheh, A.**, R.L. Wallace & E.J. Walsh. 2018. Evidence supporting species complexes within two sessile microinvertebrates, *Limnias melicerta* and *L. ceratophylli* (Rotifera, Gnesiotrocha). *PLoS One* <https://doi.org/10.1371/journal.pone.0205203>
12. **Rivas, J.A., Jr.**, J. Mohl, M.-Y. Leung, R.L. Wallace, T.E. Gill & E.J. Walsh. 2018. Evidence for regional aeolian transport of freshwater micrometazoans in arid regions. *L&O Letters* 3: 320-330. <https://doi.org/10.1002/lol2.100722017>
13. Wallace, R.L., **A. Kordbacheh** & E.J. Walsh. Key to the currently recognized species of *Limnias* Schrank, 1803 (Rotifera, Monogononta, Gnesiotrocha, Flosculariidae). *Zootaxa* 4442: 307-318.
14. **Kordbacheh, A., G. Garbelena** & E.J. Walsh. 2017. Cryptic speciation and population structure in the cosmopolitan rotifer *Euchlanis dilatata*. *Zoological Journal of the Linnean Society* 181:757-777. <https://doi.org/10.1093/zoolinnean/zlx027>
15. Segers, H. & E.J. Walsh. 2017. The genus *Rhinoglena* (Rotifera, Monogononta, Ephiphanidae) in North America, with the description of two new species. *Zootaxa* 4290:113-122. <http://dx.doi.org/10.11646/zootaxa.4290.1.6>
16. Alvarado-Flores, J., Guerrero-Jiménez, G., Silva-Briano, M., Adabache-Ortiz, A., Delgado-Saucedo, J., Pérez-Yañez, D., Marín-Chan, A.G., DeGante-Flores, M., Arroyo-Castro, J.L., **Kordbacheh, A.**, Walsh, E.J., & Rico-Martínez, R. 2017. Sexual reproductive biology of twelve species of rotifers in the genera: *Brachionus*, *Cephalodella*, *Collotheca*, *Epiphanes*, *Filinia*, *Lecane*, and *Trichocerca*. *Marine & Freshwater Behavior & Physiology* 50:141-163. <https://doi.org/10.1080/10236244.2017.1344554>
17. Korovchinsky, N.M., E.J. Walsh, & R. Smolak. 2017. *Diaphanosoma* Fischer, 1850 (Crustacea: Cladocera: Sididae) of Lake Turkana (East Africa), with the description of a new species of the genus. *Zootaxa* 4250:77-89. <http://dx.doi.org/10.11646/zootaxa.4250.1.6>
18. Hochberg, R., R.L. Wallace, & E.J. Walsh. 2017. The ultrastructure of the integument and proventriculus in the raptorial rotifer, *Cupelopagis vorax* (Monogononta: Collothecaceae: Atrochidae). *Invertebrate*

- Biology 136:50-61. <https://doi.org/10.1111/ivb.12161>
19. Mills, S., J.A. Alcantara-Rodriguez, J. Ciros-Pérez, A. Gomez, A. Hagiwara; **K.H. Galindo**, C. Jersabek, R. Malekzadeh-Viayeh, F. Leasi, J.-S. Lee, D.B. Mark Welch, S. Papakostas, S. Riss, H. Segers, M. Serra, R. Shiel; R. Smolak, T.W. Snell, C.-P. Stelzer, C.Q. Tang, R.L. Wallace, D. Fontaneto & E.J. Walsh. 2017. Fifteen species in one: deciphering the *Brachionus plicatilis* species complex (Rotifera, Monogononta) through DNA taxonomy. *Hydrobiologia* 796:39-58. DOI:10.1007/s10750-016-2725-7
 20. Walsh, E.J., L. May, & R.L. Wallace. 2017. A metadata approach to documenting sex in phylum Rotifera: diapausing embryos, males, and hatchlings from sediments. *Hydrobiologia* 796:265-276. DOI: 10.1007/s10750-016-2712-z
 21. Hochberg, R., R.L. Wallace, & E.J. Walsh. 2015. Soft Bodies, Hard jaws: An Introduction to the Symposium with Rotifers as Models of Jaw Diversity. *Integrative and Comparative Biology* 55:179-192. DOI:10.1093/icb/icv002
 22. **Martinez-Gomez, D., S. Baca**, & E.J. Walsh. 2015. Lethal and sublethal effects of selected PPCPs on the freshwater rotifer, *Platyonus patulus*. *Environmental Toxicology and Chemistry*, 34:913-922. <https://doi.org/10.1002/etc.2873>
 23. Meksuwan, P., P. Pholpunthin, E.J. Walsh, H. Segers & R.L. Wallace. 2014. Nestedness in sessile and periphytic rotifer communities: A meta-analysis. *International Review of Hydrobiologia* 99:58-64.
 24. Walsh, E.J., **H.A. Smith** & R.L. Wallace. 2014. Rotifers of temporary waters. *International Review of Hydrobiologia* 99:20-37.
 25. Walsh, E.J., **M.L. Arroyo**, T. Schröder, & R.L. Wallace. 2014. Species richness and species turnover (complementarity) of Rotifera in selected aquatic systems of Big Bend National Park, Texas. In: C.A. Hoyt & J. Karges (editors). Proceedings of the Sixth Symposium on the Natural Resources of the Chihuahuan Desert Region. October 14–17. Chihuahuan Desert Research Institute, Fort Davis, TX. pp. 185–204. <http://cdri.org/publications/proceedings-of-the-symposium-on-the-natural-resources-of-the-chihuahuandesert-region/>
 26. Rico-Martínez, R. & E.J. Walsh. 2013. Sexual reproductive biology of a colonial rotifer *Sinantherina socialis* (Rotifera: Monogononta). Do mating strategies vary between colonial and solitary rotifer species? *Marine and Freshwater Behaviour and Physiology*, 46:6, 419-430, DOI: 10.1080/10236244.2013.834110
 27. Schröder, T. & E.J. Walsh. 2010. Genetic differentiation, behavioral reproductive isolation and mixis cues in three sibling species of monogonont rotifers. *Freshwater Biology*. 55: 2570-2584.
 28. Suárez Morales, E., M.A. Gutiérrez-Aguirre & E. Walsh. 2010. Freshwater Copepoda (Crustacea) from the Chihuahuan Desert with comments on biogeography. *Southwestern Nat.* 55(4):525–531.
 29. Suárez-Morales, E. & E.J. Walsh. 2009. Two new species of *Eucyclops* Claus (Copepoda: Cyclopoida) from the Chihuahuan Desert with a redescription of *E. pseudoensifer* Dussart. *Zootaxa* 2206:1-22.
 30. Walsh, E.J., Schröder, T., & R.L. Wallace. 2009. Cryptic speciation in *Lecane bulla* (Monogononta: Rotifera) in Chihuahuan Desert waters. *Verh. Internat. Verein. Limnol.* 30(7):1046–1050.
 31. Wallace, R.L., E.J. Walsh, T. Schröder, R. Rico-Martínez & J.V. Rios-Arana. 2008. Species composition and distribution of rotifers in Chihuahuan Desert waters of México: is everything everywhere? *Verh. Internat. Verein. Limnol* 30:73-76.
 32. Suárez-Morales, E., G. Rodríguez-Almaraz, M.A. Gutiérrez-Aguirre, & E.J. Walsh. 2008. The coastal-Estuarine copepod *Eurytemora affinis* (Pope) from inland arid areas of Mexico: An expected occurrence? *Crustaceana* 81:679-694.
 33. Walsh, E.J., T. Schröder, R.L. Wallace, J.V. Rios Arana & R. Rico Martinez. 2008. Rotifers from selected inland saline waters in the Chihuahuan Desert of Mexico. *Saline Systems* 4:7, doi:10.1186/1746-1448-4-7. <https://doi.org/10.1186/1746-1448-4-7>
 34. Schröder, T., **S. Howard**, **L. Arroyo** & E.J. Walsh. 2007. Sexual reproduction and diapause of *Hexarthra* sp. (Rotifera) in short-lived Chihuahuan Desert ponds. *Freshwater Biology* 52:1033-1032.
 35. **Rios Arana, J.V.**, Walsh, E.J. & M. Ortiz. 2007. Interaction effects of multi-metal solutions (As, Cr, Cu, Ni, Pb and Zn) on life history traits in the rotifer *Platyonus patulus*. *J. Env.Sci. & Health Part A* (2007) 42:1473–1481.
 36. Walsh, E.J., T. Schröder, **M.L. Arroyo**, & R.L. Wallace. 2007. Rotifera of Big Bend National Park, Texas (USA): species richness, turnover, and interannual variation among selected sites. *Hydrobiologia* 593:39-47.
 37. Schröder, T. & E.J. Walsh. 2007. Cryptic speciation in the cosmopolitan *Epiphanes senta* complex (Monogononta, Rotifera) with the description of three new species. *Hydrobiologia* 593:129-140.

38. Walsh, E.J., **M. Salazar, J. Ramirez, O. Moldes**, & R.L. Wallace. 2006. Predation by invertebrate predators on the colonial rotifer *Sinantherina socialis*. *Invertebrate Zoology* 125:325-335.
39. Wallace, R.L., E.J. Walsh, **M.L. Bonilla**, & P.L. Starkweather. 2005. Life on the edge: rotifers from springs and ephemeral waters in the Chihuahuan Desert, Big Bend National Park (Texas, U.S.A.). *Hydrobiologia* 546:147-157.
40. Walsh, E.J. & R.L. Wallace. 2005. Toward a better understanding of the phylogeny of the Asplanchnidae (Rotifera). *Hydrobiologia* 546:71-80.
41. Gilbert, J.J. & E.J. Walsh. 2005. *Brachionus calyciflorus* is a species complex: Mating behavior and genetic differentiation among four geographically isolated strains. *Hydrobiologia* 546:257-265.
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49. Walsh, E.J. & L. Zhang. 1992. Polyploidy and body size variation in a natural population of the rotifer *Euchlanis dilatata*. *Journal of Evolutionary Biology* 5:345-353.
50. Walsh, E.J. & P.L. Starkweather. 1991. Analysis of rotifer ribosomal gene structure using the polymerase chain reaction. *Hydrobiologia* 255/256:219-224.
51. Walsh, E.J. 1991. Rotifer genetics: Integration of classic and modern techniques. *Hydrobiologia* 255/256:193-204.
52. Walsh, E.J. 1989. Oviposition behavior in the littoral rotifer *Euchlanis dilatata*. *Hydrobiologia* 186/187:157-161.
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Submitted and in preparation manuscripts

1. Rico-Martinez, R., J. Alvarado-Flores, D. Pérez-Yañez, I. Rubio-Franchini, J.V. Ríos-Arana & E.J. Walsh. 2019. Routes of uptake, bioconcentration, bioaccumulation, and detoxification of Cd²⁺ and Pb²⁺ in rotifers. *In revision*.
2. Smolak, R. & Walsh, E. J. Contributions to the knowledge of freshwater rotifers of Kenya, with new records for Kenya. Submitted to *Freshwater Biology*. *In revision*.
3. Garcia, E.D. and E.J. Walsh. 2020. Survey of Pharmaceuticals and Personal Care Products (PPCPs) in the Rio Grande and toxicological assays of selected antibiotics using a model invertebrate. *In revision*.
4. **Preza, E.**, E.J. Walsh & R. Hochberg. Remodeling of the 5HT-LIR nervous system during metamorphosis of the indirectly developing rotifer, *Cupelopagis vorax* (Gnesiotrocha, Collothecaceae). Submitted to *Invertebrate Biology*. *In revision*.
5. Yang, H., R. Hochberg, E.J. Walsh & R.L. Wallace. Ultrastructure of the extracorporeal secretions of four sessile species of Rotifera (Gnesiotrocha) with observations on the chemistry of the gelatinous tube. Submitted to *Invertebrate Biology*. *In revision*.

Book

1. Gutiérrez-Aguirre, M.A., E. Suárez-Morales, A. Cervantes-Martínez & E.J. Walsh. 2019. Freshwater copepods (Calanoida, Cyclopoida and Harpacticoida) from the Chihuahuan Desert. Clave. 88 pp.

Edited Volume

1. Devetter, M., D. Fontaneto, C.D. Jersabek, D.B. Mark Welch, L. May, & E.J. Walsh. 2017. Evolving rotifers, evolving science. *Hydrobiologia* 796.

Book Chapters

1. Wallace, R.L., T. Snell, Walsh, E.J., S.S.S. Sarma, & H. Segers. 2016. Chapter 8: Rotifera. In Thorp and Covich's *Freshwater Invertebrates. Keys to Nearctic Fauna*. Eds: Thorp, J.H. and D.C. Rogers. 4th edition. Pp. 131-167.
2. Wallace, R.L., T. Snell, Walsh, E.J., S.S.S. Sarma, & H. Segers. 2019. Chapter 8: Rotifera. In Thorp and Covich's *Freshwater Invertebrates. Keys to Palearctic Fauna*. Eds: D.C. Rogers and J.H. Thorp. 4th edition. Pp. 244-268.

Published Laboratory Manuals

1. Walsh, E.J., P.E. Hotchkiss & S. Dash. 2013. B1108 Organismal Biology Laboratory Manual. Kendall Hunt Publishing Co., 2nd printing. 119 pp.
2. Floyd, K. & E.J. Walsh. 2017. Environmental Science Laboratory Manual. Kendall Hunt Publishing. 153 pp.

Publications – not peer reviewed

1. Devetter, M., D. Fontaneto, C.D. Jersabek, L. May & E.J. Walsh. 2017. Preface: evolving rotifers, evolving science. *Proceedings of the XIV International Rotifer Symposium*. *Hydrobiologia* 796:1–6.
2. Walsh, E.J. & R.L. Wallace. 2019. Crossing Disciplinary Borders in Rotifer Research. *Proceedings of the 15th International Rotifer Symposium*. *Hydrobiologia* 844:1-8. <https://doi.org/10.1007/s10750-019-04090-3>

GRANTS

1. Walsh, E.J. (co-PI). MSEIP Supplement Funding: Research Capacity. Dept. Education. MSEIP. \$199,624. 10/01/2018-09/30/20
2. Walsh, E.J. (co-PI). RISE Option III: Research Scholars Program. NIH NIGMS 2R25GM069621-09. \$3,855,303. 6/01/17-5/30/22
3. Walsh, E.J. (co-PI). STEMGROW Program. Dept. Education. P031C160235. \$5,412,165. 10/01/16-9/30/2021
4. Walsh, E.J. (co-PI). Improved STEM education for 21st century environmental scientists through stratified mentoring and professional networking. NSF IUSE 1611860. \$298,431. 8/01/16-7/31/20
5. Walsh, E.J. (PI). Integrating genetics, life history, and morphology to understand the diversification of an enigmatic metazoan lineage. NSF DEB. \$320,000. 5/01/13-4/30/17. REU Supplements: \$26,960.
6. Walsh, E.J. (PI). TIERA: Training in Environmental Research and Academic Success. Dept. Education. MSEIP. P120A130103. \$604,868. 10/01/13-9/30/2016.
7. Walsh, E.J. (co-PI). RISE Option III: Research Scholars Program. NIH NIGMS 2R25GM069621-09. \$4,250,000. 3/01/2012-2/20/2017.
8. Walsh, E.J. (co-PI, 25%). Enhancement of Quantitative Skills in Biology Curricula (co-PI), NIH MARC, \$1,236,085. 7/1/09-6/30/13
9. Walsh, E.J. (co-PI, 30%). UBM-Institutional: Undergraduate Training in Bioinformatics. NSF DUE-0926721. \$870,000. 9/01/09-8/31/14
10. Walsh, E.J. (co-PI, 10%). Experimental study of Cu, Fe, and Zn isotopes: Developing tools to understand biogeochemical processes in geologic systems. NSF EAR-0745345. \$174,661. 8/01/2008–7/31/12
11. Walsh, E.J., M.B. Cox, V. Loughheed and W.Y. Lee. Developing Monitoring Systems for Emerging Contaminants in the Rio Grande. UTEP BBRC Pilot Project. \$50,000. 2010
12. Walsh, E.J., Kirken, R. and I. Almeida, and Das, S. Localization, transportation and detoxification of heavy metals in a model system, UTEP BBRC Pilot Project. \$50,000 2010
13. Walsh, E.J. Community composition and phylogeny of basal consumers in Chihuahuan Desert waters. NSF, DEB-Biotic Surveys & Inventories, \$598,000. REU Supplements: \$39,650.
14. Walsh, E.J. Assessing impacts of heavy metal mixtures using genetic variation as a biomarker. NIH (SCORE), \$373,000. 6/01/04-5/30/07
15. Assessment of Genetic diversity in fishes and rotifers in the Rio Grande: A Biomarker of Anthropogenic Stress. ERC-EPA. \$38,481. With B. Washburn.

16. Walsh, E.J. Tobacco Settlement Funds. Long-term impacts of lead and arsenic in a model system. \$42,046. 4/01/03-12/31/03.
17. Walsh, E.J. Molecular Systematics of the Rotifera. NSF HRD-9628568. \$249,583. 6/01/96-5/ 31/99. Institutional Match \$43,200.
18. Walsh, E.J. Genetic impacts from long-term heavy metal exposure. NSF ADVANCE (L. Foster, student support). \$6225. Fall 2005
19. Walsh, E. Evaluation of freshwater spring habitats in the Chihuahuan Desert (Dissert. Project: D. Wambuguh). T&E Inc., \$2,500, 5/01/04-4/31/05.
20. Assessment of Genetic diversity in fishes and rotifers in the Rio Grande: A Biomarker of Anthropogenic Stress. ERC-EPA. \$38,481. With B. Washburn.
21. Walsh, E.J. Tobacco Settlement Funds. Long-term impacts of lead and arsenic in a model system. \$42,046. 4/01/03-12/31/03.
22. Walsh, E.J. & R.L. Wallace. Life on the edge: Comparative phylogeography and ecology of basal microinvertebrates in endangered springs and ephemeral waters of the Chihuahuan Desert (US & Mexico). WISC-AAAS \$4000.
23. Aley, S.J. and E.J. Walsh. Genotyping and rapid molecular determination of drug resistance of clinical isolates of *Mycobacterium tuberculosis* from the El Paso/Ciudad Juarez border region. Coldwell Foundation. \$20,000. 9/01/99-8/31/00.
24. Walsh, E.J. Pilot Study: Determination of the ability of the rotifer *Brachionus calyciflorus* to bioaccumulate toxicants from freshwater ecosystems. CERM \$12,767. 5/15/95- 8/30/95.
25. Walsh, E.J. and R.D. Worthington. Biotic Assessment of Manzanita Spring, Guadalupe Mountains National Park, Culberson, County, Texas. \$1100. December 1996.
26. Walsh, E.J. The application of molecular techniques in resolving phylogenetic relationships of the Rotifera. \$3100. URI, UTEP. 10/27/94-8/31/95.

PRESENTATIONS – ONLY 2015 – 2020

Contributed at international, national or regional meetings (**bold indicates student co-author; * presenter**)

1. Walsh, E.J., L. Jin, D. Doser, V. Lougheed, L.K. Hamdan, M. Zarei & L. Corral. Experiential learning and stratified mentoring improve recruitment & retention in the undergraduate environmental science program at a Hispanic serving institution. 2019 ESA Annual Meeting, KY (August 11 – 16, 2019).
2. **Blevines, V.**, M.J. Baeza & E.J. Walsh. Desiccation, pigment levels, and resistance to ultraviolet radiation in an aquatic microinvertebrate. 2019 ESA Annual Meeting, KY (August 11 – 16, 2019).
3. **Garcia, E.D.** & E.J. Walsh. Effects on mortality, reproduction, and behavior in the rotifer *Platyonus patulus* by anthropogenic contaminants. 2019 ESA Annual Meeting, KY (August 11 – 16, 2019).
4. Walsh, E.J., **S.D. Samaniego** & J. Mohl. Rotifer community profiling in temporary waters through resurrection ecology and next-generation sequencing. ASLO Aquatic Sciences Meeting, San Juan, Puerto Rico. (Feb 27, 2019).
5. Walsh, E.J., **P.D. Brown, A. Pina**, H. Geller, P. Hotchkin & V. Lougheed. Using aquatic systems to introduce community college students to university research. ASLO Aquatic Sciences Meeting, San Juan, Puerto Rico. (Feb 26, 2019).
6. Baeza, M.J., E.J. Walsh. Multi-Generational Exposure of Aquatic Microinvertebrates to Enhanced Ultraviolet Radiation. ASLO Aquatic Sciences Meeting, San Juan, Puerto Rico. (Feb 26, 2019).
7. Brown, P.D. & E.J. Walsh. Lifestyle, genome size, and Bergmann's rule in an understudied invertebrate clade. ASLO Aquatic Sciences Meeting, San Juan, Puerto Rico. (Feb 27, 2019).
8. Hurtado, G. & E.J. Walsh. Competitive interactions & environmental toxicants. ASLO Aquatic Sciences Meeting, San Juan, Puerto Rico. (Feb 27, 2019).
9. **Suh, E., Gonzalez, L., Calderon, A., Brown, P.**, & E.J. Walsh. Desert Wetlands: Correlation Between Environmental Nutrient Levels and Species Richness. SACNAS Annual Meeting, San Antonio, TX. (Oct 11, 2018)
10. **Gonzalez, L., Suh, E., Calderon, A., Brown, P.**, & E.J. Walsh Urban Ponds: correlating chlorophyll-a with species richness in the Chihuahuan Desert. SACNAS Annual Meeting, San Antonio, TX. (Oct 11, 2018)
11. Saucedo Rios, S., Santos-Medrano, G., Rico Martinez, R., & E.J. Walsh, Relationship between phylogenetic distance and the lead sensitivity in selected strains of the genus *Lecane* (Rotifera:

- Monogononta), 15th International Rotifer Symposium, UTEP. (June 8, 2018).
12. **Rivas, J.A.***, Gill, T.E., Walsh, E.J. & R.L. Wallace, Dust storms and the transport of rotifers in the Chihuahuan Desert, 15th International Rotifer Symposium, UTEP, El Paso, Texas. (June 8, 2018). *Best student oral presentation award*
 13. **Yang, H.**, Hochberg, R., Walsh, E. J. & R.L. Wallace, Birefringent bodies in larvae of gnesiotrochan rotifers: taxonomic distribution and ultrastructure, 15th Internat'l. Rotifer Symp., UTEP. (June 7, 2018).
 14. Smolak, R., & E.J. Walsh, Contributions to the knowledge of freshwater rotifers of Kenya, 15th International Rotifer Symposium, UTEP. (June 7, 2018).
 15. **Kordbacheh, A.***, **Mohl, J.***, & E.J. Walsh, Detecting adaptive genetic variation among cryptic species of *Euchlanis dilatata* using a next generation sequencing approach. 15th Internat'l. Rotifer Symp., UTEP. (June 7, 2018).
 16. **Reyes, D.** & E.J. Walsh, Genetic diversity in populations of *Epiphanes chihuahuaensis* (Rotifera: Monogononta) in the northern Chihuahuan desert, 15th Internat'l. Rotifer Symp., UTEP. (June 7, 2018).
 17. **Walsmith, R.***, **Preza, E.** & E.J. Walsh, Immunoreactivity of the serotonergic nervous systems of the rotifers *Lacinularia flosculosa* and *Collotheca ferox*, 15th Internat'l. Rotifer Symp., UTEP. (June 7, 2018).
 18. **Munoz, A.***, & E.J. Walsh, Investigating sensitivities to selected pharmaceuticals and personal care products in the brackish water rotifer, *Brachionus plicatilis*, 15th Internat'l. Rotifer Symp., UTEP. (June 7, 2018).
 19. Walsh, E. J., Schroeder, T. & R.L. Wallace, Long-term patterns of species richness in desert pools, 15th International Rotifer Symposium, UTEP. (June 7, 2018).
 20. Rios Arana, J. & E.J. Walsh, Metallothionein like-proteins (MTLPs) induced by Cu and Zn in rotifers, 15th International Rotifer Symposium, UTEP. (June 8, 2018).
 21. **Ordonez, J.***, Hochberg, R., **Kordbacheh, A.***, Wallace, R. L., & E.J. Walsh, Phylogeny of Gnesiotrocha based on 18S and COI sequence analysis, 15th International Rotifer Symposium, UTEP. (June 7, 2018).
 22. **Mohl, J.***, **Brown, P.*** & E.J. Walsh. Sequencing and annotation of the *Sinantherina socialis* genome, 15th International Rotifer Symposium, UTEP. (June 7, 2018).
 23. **Preza, E.***, R. Hochberg & E.J. Walsh, Serotonin immunoreactivity in the nervous system of a sessile rotifer, 15th International Rotifer Symposium, UTEP. (June 7, 2018). *Best student poster presentation award*
 24. Hochberg, R., **Yang, H.**, Hochberg, A., Walsh, E.J. & Wallace, R.L., When heads are not homologous: the case of Order Collothecaceae (Rotifera), 15th International Rotifer Symposium, UTEP. (June 7, 2018).
 25. **Brown, P.*** & E.J. Walsh, Genome size in selected gnesiotrochan rotifers, 15th International Rotifer Symposium, UTEP. (June 7, 2018).
 26. **Baeza, M.***, **Apodaca, R.***, & E.J. Walsh, Impacts of ultraviolet radiation on pigmented bdelloid rotifers, 15th International Rotifer Symposium, UTEP. (June 4, 2018).
 27. **Rivas, J.A.***, Walsh, E. J., & T.E. Gill, Characterization of falling sand and dust at El Paso, Texas, USA: Preliminary Results, 9th International Workshop on Sand / Dust Storms and Associated Dustfall, Tenerife, Spain. (May 23, 2018).
 28. Walsh, E.J., **J.A. Rivas**, R.S. Van Pelt, R.L. Wallace & T.E. Gill. Connectedness among desert aquatic habitats via wind dispersal? Wind tunnel experiments and diapausing stages. ASLO, Honolulu, HI (Feb 27, 2017)
 29. Wallace, R.L., J.V. Rios Arana & E.J. Walsh. Assessing rotifer community structure in endorheic aridland waters, ASLO, Honolulu, HI (Feb 27, 2017)
 30. **Samaniego, S.*** & E.J. Walsh, Assessing aquatic diversity in northern Chihuahuan Desert wetlands using next-gen sequencing, Evolution 2017, Portland, OR. (June 25, 2017)
 31. **Kordbacheh, A.***, **Mohl, J.** & E.J. Walsh, Detecting adaptive genetic variation among cryptic species of the rotifer *Euchlanis dilatata*, using next generation sequencing, Evolution 2017, Portland, OR. (June 25, 2017).
 32. **Preza, E.***, Walsh, E. J., Feeding and neural mechanisms underlying the predatory behavior of a model aquatic invertebrate, Evolution 2017, Portland, OR. (June 25, 2017).
 33. Lougheed, V.L., Jin, L., Walsh, E.J., Doser, D.I., Corral, G., Hamdan, L.K. & J.R. Carr, Developing authentic wetland research experiences in the Environmental Science curriculum at a Hispanic-Serving Institution, Society of Wetland Scientists, San Juan, Puerto Rico. (June 5, 2017).
 34. **Shapiro, A.N.***, **Kordbacheh, A.*** & E.J. Walsh, Ecological differentiation among cryptic rotifer species from diverse aquatic habitats, Society of Wetland Scientists, San Juan, Puerto Rico. (June 5, 2017). *ASLOMP Travel Award*.

35. Lopez, A., Nazanin, H., Corral, G., Walsh, E. J., Lougheed, V. L., Jin, L., Doser, D. I., Spring Symposium, Preparing versatile and confident professionals through participation in the Training in Environmental Research and Academic Success (TIERA) program, UTEP COURI, El Paso, TX. (April 29, 2017).
36. **Barnes, L.***, Floyd, K., & E.J. Walsh, Rooftop Gardens as Pollinator Habitat in Urban Environments, UTEP COURI, El Paso, TX. (April 29, 2017).
37. **Shapiro, A.***, **Kordbacheh, A.*** & E.J. Walsh, Ecological differentiation among rotifers in a cryptic species complex. ASLO- American Society for Limnology and Oceanography, Honolulu, HI. (February 2017).
38. **Martin, M.***, & E.J. Walsh, UV radiation resistance in bdelloid rotifers from diverse habitats, ASLO- American Society for Limnology and Oceanography, Honolulu, HI. (February 2017). *ASLOMP Travel Award*.
39. Wallace, R. L., Walsh, E. J., & J.V. Rios Arana, Assessing rotifer community structure in endorheic aridland waters, ASLO- American Society for Limnology and Oceanography, Honolulu, HI. (February 27, 2017).
40. Yang, H., Hochberg, A., Dhimitri, S., Hochberg, R., Walsh, E.J. & R.L. Wallace, R., Getting a (new) head in life: the non-homology of the rotifer corona and infundibulum, Society for Integrative and Comparative Biology, New Orleans, LA. (January 5, 2017).
41. **Rivero-Estans, M.***, **E. Preza**, Saucedo Rios S. & E.J. Walsh. Impact of diet on survival and reproduction of an aquatic predator. Ecological Society of America. (Aug 2017)
42. **Kordbacheh, A.*** & E.J. Walsh. Detecting adaptive genetic variation among cryptic species of the rotifer *Euchlanis dilatata*, using next generation sequencing. Evolution. Portland, OR (June 2017).
43. **Preza, E.*** & E.J. Walsh. Feeding and neural mechanisms underlying the predatory behavior of a model aquatic invertebrate. Evolution. Portland, OR (June 2017).
44. **Samaniego, S.D.***, **J. Mohl**, & E.J. Walsh. Assessing aquatic diversity in northern Chihuahuan Desert wetlands using next-gen sequencing. Evolution. Portland, OR (June 2017).
45. Jin, L. V. Lougheed, E.J. Walsh, D. Doser, L. Hamdan, M. Zarei & L. Corral. Employing effective strategies to improve undergraduate education in Environmental Sciences through curriculum revision at a Hispanic Serving Institution. Earth Educators' Rendezvous 2017. Albuquerque, NM (July 2017)
46. **Martin, M.*** & E.J. Walsh. UV radiation resistance in bdelloid rotifers from diverse habitats. Association of the Sciences of Limnology and Oceanography, Honolulu, HI (Feb 26, 2017). *ASLOMP Travel Award*.
47. **Shapiro, A.**, **A. Kordbacheh** & E.J. Walsh. Ecological differentiation among rotifers in a cryptic species complex. Association of the Sciences of Limnology and Oceanography, Honolulu, HI (Feb 27, 2017). *ASLOMP Travel Award*.
48. Walsh, E.J., **J.A. Rivas**, R.S. Van Pelt, R.L. Wallace & T.E. Gill. Connectedness among desert aquatic habitats via wind dispersal? Wind tunnel experiments and diapausing stages. Association of the Sciences of Limnology and Oceanography, Honolulu, HI (Feb 27, 2017).
49. Wallace, R.L., J.V. Rios Arana & E.J. Walsh. Association of the Sciences of Limnology and Oceanography, Honolulu, HI (Feb 27, 2017)
50. Rios Arana, J.V. & E.J. Walsh. From single to metal mixture exposure: Effects on *Plationus patulus* population dynamics. SETAC. Orlando, FL (November 8, 2016)
51. **Walsmith R.***, **Preza, E.** & E.J. Walsh. Immunoreactivity of the serotonergic nervous system of the colonial rotifer *Lacinularia flosculosa*. SACNAS, Long Beach, CA. (October 13, 2016).
52. **Chapina, R.**, **J. Ramos Chavez**, P. Sikkel & E.J. Walsh*. Genetic variation in populations of a tropical mysid, *Mysidium gracile*, International Coral Reef Symposium, Honolulu, HA. (June 21, 2016).
53. **Kordbacheh, A.*** **E. Preza** & E.J. Walsh. A better estimate of species diversity in aquatic invertebrates: A case study of two sessile rotifers. Society for the Study of Evolution, Austin, TX. (June 2016).
54. Walsh, E.J.*, **J.A. Rivas, Jr, J, Mohl**, M.-Y. Leung, R.L. Wallace, T.E. Gill & R. Van Pelt. Aeolian transport of biota with dust: Capturing diversity using a multi-faceted approach, Association of the Sciences of Limnology and Oceanography, Santa Fe, NM. (June 6, 2016).
55. Wallace, R.L.*, L. May & E.J. Walsh. How widespread is the production of diapausing embryos (DE) in monogonont rotifers? A proposal to construct an internet-based catalog of resources, Association of the Sciences of Limnology and Oceanography, Santa Fe, NM. (June 7, 2016).
56. Walsh, E.J.*, D. Doser, L. Jin, V. Lougheed, L.K. Hamdan & L. Corral. Authentic research experiences in Environmental Science to address environmental challenges, Association of the Sciences of Limnology and Oceanography, Santa Fe, NM. (June 7, 2016).
57. **Samaniego, S.D.*** & E.J. Walsh. Recovering species composition of desert wetlands through sediment rehydration. Society of Wetland Scientist, Corpus Christi, TX (May 31 – June 4, 2016).

58. Walsh, E.J. Ecology and Evolutionary Biology: Using Rotifera as a model system, UTEP EEB Program, UTEP, El Paso, TX. (March 26, 2016).
59. **Rivas, J.A.***, T.E. Gill, R.S. Van Pelt, R.S. & E.J. Walsh. Aeolian transport of biota with dust: A wind tunnel experiment, American Geophysical Union, San Francisco, CA. (December 17, 2015).
60. Walsh, E.J., T.E. Gill, **J.A. Rivas**, M.-Y. Leung & **J. Mohl**. Environmental sequencing of biotic components of dust in the Chihuahuan Desert, American Geophysical Union, San Francisco, CA. (December 17, 2015).
61. Doser, D.I.* , E.J. Walsh, L. Jin, & V.L. Lougheed, Lessons Learned from Years 1 and 2 of the TIERA (Training in Environmental Research and Academic Success) Program, Geological Society of America, Baltimore, MD. (November 2015).
62. Rios Arana, J.* , E.J. Walsh & R.L. Wallace, Chihuahuan Desert Springs: water quality and rotifer diversity in Northern Mexico, 14th International Rotifer Symposium, České Budějovice, Czech Republic. (September 4, 2015).
63. **Martin, M.*** & E.J. Walsh. Examining UV-induced genetic degradation in bdelloid rotifers from semi-arid habitats, 14th International Rotifer Symposium, České Budějovice, Czech Republic. (September 3, 2015).
64. Mills, S., J.A. Alcantara-Rodriguez, J. Ciros-Pérez, A. Gomez, A. Hagiwara; **K.H. Galindo**, C. Jersabek, R. Malekzadeh-Viayeh, F. Leasi, J.-S. Lee, D.B. Mark Welch, S. Papakostas, S. Riss, H. Segers, M. Serra, R. Shiel; R. Smolak, T.W. Snell, C.-P. Stelzer, C.Q. Tang, R.L. Wallace, D. Fontaneto & E.J. Walsh. Fifteen species in one: deciphering the *Brachionus plicatilis* species complex (Rotifera, Monogononta) through DNA taxonomy. 14th International Rotifer Symposium, České Budějovice, Czech Republic. (August 31, 2015).
65. Walsh, E.J.* , L. May & R.L. Wallace. Production of diapause embryos in phylum Rotifera: A metadata approach to documenting sexual reproduction, 14th International Rotifer Symposium, České Budějovice, Czech Republic. (September 1, 2015).
66. **Preza, E.*** & E.J. Walsh. Predatory behavior and neuroanatomy of a sessile rotifer, *Cupelopagis vorax*," 14th International Rotifer Symposium, České Budějovice, Czech Republic. (August 31, 2015).
67. **Floyd, K.*** & E.J. Walsh. The promises and perils of using molecular techniques to investigate the effects of roads on gene flow in wildlife populations, Ecological Society of America, Baltimore, MD. (August 11, 2015).
68. **Chapina, R.***, **Ramos Chavez, J*** & E.J. Walsh, Genetic diversity in populations of a Caribbean mysid, *Mysidium gracile*, COURI Summer Research Symposium, UTEP, El Paso, TX. (August 1, 2015).
69. **Alonso, A.*** & E.J. Walsh. Novel drought-tolerating strategies of the desert rock pool rotifer *Hexarthra* n. sp., COURI Summer Research Symposium, UTEP, El Paso, TX. (August 1, 2015).
70. **Samaniego, S.*** & E.J. Walsh, Ecology in Temporary Desert Aquatic Community, COURI Summer Research Symposium, UTEP, El Paso, TX. (August 1, 2015).
71. **Ferguson, B.,*** & E.J. Walsh, Salinity tolerance of the rotifer *Brachionus plicatilis* in desert, inland saline waters, COURI Summer Research Symposium, UTEP, El Paso, TX. (August 1, 2015).
72. **Preza, E.***, **A. Kordbacheh** & E.J. Walsh. Cryptic speciation in gnesiotrochan rotifers. ASLO Aquatic Sciences Meeting, Granada, Spain. (Feb 22-27, 2015). *Preza was awarded a full travel scholarship to attend the meeting by the ASLO Hampton Multicultural Program.*
73. **Chapina, R.***, **J. Chavez Ramos** & E.J. Walsh. ASLO Aquatic Sciences Meeting, Granada, Spain. (Feb 22-27, 2015). *Chapina was awarded a full travel scholarship to attend the meeting by the ASLO Hampton Multicultural Program.*
74. Walsh, E.J.* , **S. Samaniego**, **C. Messerschmidt**, **A. Schmidt** & R.L. Wallace. Dormancy and community assembly in temporary desert waters. ASLO Aquatic Sciences Meeting, Granada, Spain. (Feb 22-27, 2015).
75. Hochberg, R., **A. Hochberg***, E.J. Walsh & R.L. Wallace. 2015. On the ultrastructure of soft and hard protective tubes of sessile rotifers (Rotifera). Annual meetings of the Society for integrative and comparative biology, (January 3-7, 2015).

COURSES TAUGHT - *SINGLE TIME, ** MULTIPLE TIMES

Undergraduate	Graduate
ESCI 2204 Environmental Science Research**	BIOL 5322 Advances in Evolution**
BIOL 1303 Introduction to Biology (Non-Majors)**	BIOL 5316 Biosystematics**
BIOL 1306 Organismal Biology**	BIOL 5360 Limnology**
ZOOL 2466 General Zoology**	BINF 5351 Bioinformatics 1**
ZOOL 2406 Invertebrate Zoology**	BINF 5352 Bioinformatics 2**
BIOL 3321 Evolutionary Theory**	BINF 5130 Bioinformatics Seminar**
ESCI 1301 Intro. to Environmental Science**	BIOL 6312 Biodiversity*
ESCI 2201 Practicum: Water Analysis**	BIOL 1530 Seminar: Mol. App. to Evol. Biol*
ESCI 4301 Senior Seminar**	Lab Coordinator: BIOL 1108; ESCI 1101**

GRADUATE STUDENT DISSERTATIONS AND THESES DIRECTED SINCE 2010**DISSERTATION CHAIR:**

- Judith V. Rios (Environmental Science & Engineering) Integrating life history and molecular responses to arsenic and heavy metals in a basal consumer (Rotifera: *Plationus patulus*) in a riverine food web – Graduated 2003.
- Kevin Floyd (Environmental Science & Engineering) – Effects of Roads on Lizard population dynamics and genetic structure - (co-Advised by C.S. Lieb) – Graduated 2015.
- Dominic Lannutti (Ecology and Evolutionary Biology) Phylogeography of the Mojave rattlesnake (co-Advised by C.S. Lieb) – Graduated 2020.
- Azar Kordbacheh (EEB) Hidden diversity in aquatic habitats: lessons from cryptic species in microscopic invertebrates (Rotifera) – Graduated May 2018.
- Jose Rivas (EEB) Dust and the dispersal of aquatic invertebrates – entered Fall 2011, candidacy Aug 2015
- Patrick Brown (EEB) Genomics of Gnesiotrochan rotifers – entered Fall 2015, candidacy Nov 2018
- Maribel Baeza (EEB) UV stress in bdelloid rotifers – entered Fall 2016, candidacy Jan 2020
- Javier Ordonez (EEB) Phylogeny of the Gnesiotrocha – entered Fall 2015
- Nina Dropcho (EEB) Rapid evolution in *B. plicatilis* – entered Spring 2020

SERVICE ON DOCTORAL COMMITTEE

- Jaime Chapoy (Biological Sciences) – Graduated Dec 2005
- Jose Pachecho (Biological Sciences) – Graduated May 2007
- Cynthia Morgan (Biological Sciences) – December 2009
- Shawn Dash (Biological Sciences) – Graduated May 2011
- Mark Lara (Biological Sciences) – Graduated 2012
- Porfirio Peinado (Geological Sciences) – Graduated 2013
- Sandra Villareal (Biological Sciences) – Graduated 2013
- Cyren Rico (Chemistry) – Graduated December 2014
- Susana Saucedo Rios (Univ Autonoma Aguascalientes) – Graduated 2017
- Mariana Vargas (Biological Sciences) – Graduated August 2019
- Hui Yang (Biological Sciences, U Mass Lowell) – Graduated August 2019
- Anna Pina (EEB Program) – in progress
- Leticia Rodriguez (ESE Program) – in progress

THESIS COMMITTEE CHAIR (of 13 in total)

- Lina Hamdan (Biology) Ecology and genetics of *Philodina Megalotrocha* – Graduated 2010
- Diana Martinez Gomez (Environmental Sciences) A survey of selected pharmaceuticals and personal care products in the Rio Grande and impacts on the rotifer, *Plationus patulus* (Rotifera) – Graduated 2011
- Diego Reyes (Biology) Genetic diversity in populations of *Epiphanes chihuahuaensis* – Graduated 2013
- Jennifer Martinez (Biology) Water quality and benthic macroinvertebrate community – Graduated 2013
- Elizabeth Preza (Biology) Neuroanatomy and behavior in the sessile rotifer *Cupelopagis vorax* – Dec 2017
- Maite Martin (Environmental Science) Environmental stress and in bdelloid rotifers – Graduated May 2017

Outstanding Graduate in Environmental Science

7. Enrique Garcia (Environmental Science) Detection of Pharmaceuticals and Personal Care Products in the Rio Grande and effects on *Platyonus patulus* – Graduated Dec 2018 **Outstanding Graduate in Environmental Science**
8. Sergio Samaniego (Environmental Science) Environmental stress and genetic integrity in bdelloid rotifers – Graduated May 2019
9. Amorita Armendariz – (Biological Sciences) Cryptic speciation in *Lecane bulla*. – In progress

SERVICE ON GRADUATE MS COMMITTEE:

1. Linda Ko (Biological Sciences) "Iron Uptake by *Trichomonas vaginalis*" – Graduated August 1999
2. Greg Hahn (Civil Engineering) Graduated 1998
3. Alan Mabry (Mathematical Sciences) "A Nonparametric Approach to Genetic Linkage mapping using kernel density estimation" – Graduated July 1997
4. Curtis Eckerman (Biological Sciences) "Variation, Systematics, and Interspecific position of *Heterodon nasicus*" – Graduated December 1996
5. Judith Rios (Chemistry) "Study of Oat and Wheat Biomasses for metal removal and optimization of metal ion binding" – Graduated May 1999
6. Karen Katz (Biological Sciences) "Use of Atomic Force Microscopy to Directly Visualize DNA for Assembly of contigs of *Giardia lamblia* Genomic DNA" – Graduated 2000
7. Gabriela Sanchez (Biological Sciences) "Genetic polymorphisms of xenobiotic metabolizing enzymes" – Graduated 2002
8. Raul Guitierrez (Biological Sciences) DNA sequencing of Proboscidea (Family Martyniaceae) – Graduated – 2002
9. Allison Davis (Biological Sciences) – Graduated 2002
10. Daniel Ott (Geological Sciences) – Graduated 2005
11. Rob Dean (Geological Sciences) – Graduated 2005
12. Heriberto Valentin (Chemistry) – Graduated
13. Catalina Ordonez – Graduated December 2005
14. Katy Duncan (Geological Sciences) – Graduated August 2006
15. Salma Khutan (Geological Sciences) – Graduated 2008
16. Nikolay Boykov (Geological Sciences) – Graduated 2009
17. Carmen Agüero Reyes (Env. Sci. Engineering, UACJ) – Graduated
18. Rudolfo Guerrero (Chemistry) – Graduated May 2011
19. Anita Thapalia (Geology) – Graduated
20. Gena Esposito (Environmental Science) – Graduated Fall 2012
21. Christina Hernandez (Environmental Science) – Graduated Fall 2012
22. Jessica Martinez Jurado (Environmental Science) – Graduated Fall 2013
23. Adele Hochberg (Biological Sciences, U Mass Lowell) – Graduated Fall 2014
24. Ryan Ronson (Geological Sciences) – Graduated Summer 2018
25. Rafael Delfin (Geological Sciences) – Graduated Fall 2019

UNDERGRADUATE STUDENT MENTORING Funding generated by Walsh is show in **bold**.

Name (Dates)	Project title	Funding Source
1. Luisa Bonilla Arroyo (1995 – 2000)	Seasonal patterns of mixis in rotifers	NSF-RIMI, HI-CREST
2. Ki Borello (1995)	Phylogenetic relationships of rotifers	Special Problems
3. Victor Montes (1995)	Phylogenetic relationships of rotifers	Special Problems
4. Jennifer Apodaca (1995)	Using rotifers to assay toxicity of cyanobacteria	Howard Hughes
5. Ralu Hinojos (1995)	Using rotifers to assay toxicity of cyanobacteria	Howard Hughes
6. Isaac Estrada (1995 – 1996)	Using rotifers to assay toxicity of cyanobacteria	CERM

7. Monica Sanchez (1996)	Detection of stress proteins in rotifers using ELISA	Howard Hughes
8. Celeste Delgado (1997)	Biological Indicators of toxicity of air pollutants	MIE
9. Michael Gaglio (1995)	Rotifers occurring at Hueco Tanks Historical State Park	Special Problems
10. Abraham Frias (1995 – 1998)	Rotifers occurring at Hueco Tanks Historical State Park	NSF-RIMI
11. Alejandro Armendariz (1996 – 1998)	Biotic survey of Manzanita Springs	NSF-RIMI
12. Alfredo Andrade (1996)	Biotic survey of Manzanita Springs	Special Problems
13. Kevin Cataldi (1997 – 1998)	Biotic survey of Manzanita Springs	NSF-RIMI
14. Erica Estrada (1995 – 1997)	Geographic variation among <i>Brachionus plicatilis</i> strains	Bridges, NSF-RIMI , MIE, LSAMP
15. Melissa Ortega (1995 – 1996)	Phylogenetic relationships of Asplanchnidae (Rotifera)	NSF-LSAMP
16. Jennifer Barnett (1995 – 1996)	Molecular phylogenetic relationships of rotifers	Howard Hughes
17. Jeff Houghton (1998)	Genetic variation in populations of rotifers	NSF-RIMI
18. Alvaro Virgen (1998)	Genetic variation in populations of rotifers	NSF-RIMI
19. Carmen Gallegos (1996)	Genetic variation in parasitized termites	NSF-RIMI
20. Gabriela Sanchez (1997)	Molecular systematics of rotifers	NSF-RIMI
21. Shelby Howard (1998 – 2000)	Sex allocation ratios in temporary populations	NSF-RIMI , MIE
22. Julie Sanchez (1997 – 1999)	Genetic variation in populations of rotifers	NSF-RIMI
23. Stacia Clement (1998 – 1999)	Genetic variation in rotifers occurring in Ascarate Lake	NSF-RIMI , MIE
24. Oscar Sanchez (1998)	Seasonal patterns of species succession in rotifers	NSF-RIMI
25. David Nevarez (1999 – 2000)	Development of the rotifer systematics database	NSF-RIMI
26. Alicia Laurenano (1999)	Molecular systematics of rotifers	NSF-RIMI
27. Pia Hoffmann (1996 – 1998)	Molecular systematics of bdelloid rotifers	NIH-MARC
28. Jennifer Barnett (1995 – 1996)	Molecular systematics of rotifers	Howard Hughes
29. Delia Cruz (1999 – 2003)	Genetic variation in branchiopods	NSF-RIMI , MIE
30. Marissa Fout (1999 – 2000)	Genetic variation in the rotifer <i>Asplanchna</i> .	NSF-RIMI
31. Belen Fierro (1999)	Amplification of DNA from formalin specimens	Special Problems
32. Oscar Candia (1998)	Rotifers occurring in a temporary desert pond	Special Problems
33. Stephen Edwards (1999 – 2000)	Biochemical characterization of rotifer resting eggs	MIE

34. Ruby Navarro (2000 – 2001)	Molecular systematics of the <i>Brachionus plicatilis</i>	NSF-RIMI
35. Ki Borrello (1995)	Molecular systematics of rotifers	Special Problems
36. Idy Gonzales (1999-2000)	Response of rotifers to environmental toxicants	Bridges to the Future
37. Katrina Espinoza (summer 2002)	Response of rotifers to environmental toxicants	Bridges to the Future
38. Rachel Garcia (1999-2001)	Response of rotifers to environmental toxicants	Bridges to the Future, McNair
39. Diego Puch (2001)	Response of rotifers to environmental toxicants	Special Problems
40. Darrelle Leeming (2001)	Response of rotifers to environmental toxicants	Special problems
41. Helen Brewer (1999 – 2000)	Video image database of the Rotifera.	NASA MuSpin
42. Daniel Grajeda (2000)	Molecular systematics of the Rotifera	NSF-RIMI
43. John Ingle (2000)	Genetic variation of rotifers in temporary desert ponds	Staley
44. Zaynab Bakir (2000)	Drug resistance in <i>Mycobacteria tuberculosis</i>	Staley
45. Cynthia Batkin (2000)	Genotypic variation in rotifers and fishes in the Rio Grande	ERC-EPA
46. Michael Sealy (2002)	Rotifers of the Rio Grande	Special Problems
47. Lorenna Vironyoki (2002)	Coral bleaching at Puerto Penasco Mexico	MIE
48. Martha Rios (summer 2002)	Response of rotifers to environmental toxicants	Bridges to the Future
49. Karina Espinosa (summer 2002)	Response of rotifers to environmental toxicants	Bridges to the Future
50. Michael Salazar (2003-2005; 2007)	Unpalatability of a colonial rotifer to invertebrate predators	Bridges to the Future, NSFREU
51. Edith Soto (summer 2003)	Rotifers occurring at Hueco Tanks State Park	Bridges to the Future
52. Orestes Moldes (2003 – 2005)	Unpalatability of colonial rotifers to invertebrate predators	Bridges to the Future
53. Fernanda de la Cerda (2004 – 2005)	Impacts of heavy metals on rotifer genetic structure	LSAMP
54. Steve Marpula (2004)	Genetic variation in mysid shrimp swarms	Special problems
55. John Salas (2004)	Genetic variation in rotifers from the Rio Grande	Special problems
56. Juan Rameriz (2003 – 2005)	Unpalatability of the colonial rotifer <i>Sinantherina socialis</i> to invertebrate predators	Special problems
57. Claudia Ramirez	Impacts of heavy metals on rotifer populations	NSF-UMEB
58. Christian Andresen	Impacts of heavy metals on rotifer populations	NSF-UMEB
59. Nancy Salas Mercado	Genetic variation in copepod populations	NSF-REU
60. Ryan Deregnier (Ripon College) (summer 2006)	Genetic variation in rotifer populations	NSF-REU

61. Andrea Lam (UT Austin) (summer 2006)	Genetic variation in cladoceran populations	REU
62. Danielle Ivey (summer 2006)	Impacts of heavy metals on rotifer populations	Bridges to the Future
63. Megan Voss (Univ. Pittsburg) (summer 2005)	Impacts of heavy metals on rotifer populations	REU
64. Terry Enriquez (summer 2005)	Water quality in Chihuahuan desert springs	Bridges to the Future
65. Katrina Weber (2006 – 2008)	Unpalatability of rotifers to insect predators	UTEP Bristol-Mayberry Award
66. Leslie Chavez (summer 2007)	Genetic variation in crustacean populations	NSF-REU
67. C.R. Flores (summer 2005)	Genetic variation in rotifer populations	Bridges to the Future
67. Matthew Stensberg (Ripon College) (summer 2007)	Genetic variation in rotifer populations	NSF-REU
68. Kassondra Meyers (Ripon College) (summer 2008)	Genetic variation in populations of <i>Euchlanis</i>	NSF-REU
69. Alma Castanon (summer 2007)	Colonization of mesocosms by zooplankton	NSF-REU
70. Sairy Hernandez (St. Mary's College) (summer 2004)	Genetic variation in mysid populations	REU
71. Nubia Legarda (2010)	Impacts of PPCPs on chironomid populations	Special Problems
72. Kayla Hinson Galindo (2010 – 2012)	Genetic variation in populations of <i>B. plicatilis</i>	NSF-UPBiT, NIH RISE
73. Robert Menjo (2011)	Genetic variation in populations of <i>B. plicatilis</i>	NSF-UPBiT
74. Eric Vest (2011)	Genetic variation in rotifer populations	NSF-UPBiT
75. Jennifer Ramos (2010)	Genetic variation in mysid and rotifer populations	Bridges to the Future
76. Francisco Renteria (2011)	Impacts of PPCPs on rotifer populations	Bridges to the Future
77. Adam Banda (summer 2011)	Genetic variation in lizard populations	Bridges to the Future
78. Chanel Mejias (summer 2008)	Genetic variation of tadpole shrimp populations	REU
79. Ashley Lopez (summer 2008)	Mating behavior in cryptic species of the rotifer <i>Lecane</i>	NSF-REU
80. Elizabeth Coon (2010)	UV tolerance in tardigrades	Special Problems
81. Lauren Kelly (summer 2009)	Genetic variation in the rotifer <i>Euchlanis dilatata</i>	NSF-REU
82. Irma Gutierrez (2009 – 2013)	Impacts of copper on rotifer populations	NIH-RISE
83. Francisco Arredondo (summer 2011)	PPCP impact on rotifer populations	UTEP – COURI
84. Stephany Carrillo (2012)	Tadpole shrimp biology	Special Problems
85. Sarah Baca (2010 – 2013)	Impacts of PPCPs on rotifer populations	NSF-URM, NIH-RISE
86. Michael Woods (2010 – 2011)	Competition in rotifer species	Special Problems

87. Fernando Marin (2012)	Genetic variation in lizard populations	Bridges, LSAMP
88. Priscilla Duran (2011 – 2012)	Genetic variation in lizard populations	NSF-URM
89. Christina Mendez (2012)	Genetic variation in mysid populations	Volunteer
90. Evan Moschopoulos (2012)	Genetic variation in rotifer populations	Special Problems
91. Abigail Munoz (2012)	Genetic variation in rotifer populations	NSF-UPBiT
92. Ivan Alvarez (2012 – 2013)	Mating behavior in <i>Epiphanes chihuahuaensis</i>	Special Problems
93. Maite Martin (2013 – 2014)	Biodiversity in dust: Env. sequencing	NSF-URM
94. Rosaura Chapina (2013 – 2017)	Genetic variation in Caribbean mysids	UTEP COURI
95. Edgar Jauregui (2013 – 2014)	Arsenic detoxification pathways in rotifers	UPBiT
96. Elizabeth Preza (2013 – 2014)	Phylogeny of Gnesiotrocha	NSF DEB
97. Cody Messerschmidt (Ripon College) (Summer 2014)	Phylogenetics of <i>Hexarthra</i>	NSF DEB
98. Stephen Escarzaga (Summer 2014)	GIS mapping of the Chihuahuan Desert	NSF DEB
99. Katherine Dixon (Case Western) (Summer 2014)	Phylogenetics of Gnesiotrocha	NSF-CDB
100. Sergio Samaniego (2014 – 2016)	Phylogenetics of Gnesiotrocha	NSF DEB
101. Fredrik Karlsson (Fall 2014)	Phylogenetics of Gnesiotrocha	NSF DEB
102. Elizabeth Parra (Spring 2015 – present)	Desiccation tolerance of tardigrades	NSF DEB
103. Patricia Salazar (Spring 2015)	PPCPs and rotifer life history	Special Problems
104. Briana Ferguson (Summer 2015)	Toxicology	NSF-REU
105. Alex Alonso (Summer 2015)	Adaptations to temporary habitats in rotifers	NSF DEB
106. Robert Walsmith (Summer 2015 – 2017)	Neural anatomy of rotifers	NSF DEB
107. Airon Casas (2015 – 2016)	Cryptic speciation in rotifers	NSF-UPBiT
108. Ashley Mcaffee (Summer 2016)	Cryptic speciation in rotifers	NSF-REU
109. Ashanti Shapiro (Summer 2016 – June 2018)	Cryptic speciation in rotifers	NSF DEB
110. Marcela Rivero Estens (Summer 2016 – Summer 2018)	Life history of rotifers	NSF DEB
111. Lara Barnes (Summer 2017 – Summer 2018)	Pollination Biology	TIERA, NSF
112. Alan Munoz (Summer 2017 – Summer 2018)	PPCPs and rotifer life history	Bridges, MARC
113. Rachael Apodaca (Summer 2017 – Summer 2018)	Bdelloid rotifer resistance to UVR	NSF REU
114. Gabriela Hurtado (Spring 2018 – Fall 2019)	Ecotoxicology	NIH RISE

115. Cynthia-Rae Moreno (Spring 2018 – Summer 2018)	Sessile rotifer biology	NSF, NSF REU
116. Joseph McDaniel (Summer 2018 – Fall 2019)	Impact of Barbary sheep on water quality at Hueco Tanks	Special Problems
117. Andrea Vega (Summer 2018)	Impact of Barbary sheep on water quality at Hueco Tanks	Special Problems
118. Eric Suh (Summer 2018)	Water quality of urban ponds	STEMGROW
119. Erin Gutierrez (Summer 2018)	Water quality of urban ponds	STEMGROW
120. Lizette Gonzalez (Summer 2018)	Water quality of urban ponds	STEMGROW
121. Samantha Pena (Fall 2018 – Summer 2019)	Predator prey interactions of aquatic invertebrates	Special Problems
122. Raquel Gomez (2019)	PPCPs and rotifer life history	Special Problems
123. Helen Burch (Summer 2019)	Cryptic species of <i>Cupelopagis vorax</i>	NSF REU
124. Natalie Figueroa (Summer 2019 – present)	PPCPs and rotifer life history	STEMGROW
125. Sabrina Bernal (Summer 2019)	PPCPs and rotifer life history	STEMGROW
126. Vanessa Blevines (Fall 2018 – Spring 2020)	UV radiation and impacts on bdelloid rotifers	Special Problems
127. Cynthia Sanchez (Fall 2019 – Spring 2020)	Sediment egg banks	ESCI 2204
128. Abigail OHare (Summer 2020)	Scaling in metabolic rates	STEMGROW
129. Jaime Gutierrez (Summer 2020)	Scaling in metabolic rates	STEMGROW

COMMUNITY SERVICE (SELECTED)

1. Presentation to El Paso Master Naturalists, "Wetlands Ecology and Management," Mar 23, 2016; Mar 29, 2017; Mar 31, 2018; Apr 4, 2019; Apr 2, 2020
2. Presentation to El Paso Native Plant Society, "Riparian zones," Jan 11, 2018
3. Presentation to El Paso Group of Sierra Club, "Our Wild America," Oct 22, 2018; Nov 26, 2019
4. Presentation to El Paso Master Naturalists, "El Paso Waters: What lies beneath the surface," Feb 4, 2016.
5. Developed museum exhibit on invertebrate jaws. Centennial Museum, UTEP. 2015.
6. Developed museum exhibit on the Rio Grande: a river interrupted. Centennial Museum, UTEP. 2010-2011.
7. Hueco Tanks State Park and Historic Site Guide Training: presenter biannually each year since 1999.
8. Hueco Tanks State Park and Historic Site Planning Taskforce. Appointed 2015 - 2016.
9. City of El Paso Mayor's Environmental Task Force - Appointed September 2001-2002.
10. Faculty mentor for the ESA SEEDS Chapter - the Club hosted 7 environmental days at Rio Bosque educating local school children on the Chihuahuan Desert. Summer 2005.
11. Tech20 WISE Actions. Co-organized field trip for middle school children to visit a local wetland and learn about water resources in the Chihuahuan Desert. Fall 2015.
12. Earth Day Keynote Speaker. US Consulate, Ciudad Juarez. April 2014.
13. Science fair projects – Heather Almengor (2010, State winner), Lana Hamdan (2010, Regional winner).
14. Talk on the Border Wall and Wildlife - Universidad Autonoma de Ciudad Juarez, Oct 2008.
15. Guest speaker for miniCAST, Oct 19, 2018
16. Guest speaker, Project Wild and Aquatics Wild, Tech20; May 4, 2013

**STATE PARK SCIENTIFIC STUDY PERMIT
TEXAS PARKS AND WILDLIFE DEPARTMENT
NATURAL RESOURCES PROGRAM**

Telephone: 512/389-4679
FAX: 512/389-4495
Email: david.riskind@tpwd.state.tx.us

Permit No: 2017- R1-19
Date: 14 December 2017

Permit Period: From : 15 December 2017 To: 31 December 2019.

Permit Scope: To collect plankton and other aquatic microflora and fauna at springs and other water sources within Balmorhea, Bastrop, Big Bend Ranch, Davis Mountains, Enchanted Rock, Franklin Mountain, Inks Lake, Lake Somerville, McKinney Falls State Parks, Heco Tanks State Park & Historic Site, and Devils River State Natural Area - Del Norte Unit. Water samples and specimens of aquatic vegetation may be collected in association with sampling. Collections may be taken with hand held plankton net kept in spring source water. Permittee is required to contact park in advance of collecting trip and coordinate collecting sites with park staff.

Permittee: Elizabeth J. Walsh
Department of Biological Sciences
500 W. University Ave.
University of Texas at El Paso
El Paso, TX 79968

General Provisions: The permittee agrees to the following provisions (1) discretely conduct such studies so as not to unduly disturb or destroy any physical, natural or aesthetic features within said park (other than the specimens collected) or disturb park visitors; (2) to notify the Park Superintendent upon arrival at the site; (3) to abide by any special directives issued by or through the Park Superintendent concerning the area(s) in which studies may be conducted; (4) The permittee understands that no study shall take place in the park before or after the permit period designated above; (5) that all studies be conducted by the requestee or by collaborators or assistants as designated above; (6) that none of the specimens may be sold or used for barter or trade; (7) that the permit issued may be revoked by the Texas Parks and Wildlife Department at any time; and (8) a copy of this permit must be available for inspection during field work at park site. (Please refer to permit number in all correspondence.)

Special Provisions: (1) The permittee agrees to furnish the Texas Parks and Wildlife Department a complete summary of the studies conducted under the provisions of this permit by March of the year following this permit and an established account resulting from investigations authorized by this permit, (2) the permittee agrees to furnish the Texas Parks and Wildlife Department a list of all collections made during this study and as well must furnish the Department with the name and location of the institution or collection in which the specimens are deposited, and (3) the permittee shall acknowledge the Texas Parks and Wildlife Department in any published article regarding research carried out under the terms of this permit. The acknowledgement shall include the appropriate permit number(s).

Waiver: See park superintendent for scientific study/educational day-use entrance fee waiver.

By affixing his signature hereon,
the permittee agrees to all terms
and conditions of this permit.

Elizabeth J. Walsh
Signature

1/2/18

Date: _____

Approved by the Texas Parks
and Wildlife Department.

Nickolas Hawlik

for DHR
Signature David H. Riskind

Natural Resources Program Date: 14 December 2017

SCIENTIFIC RESEARCH AND COLLECTING PERMIT



Grants permission in accordance with the attached
general and special conditions

United States Department of the Interior
National Park Service
White Sands

Study#: WHSA-00013

Permit#: WHSA-2009-SCI-0011

Start Date: Feb 18, 2019

Expiration Date: Dec 31, 2022

Coop Agreement#:

Optional Park Code:

Name of principal investigator:

Name: Dr Elizabeth Walsh

Phone: 915-747-5421

Email: ewalsh@utep.edu

Name of institution represented:

University of Texas - El Paso

Additional investigators or key field assistants:

Study Title:

Biodiversity and biogeography of selected invertebrates in Chihuahuan desert waters

Purpose of study:

Zooplankton play major roles in freshwater ecosystems; their abundance and ubiquitous occurrence rank them as one of the most important links in these aquatic food webs. Because of their high feeding and assimilation efficiencies, they play important roles in energy flow and nutrient cycling, accounting for 50% or more of the zooplankton production in some freshwater systems. Zooplankton contribute to both the microbial loop and higher trophic levels. Predation on zooplankton by malacostracans, copepods, insect larvae, hydrozoans and fish contributes to energy transfer to higher trophic levels. Additionally, species assemblages of zooplankton are useful in characterizing the trophic status of lakes.

There have been few studies of zooplankton occurring in temporary aquatic habitats in the Chihuahuan desert. In general Chihuahuan desert waters have high levels of endemism in their molluscan and fish faunas. It is predicted that unique species of zooplankton occur as well. The purpose of this study is to include zooplankton found in the Park in a large-scale ecological and molecular phylogeographic study of zooplankton in Chihuahuan desert waters. The goal of this proposal is to complete an extensive survey the zooplankton fauna occurring in springs and temporary playas (Lake Lucero and Lost River in particular) within White Sands National Park.

Subject/Discipline:

Ecology (Aquatic, Marine, Terrestrial)
Invertebrates (Insects, Other)

Locations authorized:

Lake Lucero and other temporary and permanent water sources.

Transportation method to research site(s):

A car (Honda Fit TX license plate JDL 3582) or a state of Texas van (UTEP) or by foot.

Collection of the following specimens or materials, quantities, and any limitations on collecting:

Up to three quarts of sediment or organic material and one gallon of water may be collected per site per visit.

Name of repository for specimens or sample materials if applicable:

Repository type: Permanently retained in National Park Service collection, maintained in one or more non-NPS repositories identified in attached Appendix A (complete and submit an Appendix A for each proposed repository) (Smithsonian Institution, National Museum of Natural History)

Objects collected:

Zooplankton and other aquatic invertebrates such as fairy shrimp, brine shrimp, ostracods, and aquatic insect larvae.

NPS General Conditions for Scientific Research and Collecting Permit (available at the RPRS HELP page) apply to this permit. The following specific conditions or restrictions, and any attached conditions, also apply to this permit:

Copies of final reports, thesis, dissertation, and/or publications must be submitted to: White Sands National Monument, Attn Resource Management, POB 1086, Holloman AFB, NM 88330.

A copy of the approved research/collection permit must be in possession at all times in the field.

1. You are responsible for the research-related activities of your staff. Please ensure that all field staff adhere to all conditions of your permit. Field staff must possess a copy of your permit at all times while in the field.
2. You are required to notify the monument's research coordinator TWO WEEKS in advance of your trip, and advise them of your planned activities. Each week you will be required to completed the attached Back Country Travel Plan and submit the plan to the research coordinator and others assigned prior to conducting research activities. Once working in the park, report all emergencies by calling 911.
3. Unless otherwise authorized on your permit, you must carry out all of your activities out of public view. If you have obtained special permission to collect in front-country areas, you may be required to arrange for a uniformed escort.
4. If you collect specimens that are to be permanently retained, regardless of where they are kept, they must be accessioned and cataloged into the National Park Service's Automated National Catalog System, and must bear National Park Service accession and catalog numbers.
5. All equipment left in the field including plot markers must be specifically authorized in advance. Label all equipment with your name, date of installation, phone number, and the words "Research Study #XXXX." If you are authorized to place equipment or plot markers at White Sands, you will be required to GPS their locations.
6. Specific authorization must be obtained in advance before using chemicals or hazardous materials at White Sands. For specific information regarding the transport, use, and disposal of chemicals or hazardous materials, please contact the monument's research coordinator.
7. Cultural resources must not be adversely impacted by your research activities. Any ground disturbances must be specifically authorized in advance. Report any findings of artifacts such as lithic scatters or historical trash to the Research Permit Officer.
8. The Permittee agrees to notify the Superintendent of White Sands National Monument of every subject discovery or invention that relates in any respect to research results derived from use of any research specimens or other materials collected from White Sands National Monument, or that may be patentable or otherwise protected under the intellectual property (IP) laws of the United States or other jurisdiction. Notification must occur within sixty (60) days of the time that an inventor or other agent of the Permittee reports such a subject discovery or invention to the person(s) responsible for patent or other proprietary rights matters in the Permittee's organization, and in no case not less than sixty (60) days before a patent application is filed. Additionally, the Permittee agrees to notify the Superintendent of White Sands National Monument within thirty (30) days of filing any patent application or other IP claim in the United States or other country that relates in any respect to research results or other discoveries or inventions derived from use of any research specimens or other materials collected from White Sands National Monument. For purposes of this paragraph, the term "subject discovery or invention" means any discovery or invention related to or derived from research specimens or other materials collected from White Sands National Monument. All invention disclosures shall be marked as confidential under 35 U.S.C. Section 205.
09. Your permit does not authorize the bearer or those that accompany them to conduct commercial filming activities. Commercial film permits must be obtained from the monument's film coordinator.
10. EACH YEAR, INVESTIGATORS ARE REQUIRED TO SUBMIT COPIES OF JOURNAL ARTICLES, THESES, AND DISSERTATIONS THAT ARE DERIVED FROM THE RESULTS OF WHITE SANDS RESEARCH. THE PARK REQUESTS THAT YOU SUBMIT ARTICLES IN PDF FORMAT AND THAT ONE BOUND COPY OF EACH DISSERTATION/THESIS IS SUBMITTED.

Recommended by park staff(name and title):

Approved by park official:

Title:

Superintendent

Reviewed by Collections Manager:

Yes _____ No _____

Date Approved:

I Agree To All Conditions And Restrictions Of this Permit As Specified
(Not valid unless signed and dated by the principal investigator)

Elizabeth J. Walsh
(Principal investigator's signature)

2/14/19
(Date)

**THIS PERMIT AND ATTACHED CONDITIONS AND RESTRICTIONS MUST BE CARRIED AT ALL TIMES WHILE
CONDUCTING RESEARCH ACTIVITIES IN THE DESIGNATED PARK(S)**



GENERAL CONDITIONS For SCIENTIFIC RESEARCH AND COLLECTING PERMIT

United States Department of the Interior
National Park Service

- 1. Authority** - The permittee is granted privileges covered under this permit subject to the supervision of the superintendent or a designee, and shall comply with all applicable laws and regulations of the National Park System area and other federal and state laws. A National Park Service (NPS) representative may accompany the permittee in the field to ensure compliance with regulations.
- 2. Responsibility** - The permittee is responsible for ensuring that all persons working on the project adhere to permit conditions and applicable NPS regulations.
- 3. False information** - The permittee is prohibited from giving false information that is used to issue this permit. To do so will be considered a breach of conditions and be grounds for revocation of this permit and other applicable penalties.
- 4. Assignment** - This permit may not be transferred or assigned. Additional investigators and field assistants are to be coordinated by the person(s) named in the permit and should carry a copy of the permit while they are working in the park. The principal investigator shall notify the park's Research and Collecting Permit Office when there are desired changes in the approved study protocols or methods, changes in the affiliation or status of the principal investigator, or modification of the name of any project member.
- 5. Revocation** - This permit may be terminated for breach of any condition. The permittee may consult with the appropriate NPS Regional Science Advisor to clarify issues resulting in a revoked permit and the potential for reinstatement by the park superintendent or a designee.
- 6. Collection of specimens (including materials)** - No specimens (including materials) may be collected unless authorized on the Scientific Research and Collecting permit.

The general conditions for specimen collections are:

- Collection of archeological materials without a valid Federal Archeology Permit is prohibited.
- Collection of federally listed threatened or endangered species without a valid U.S. Fish and Wildlife Service endangered species permit is prohibited.
- Collection methods shall not attract undue attention or cause unapproved damage, depletion, or disturbance to the environment and other park resources, such as historic sites.
- New specimens must be reported to the NPS annually or more frequently if required by the park issuing the permit. Minimum information for annual reporting includes specimen classification, number of specimens collected, location collected, specimen status (e.g., herbarium sheet, preserved in alcohol / formalin, tanned and mounted, dried and boxed, etc.), and current location.
- Collected specimens that are not consumed in analysis or discarded after scientific analysis remain federal property. The NPS reserves the right to designate the repositories of all specimens removed from the park and to approve or restrict reassignment of specimens from one repository to another. Because specimens are Federal property, they shall not be destroyed or discarded without prior NPS authorization.
- Each specimen (or groups of specimens labeled as a group) that is retained permanently must bear NPS labels and must be accessioned and cataloged in the NPS National Catalog. Unless exempted by additional park - specific stipulations, the permittee will complete the labels and catalog records and will provide accession information. It is the permittee's responsibility to contact the park for cataloging instructions and specimen labels as well as instructions on repository designation for the specimens.
- Collected specimens may be used for scientific or educational purposes only, and shall be dedicated to public benefit and be accessible to the public in accordance with NPS policies and procedures.
- Any specimens collected under this permit, any components of any specimens (including but not limited to natural organisms, enzymes or other bioactive molecules, genetic materials, or seeds), and research results derived from collected specimens are to be used for

scientific or educational purposes only, and may not be used for commercial or other revenue - generating purposes unless the permittee has entered into a Cooperative Research And Development Agreement(CRADA) or other approved benefit - sharing agreement with the NPS. The sale of collected research specimens or other unauthorized transfers to third parties is prohibited. Furthermore, if the permittee sells or otherwise transfers collected specimens, any components thereof, or any products or research results developed from such specimens or their components without a CRADA or other approved benefit-sharing agreement with NPS, permittee will pay the NPS a royalty rate of twenty percent(20 %) of gross revenue from such sales or other revenues. In addition to such royalty, the NPS may seek other damages to which the NPS may be entitled including but not limited to injunctive relief against the permittee.

7. **Reports** - - The permittee is required to submit an Investigator's Annual Report and copies of final reports, publications, and other materials resulting from the study. Instructions for how and when to submit an annual report will be provided by NPS staff. Park research coordinators will analyze study proposals to determine whether copies of field notes, databases, maps, photos, and / or other materials may also be requested. The permittee is responsible for the content of reports and data provided to the National Park Service

8. **Confidentiality** - - The permittee agrees to keep the specific location of sensitive park resources confidential. Sensitive resources include threatened species, endangered species, and rare species, archeological sites, caves, fossil sites, minerals, commercially valuable resources, and sacred ceremonial sites.

9. **Methods of travel** - Travel within the park is restricted to only those methods that are available to the general public unless otherwise specified in additional stipulations associated with this permit.

10. **Other permits** - The permittee must obtain all other required permit(s) to conduct the specified project.

11. **Insurance** - If liability insurance is required by the NPS for this project, then documentation must be provided that it has been obtained and is current in all respects before this permit is considered valid.

12. **Mechanized equipment** - No use of mechanized equipment in designated, proposed, or potential wilderness areas is allowed unless authorized by the superintendent or a designee in additional specific conditions associated with this permit.

13. **NPS participation** - The permittee should not anticipate assistance from the NPS unless specific arrangements are made and documented in either an additional stipulation attached to this permit or in other separate written agreements.

14. **Permanent markers and field equipment** - The permittee is required to remove all markers or equipment from the field after the completion of the study or prior to the expiration date of this permit. The superintendent or a designee may modify this requirement through additional park specific conditions that may be attached to this permit. Additional conditions regarding the positioning and identification of markers and field equipment may be issued by staff at individual parks.

15. **Access to park and restricted areas** - Approval for any activity is contingent on the park being open and staffed for required operations. No entry into restricted areas is allowed unless authorized in additional park specific stipulations attached to this permit.

16. **Notification** - The permittee is required to contact the park's Research and Collecting Permit Office (or other offices if indicated in the stipulations associated with this permit) prior to initiating any fieldwork authorized by this permit. Ideally this contact should occur at least one week prior to the initial visit to the park.

17. **Expiration date** - Permits expire on the date listed. Nothing in this permit shall be construed as granting any exclusive research privileges or automatic right to continue, extend, or renew this or any other line of research under new permit(s).

18. **Other stipulations** - This permit includes by reference all stipulations listed in the application materials or in additional attachments to this permit provided by the superintendent or a designee. Breach of any of the terms of this permit will be grounds for revocation of this

permit and denial of future permits.



Prohibited Invasive Species Permit #520

Permit Valid from 4/17/2019 through 12/31/2019

Minnesota Department of Natural Resources (DNR)
Division of Ecological and Water Resources

Permittee: **Elizabeth Walsh and designees**
Organization: **University of Texas- El Paso (UTEP) - Dept. of Biological Sciences**
Address of organization: **500 W University Avenue, El Paso TX 79968**
Phone: **(915) 747-5421 [Daytime], (915) 342-7630 [Evening]**

Activities covered by this permit

- Collect and possess prohibited invasive species, native macrophytes, and infested waters for NSF rotifer research project.
- Renewal to permit #495

Permit conditions

- The permittee and all designees shall have a copy of the permit in their possession while conducting authorized activities of this permit.

Cleaning & Disposal

- Remove all aquatic plants, prohibited invasive species and other debris from equipment before leaving a water body.
- Dispose of all prohibited invasive species or render as nonviable upon completion of the project.

Transportation

- Transport specimen and infested waters in closed containers, label accordingly, and ship directly to research facilities.

Dates valid

- This permit is valid until 12/31/2019

Keegan Lund, Invasive Species Specialist

4/17/2019

Date

Signature of person responsible for activities under this permit	Date
	4/18/2019

This permit is only valid within the State of Minnesota. The DNR may revoke this permit if necessary to protect the public or state resources, and may inspect your facilities at any reasonable time. The State of Minnesota is not liable for any actions you take under this permit. Call the Division of Ecological and Water Resources at 651-259-5100 if you have questions about this permit.

Copied to: Maj. Glaser, Heidi Wolf, Dan Lais, Kelly Pennington, Jeanne Daniels, Kylie Cattoor, April Londo

 <p>SCIENTIFIC RESEARCH AND COLLECTING PERMIT Grants permission in accordance with the attached general and special conditions United States Department of the Interior National Park Service White Sands</p>	Study#: WHSA-00013 Permit#: WHSA-2014-SCI-0011 Start Date: Sep 09, 2014 Expiration Date: Dec 31, 2019 Coop Agreement#: Optional Park Code:
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Name of principal investigator: Name: Dr Elizabeth Walsh Phone: 915-747-5421 Email: ewalsh@utep.edu
Name of institution represented: University of Texas - El Paso
Co-Investigators:
Study Title: Biodiversity and biogeography of selected invertebrates in Chihuahuan desert waters
Purpose of study: Zooplankton play major roles in freshwater ecosystems; their abundance and ubiquitous occurrence rank them as one of the most important links in these aquatic food webs. Because of their high feeding and assimilation efficiencies, they play important roles in energy flow and nutrient cycling, accounting for 50% or more of the zooplankton production in some freshwater systems. Zooplankton contribute to both the microbial loop and higher trophic levels. Predation on zooplankton by malacostracans, copepods, insect larvae, hydrozoans and fish contributes to energy transfer to higher trophic levels. Additionally, species assemblages of zooplankton are useful in characterizing the trophic status of lakes. There have been few studies of zooplankton occurring in temporary aquatic habitats in the Chihuahuan desert. In general Chihuahuan desert waters have high levels of endemism in their molluscan and fish faunas. It is predicted that unique species of zooplankton occur as well. The purpose of this study is to include zooplankton found in the Park in a large-scale ecological and molecular phylogeographic study of zooplankton in Chihuahuan desert waters. The goal of this proposal is to complete an extensive survey the zooplankton fauna occurring in springs and temporary playas (Lake Lucero in particular) within White Sands National Park.
Subject/Discipline: Animal Communities / Wildlife Microbes
Locations authorized: Lake Lucero and other temporary and permanent water sources. The western 1/2 of the park (co-use) is subject to military restrictions. The park requires two weeks advance notice of visits to coordinate access.
Transportation method to research site(s): A car (Honda Fit TX JSY 541) or a state of Texas van (UTEP) or by foot.
Collection of the following specimens or materials, quantities, and any limitations on collecting:
Name of repository for specimens or sample materials if applicable:
Specific conditions or restrictions (also see attached conditions): Copies of final reports, thesis, dissertation, and/or publications must be submitted to: White Sands National Monument, Attn Resource Management, POB 1086, Holloman AFB, NM 88330. A copy of the approved research/collection permit must be in possession at all times in the field. 1. You are responsible for the research-related activities of your staff. Please ensure that all field staff adhere to all conditions of your permit. Field staff must possess a copy of your permit at all times while in the field. 2. You are required to notify the monument's research coordinator TWO WEEKS in advance of your trip, and advise them of your planned activities. Each week you will be required to completed the attached Back Country Travel Plan and submit the plan to the research coordinator and others assigned prior to conducting research activities. Once working in the park, report all emergencies by calling 911.

3. Unless otherwise authorized on your permit, you must carry out all of your activities out of public view. If you have obtained special permission to collect in front-country areas, you may be required to arrange for a uniformed escort.

4. If you collect specimens that are to be permanently retained, regardless of where they are kept, they must be accessioned and cataloged into the National Park Service's Automated National Catalog System, and must bear National Park Service accession and catalog numbers.

5. All equipment left in the field including plot markers must be specifically authorized in advance. Label all equipment with your name, date of installation, phone number, and the words "Research Study #XXXX." If you are authorized to place equipment or plot markers at White Sands, you will be required to GPS their locations.

6. Specific authorization must be obtained in advance before using chemicals or hazardous materials at White Sands. For specific information regarding the transport, use, and disposal of chemicals or hazardous materials, please contact the monument's research coordinator.

7. Cultural resources must not be adversely impacted by your research activities. Any ground disturbances must be specifically authorized in advance. Report any findings of artifacts such as lithic scatters or historical trash to the Research Permit Officer.

8. The Permittee agrees to notify the Superintendent of White Sands National Monument of every subject discovery or invention that relates in any respect to research results derived from use of any research specimens or other materials collected from White Sands National Monument, or that may be patentable or otherwise protected under the intellectual property (IP) laws of the United States or other jurisdiction. Notification must occur within sixty (60) days of the time that an inventor or other agent of the Permittee reports such a subject discovery or invention to the person(s) responsible for patent or other proprietary rights matters in the Permittee's organization, and in no case not less than sixty (60) days before a patent application is filed. Additionally, the Permittee agrees to notify the Superintendent of White Sands National Monument within thirty (30) days of filing any patent application or other IP claim in the United States or other country that relates in any respect to research results or other discoveries or inventions derived from use of any research specimens or other materials collected from White Sands National Monument. For purposes of this paragraph, the term "subject discovery or invention" means any discovery or invention related to or derived from research specimens or other materials collected from White Sands National Monument. All invention disclosures shall be marked as confidential under 35 U.S.C. Section 205.

09. Your permit does not authorize the bearer or those that accompany them to conduct commercial filming activities. Commercial film permits must be obtained from the monument's film coordinator.

10. EACH YEAR, INVESTIGATORS ARE REQUIRED TO SUBMIT COPIES OF JOURNAL ARTICLES, THESES, AND DISSERTATIONS THAT ARE DERIVED FROM THE RESULTS OF WHITE SANDS RESEARCH. THE PARK REQUESTS THAT YOU SUBMIT ARTICLES IN PDF FORMAT AND THAT ONE BOUND COPY OF EACH DISSERTATION/THESIS IS SUBMITTED.

Recommended by park staff(name and title):

Don Boston 12/16/14

Approved by park official:

Mauri Sauter 12/22/14

Title:

Superintendent

Reviewed by Collections Manager:

Yes No

Date Approved:

I Agree To All Conditions And Restrictions Of this Permit As Specified
(Not valid unless signed and dated by the principal investigator)

Elizabeth J. Walsh
(Principal investigator's signature)

12/16/14
(Date)

THIS PERMIT AND ATTACHED CONDITIONS AND RESTRICTIONS MUST BE CARRIED AT ALL TIMES WHILE CONDUCTING RESEARCH ACTIVITIES IN THE DESIGNATED PARK(S)

Oregon Parks and Recreation Department Scientific Research Permit Application Instructions

The Oregon Parks and Recreation Department (OPRD) welcomes interest in conducting scientific research on lands owned and managed by the department. Scientific studies designed to increase the understanding of ecological processes and resources on state park lands are a valuable source of information for park and resource managers.

OPRD intends to cooperate with organizations and institutions when their scientific research is compatible with the department's mission of land stewardship through the protection of ecological processes and natural resources.

A scientific research permit is required for most scientific or educational activities pertaining to natural and cultural resources that involve specimen collection, field work, or that may have the potential to disturb natural and cultural resources on OPRD owned or managed lands.

All requests for permit to conduct scientific or educational research and/or collection must be submitted on a current "Oregon Parks and Recreation Department Scientific Research Permit Application" form (available in Adobe PDF or Microsoft Word formats).

Instructions:

- Complete all appropriate blocks/lines. Applications must be typewritten with original signatures. A complete application prevents delays!
- Sign the application in ink and send an original to the address at the bottom of the application. Faxed copies will not be accepted.
- Attach to application a USGS topographic map and aerial photo with precise location of proposed work.
- We recommend that applications be submitted at least 60 days in advance of the first planned field activity.
- Permits may be issued for multiple years.

Email application to:

sara.griffith@oregon.gov

or

Mail application to:

Oregon Parks and Recreation Department
Attention: Stewardship Section
725 Summer Street, NE Suite C
Salem, Oregon 97301

For further information, contact:

Sara Griffith, Stewardship Assistant
(503) 986-0737

Oregon Parks and Recreation Department Scientific Research Permit Application

Instructions: Applications must be typewritten with original signatures. The precise location of the proposed work must be shown on an USGS topographic map and aerial photo. Application should be sent to the Department's Salem office.

Please allow for a minimum of 30 days to process the permit application.

Applicant's Name:	Elizabeth J. Walsh
Title:	Professor
Affiliation:	University of Texas at El Paso
Address:	500 W. University Ave., Department of Biological Sciences
City/State/Zip:	El Paso, TX 79968
Telephone Number:	(915) 747-5421
Fax Number:	(915) 747-5808
E-mail address:	ewalsh@utep.edu

Names of others involved in project/study, including names and phone numbers of all collectors:

N/A	

Resume or curriculum vitae for principal investigator and all field staff attached (required). Please see attachment.

PROJECT DESCRIPTION:

Include: Purpose, method of investigation, method of collection, species to be investigated and/or collected, steps to be taken to minimize impact, location and duration of project. Please include a project proposal if available. However, please do not simply say, “see attached.” Include a brief project summary in the space provided below.

I request permission to collect samples of (1) zooplankton, mainly rotifers, and (2) aquatic plants (e.g., Ceratophyllum, Myriophyllum) for sessile species. We have a projected funded by the National Science Foundation to study the phylogenetics of a large group of rotifers. The aim of the project is investigate the evolution of colonial and sessile life histories. Selected zooplankton collected will be cultured and used for molecular systematic work as well as life history documentation.

Simple procedures will be used to collect specimens from aquatic habitats (lakes, ponds, rivers). No quantitative sampling protocols are required for this work. Sampling needs a few simple devices such as plankton nets (25-50 µm), jars (sessile forms). Sampling will be opportunistic, based water availability at the springs. Water will be filtered through a plankton net and re-suspended in 50 to 100mls of filtered spring water. All equipment will be thoroughly rinsed and dried before using at the next habitat to prevent contamination between sites. Efforts will be made to minimize collection of larger aquatic invertebrates and vertebrates (tadpoles, fishes). Some vegetation will be sampled but no more than 1% of the total population of any given aquatic vegetation will be removed from each site.

Species will be identified using the keys of Koste (1978), Ruttner-Kolisko (1983) and Guides to the Identification of the Microinvertebrates of the Continental Waters of the World. Alcohol-preserved specimens will be stored at UTEP for species verification, future DNA extractions, or other potential uses. Locality, habitat, and some other ecological data will be recorded for all isolates. Voucher specimens will be deposited in UTEP’s Biodiversity Collections.

I propose to collect samples from permanent water bodies (lakes, ponds, rivers) in the vicinity of Portland, OR (south to Newport/Corvallis OR) located in State Parks.

SAMPLE/SPECIMEN COLLECTION:

Plant Soils Fungi Seeds Water Animal Rock

Other (specify):

If Plant/Animal – Identify the species to be researched or collected:

Name of Species	Animals = zooplankton (rotifers, cladocerans, copepods), plants = Myriophyllum, Ceratophyllum, Elodea canadensis
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Is/are the species a:

Federal endangered or threatened species?	Yes	No	No
Federal candidate species?	Yes	No	No
State endangered or threatened species?	Yes	No	No
State sensitive or candidate species?	Yes	No	No

Voucher specimens will be deposited at:	UTEP Biodiversity Collections
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Scientific Research Permit Standard Permit Conditions and Restrictions

By acceptance of this permit, Permittee agrees to abide by the following conditions:

1. All activities shall comply with applicable federal, state, and local laws, regulations, and ordinances. Any necessary federal, state, or local permits shall be obtained prior to the beginning of the activity. Copies of those permits must be provided to the Park Manager before work begins.
2. The Permittee assumes full responsibility and liability for any damages or injury to any member of the public arising out of the activity, including personal injury and property damage, and for any damage to park property.
3. The Permittee shall indemnify and hold harmless the State of Oregon, its Parks and Recreation Commission and members thereof, the State Parks and Recreation Department, and its officer, agents, and employees against any and all damages, claims, or causes of action arising from or in connection with the activity.
4. The study shall be completed only in those areas identified in the permit application and as identified on a 1:24,000 scale USGS map with a circle drawn around the proposed study area.
5. The Permittee shall carry a copy of this permit at all times while on OPRD managed or owned property, and must be able to show the permit to OPRD staff upon request.
6. The collections allowed under this permit shall be used for scientific or educational purposes only, shall be dedicated to the public benefit, and shall not be used for commercial purposes.
7. Except for the resources indicated in the permit, the taking or disturbing of resources is specifically prohibited.
8. Any permitted holes dug must be refilled. All holes must be dug with a shovel or a hand auger.
9. The collection of plants shall not occur within 200 feet of any road, parking lot, trail, campground, picnic area, or restroom, unless the collecting site is completely screened from view, in which case 100 feet will be the minimum distance.
10. No more than 1% of the population will be collected (i.e., one out of every hundred individuals). Permittee will use scientific judgment and will collect specimens only from populations that can tolerate collection without jeopardizing the viability of that population.
11. The Permittee shall submit a summary of the information gathered to the Park Manager where the investigations took place, and to the OPRD Stewardship Section in Salem, Oregon. The Department further requires that the Permittee shall provide to the Department any materials published because of this permit.
12. Contact the Park Manager(s) at least 24 hours prior to each occurrence of the permitted activity.
13. OPRD reserves the right to cancel this permit for any reason.
14. For activities on the ocean shore, a special drive-on-beach permit is needed for any areas closed to motor vehicles.
15. If any cultural material is discovered during a project, all work and operations must stop immediately and an OPRD archeologist must be contacted to assess the discovery. Contact Coastal Region Archaeologist Steve Willis at (541) 272-9353; Valleys Region Archaeologist Nancy Nelson at (503) 986-0578, and Mountains Region Steve Jenevein at (541) 971-301-3956.
16. Drone Usage Policy: 1) permit holder meet current FAA standards and provide us either a remote pilot certificate for Pilot in Command (PIC) or an FAA issued Certificate of Authorization (COA); 2) the aircraft must also be registered with the FAA and if the operator is a public entity in Oregon, with the Oregon Department of Aviation; 3) Additionally, you would need to contact Park Manager(s) at each specific park prior to using drones in their management areas.

Will the project involve ground disturbance: Yes No

Additional Permits:

Are additional federal or state permits required? Yes No

If so, please list and provide a copy of each permit:

Area for Proposed Study:

Please note that OPRD’s jurisdiction includes all state parks AND that portion of Oregon’s coastal zone from extreme low tide to the statutory or actual vegetation line, whichever is most landward and ¼ mile on each side of the river of all State Scenic Waterways.

Oregon State Parks near Portland, OR including

Devil’s Lake State Park– approximate GPS coordinates: 44.967222/-124.016667;
44.970664/-124.0123356

Detroit Lake State Park– approximate GPS coordinates: 44.700211/-122.183492

Luckiamute Landing State Park Natural Area– approximate GPS coordinates: 44.715925/-123.1060665

Molalla River State Park– approximate GPS coordinates: 45.296741/-122.703202

Champeog State Heritage Site– approximate GPS coordinates:45.252602/-122.873856

Tryon Creek State Natural Area– approximate GPS coordinates: 45.440541/-122.678317

Dates of Proposed Study: Project Begin Date/Project End Date

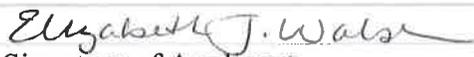
July 14, 2018	July 24, 2018	

Department of Aviation; 3) Additionally, you would need to contact Park Manager(s) at each specific park prior to using drones in their management areas.

**OPRD Special Conditions Imposed:
Do not write in box below, for reviewer use only.**

Special conditions apply: As follows See attached

I, the undersigned, have read and hereby agree to the conditions and restrictions listed above. I further understand that the department may impose special conditions. I hereby agree to abide by any special conditions if this permit is granted.

	Elizabeth J. Walsh	6/14/2018
Signature of Applicant	Printed Name of Applicant	Date

This permit has been approved with conditions denied

<hr/>	<hr/>	<hr/>
Trevor Taylor, OPRD Stewardship Manager	Printed Name Stewardship Manager	Date

Applicant must carry this permit at all times while on state park owned or managed properties

Email application to:
sara.griffith@oregon.gov

OR

Mail application to:
Oregon Parks and Recreation Department
Attention: Stewardship Section
725 Summer Street, NE Suite C
Salem, Oregon 97301

For further information, contact:
Sara Griffith, Stewardship Assistant, (503) 986-0737

 <p>SCIENTIFIC RESEARCH AND COLLECTING PERMIT Grants permission in accordance with the attached general and special conditions United States Department of the Interior National Park Service Guadalupe Mountains</p>	<p>Study#: GUMO-00083 Permit#: GUMO-2016-SCI-0017 Start Date: Nov 21, 2016 Expiration Date: Dec 31, 2017 Coop Agreement#: Optional Park Code:</p>
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<p>Name of principal investigator: Name: Dr Elizabeth Walsh Phone: 915-747-5421 Email: ewalsh@utep.edu</p>
<p>Name of institution represented: University of Texas - El Paso</p>
<p>Co-Investigators:</p>
<p>Study Title: Community composition and phylogeography of selected invertebrates in Chihuahuan desert waters</p>
<p>Purpose of study: Zooplankton play major roles in freshwater ecosystems; their abundance and ubiquitous occurrence rank them as one of the most important links in these aquatic food webs. Because of their high feeding and assimilation efficiencies, they play important roles in energy flow and nutrient cycling, accounting for 50% or more of the zooplankton production in some freshwater systems. Zooplankton contribute to both the microbial loop and higher trophic levels. Predation on zooplankton by malacostracans, copepods, insect larvae, hydrozoans and fish contributes to energy transfer to higher trophic levels. Additionally, species assemblages of zooplankton are useful in characterizing the trophic status of lakes. There have been few studies of zooplankton occurring in temporary aquatic habitats in the Chihuahuan desert. In general Chihuahuan desert waters have high levels of endemism in their molluscan and fish faunas. It is predicted that unique species of zooplankton occur as well. The purpose of this study is to include zooplankton found in the Park in a large-scale ecological and molecular phylogeographic study of zooplankton in Chihuahuan desert waters. The goal of this proposal is to complete an extensive survey the zooplankton fauna occurring in springs and other waterbodies within Guadalupe Mountains National Park.</p>
<p>Subject/Discipline: Ecology (Aquatic, Marine, Terrestrial)</p>
<p>Locations authorized: McKittrick Canyon, Choza Spring, Manzanita Spring, Pine Springs, Guadalupe Spring and other springs and waterbodies within the park to include South and Middle McKittrick Research Natural Areas with discretion.</p>
<p>Transportation method to research site(s): We will hike in to all sites.</p>
<p>Collection of the following specimens or materials, quantities, and any limitations on collecting:</p>
<p>Name of repository for specimens or sample materials if applicable: Repository type: Will be destroyed through analysis or discarded after analysis Objects collected: Zooplankton samples, live and preserved in ethanol, will be collected and used for DNA extraction for phylogenetic analyses. Voucher specimens will be retained in ethanol or formalin in UTEP's Biodiversity Collections.</p>
<p>Specific conditions or restrictions (also see attached conditions): All general permit conditions and restrictions shall apply. It is the responsibility of the primary investigator and field associates to be familiar with permit conditions and restrictions. Investigator must notify their contact in the park resource management office prior to collecting activities so park field staff may be notified of authorized projects. Please include date of arrival, vehicle description, license number and number in party in notification to park. Specimen collection is to be performed away from areas of concentrated visitor use and the collection site left in a natural-appearing condition. Research permits do not constitute a fee waiver for use fees (camping or trail use) charged within the park. Applications wishing a</p>

fee waiver should contact the Chief Ranger, Guadalupe Mountains National Park.

PARK REQUIREMENTS FOR RESEARCH PROJECT DELIVERABLES

1. Proposed Repository-Appendix A: Signed before inception of field work.
2. Field Notes/Journals/Field catalogs: End of field session.
3. GPS Data on collected specimens: End of field session.
4. List of collected specimens/samples: End of field session and annually thereafter as long as specimens continue to be processed.
5. Final Report or Publication: Upon publication date or 5 years from inception of permit, whichever comes first.
6. Maps/Stratigraphic Sections
7. Final digital deliverables MAY include: GIS shapefiles/geodatabases (w/metadata), Nonspatial (tabular) data (w/metadata), narrative documentation or descriptions, digital images (with metadata), photo or digital image log, specialists' reports/analyses, raw data sheets, analytical study data, collection inventories/tabulations/lists, specimen preparation records (if applicable), conservation treatment records (if applicable), list of samples consumed through destructive analysis (if applicable), videotapes, digital movies (with metadata), remote sensing data, and sound recordings.

All digital deliverables will be named using Guadalupe Mountains National Park file naming conventions.

All objects or samples collected from the park that are not consumed in analysis WILL BE CATALOGED into the NPS collections database and placed in an approved repository. If the project is terminated before completion, the permit holder is responsible to return all data, field notes, samples or specimens to the park. PI is responsible for ensuring collected specimens are cataloged into NPS museum database.

The principal investigator is responsible for submitting an Investigator's Annual Report to provide a status of specimens and analysis. This is required EACH YEAR until the final analysis, published manuscript or final report is received by the park.

Recommended by park staff (name and title):

General Search Res Coord

Approved by park official:

D. Brennan

Title:

Superintendent

Reviewed by Collections Manager:

Yes No

Date Approved:

05 December 2016

I Agree To All Conditions And Restrictions Of this Permit As Specified
(Not valid unless signed and dated by the principal investigator)

Elizabeth J. Walse

(Principal investigator's signature)

05 December 2016

(Date)

THIS PERMIT AND ATTACHED CONDITIONS AND RESTRICTIONS MUST BE CARRIED AT ALL TIMES WHILE CONDUCTING RESEARCH ACTIVITIES IN THE DESIGNATED PARK(S)



Research & Monitoring Special Use Permit

Station #:

(For Official Use Only)

Permit #:

Permit Term: From To

1) Principal Investigator Name/Affiliation:

- 2) Permit Status: a) Approved: If approved, provide special conditions (if any) in the text box below.
 b) Denied: If denied, provide justification in the text box below.

[Type in additional Special Conditions or Justification for Denied Permit in the space provided]

Permit recipient will be collecting water samples within and around the refuge water tanks, creeks, and ponds to study aquatic communities of invertebrates including rotifers, copepods, cladocerans, tadpole shrimp, fairy shrimp, etc. throughout 2017-2018 both before and after annual monsoons. Expected locations will include, Arivaca Cienega Trail, Arivaca Creek Trail, various stock ponds and Triangle pond.

- 3) Are there additional special conditions attached to the permit? Yes No
- 4) Are licenses/permits required, and have they been verified? Yes No N/A
- 5) Are Insurance and/or Certification(s) required, and have they been verified? Yes No N/A
- 6) Is an Assurance of Animal Care or Institutional Animal Approval form needed? Yes No N/A
- If yes, is the form attached? Yes No
- 7) Has a Minimum Requirements Decision Assessment been conducted? Yes No N/A
- If yes, is assessment attached? Yes No
- 8) Record of Payments: Exempt Partial Full
- Amount of payment: Record of partial payment:
- 9) Is a surety bond or security deposit required? Yes No N/A

This permit is issued by the U.S. Fish and Wildlife Service and accepted by the applicant signed below, subject to the terms, covenants, obligations, and reservations, expressed or implied herein, and to the notice, conditions, and requirements included or attached. A copy of this permit should be kept on-hand so that it may be shown at any time to any refuge staff.

10) Permit approved/issued by: (Signature and title)

Date: _____

11) Permit accepted by: (Signature of permittee)

Elizabeth Walsh

Date: 5/12/17

 <p>SCIENTIFIC RESEARCH AND COLLECTING PERMIT Grants permission in accordance with the attached general and special conditions United States Department of the Interior National Park Service Valles Caldera</p>	Study#: VALL-00055 Permit#: VALL-2016-SCI-0054 Start Date: Nov 28, 2016 Expiration Date: Nov 01, 2017 Coop Agreement#: Optional Park Code:
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Name of principal investigator:	Name: Dr Elizabeth Walsh	Phone: 915-747-5421	Email: ewalsh@utep.edu
Name of institution represented:	University of Texas - El Paso		
Co-Investigators:			
Study Title:	Diversity and adaptation of rotifers from high altitude ponds and lakes		
Purpose of study:	To characterize rotifer community of high altitude ponds and lakes. Rotifers will be identified, use for phylogenetic analysis and culture for experiments to determine tolerance to uv radiation and temperature regimes.		
Subject/Discipline:	Inventory Natural Resources Protista (Including Algae, Fungi) Water Quality		
Locations authorized:	Locations to be sampled include assorted hot springs, lakes, and streams		
Transportation method to research site(s):	Automobile or foot depending on access		
Collection of the following specimens or materials, quantities, and any limitations on collecting:			
Name of repository for specimens or sample materials if applicable:	Repository type: Will be destroyed through analysis or discarded after analysis Objects collected: Zooplankton samples in order to identify Rotifera		
Specific conditions or restrictions (also see attached conditions):	<p>Access for researchers is generally Preserve-wide, though standard vehicle access is restricted in many areas. Researchers may access research sites by hiking, mountain biking, horseback or UTV (with permission). ATVs are not permitted.</p> <p>Snowpack may limit winter access; researchers may use XC skis, snowshoes, or snow machines (with permission).</p> <p>Laboratory support facilities may be available in the Preserve's offices in Jemez Springs (about 20 miles from the Preserve); herbarium and museum collections of invertebrates are also available to visiting researchers. If needed, include laboratory space requests in the permit application.</p> <p>Existing databases for climate, water quality, species lists, GIS (geology, soils, vegetation, etc.), wildlife and fisheries populations, and long-term monitoring projects are available to visiting researchers.</p> <p>There are currently no on-site housing facilities for visiting researchers or summer staff; camp sites are available on the Santa Fe National Forest adjacent to the Preserve. Special use campsite locations on the Preserve may be permitted on a case-by-case basis. Motel and B&B housing may also be found in the village of Jemez Springs and the city of Los Alamos.</p> <p>Any soil-disturbing projects will require cultural resources review and evaluation; field archaeological surveys of proposed research sites may require several months notice to get on to field archaeological schedules. For large survey efforts, cost-recovery may be required from the applicant.</p>		

Recommended by park staff (name and title):
Robert Parrment 2/8/17

Reviewed by Collections Manager:

Yes No

Approved by park official:
[Signature]

Date Approved:
2/15/17

Title:
Superintendent

I Agree To All Conditions And Restrictions Of this Permit As Specified
(Not valid unless signed and dated by the principal investigator)

Elizabeth Wala
(Principal investigator's signature)

2/16/17
(Date)

THIS PERMIT AND ATTACHED CONDITIONS AND RESTRICTIONS MUST BE CARRIED AT ALL TIMES WHILE CONDUCTING RESEARCH ACTIVITIES IN THE DESIGNATED PARK(S)

Valles Caldera National Preserve

Regulations & Procedures on the Valles Caldera National Preserve (VALL) for Visiting Scientists and Researchers:

Scientific researchers are welcome on the Preserve, and the Park Service appreciates the contributions made by scientists to the knowledge base, operational policies, and public interpretation programs of the Preserve. As with all visitors and users on the Preserve, the Park Service has developed regulations and procedures to ensure protection of the natural and cultural resources, as well as public safety on the Preserve. As a visiting scientist, it is your responsibility, and that of your co-workers/students, to know and follow Preserve regulations. The following regulations and policies are in effect for each research Primary Investigator and their sub-permittees, employees, staff, students and volunteers:

Entry to the Preserve is only for objectives and locations listed on your permit. To minimize disturbance to wildlife and habitat, you may travel only on established roads on direct routes to and from research site(s). Your permit has a map attached showing these roads. The vehicle speed limit is 25 mph. Pets are not permitted. A research permit is not a permit for touring/hiking/sightseeing.

A copy of your research permit must be displayed on your vehicle's dashboard, and you should carry a second copy with you when you are away from your vehicle. Be sure to always park in either designated parking lots or in areas free of grass or other vegetation that might catch fire from the vehicle's hot exhaust system.

All researchers must telephone the Preserve or email the Chief of Science & Resources at least 24 hours prior to arriving on the Preserve (Email: Robert.Parmenter@nps.gov, Office phone: 575-829-4850; Cell phone: 505-699-6203; business hours M-F, 8 AM to 4:30 PM) to receive updates on road conditions, fire restrictions and/or potential area closures.

When entering or leaving the Preserve at any of the gates, researchers must sign in and out on the clipboards located in the metal boxes just inside the gates at Sulphur Canyon and Redondo Canyon, or at the visitor staging area in the Valle Grande. This is for your safety and protection; in case you don't come out of the Preserve on time, NPS Search & Rescue teams can check the sign-in sheet to verify you haven't come out, and can determine where your destination to start their search.

All Preserve gate combinations are changed monthly. For security reasons, gate combinations are subject to change at any time throughout the year without prior notice. Leave all gates the way you find them when entering or leaving. Do not share the gate combination with anyone outside of your research team. If anyone requests the combination, refer them to the Preserve office (575-829-4800).

To protect wildlife, habitat, cultural, and historical resources, any collecting of plant, animal, or mineral specimens, antlers, man-made objects, and artifacts is prohibited unless otherwise specified on the research permit.

Upon completion of a project, all stakes, flagging, transect markers or other man-made items must be removed according to the approved clean-up plan.

To minimize human impact on Preserve lands and wildlife, camping, fires, weapons, and littering are prohibited, unless specifically authorized in your research permit.

Do not enter the Preserve or drive on dirt roads when conditions are wet or muddy. If it starts to rain/snow, please leave the Preserve before you cause damage to the roads.

Permittees must report vehicle accidents and human injuries to the Preserve office within 24 hours to complete the necessary documentation. If possible, do not move vehicles from the scene of an accident until an investigation takes place.

Possession of alcohol or controlled substances on Preserve property is prohibited, as is entering the Preserve under the influence of alcohol or medication to such a degree as to endanger oneself, another person, or property.

No pets are permitted on the Preserve, except for dogs on leashes in designated areas near the visitor entrance station in the Valle Grande. Pets cannot be transported beyond this area, even with the intention of leaving them in your vehicle, so please leave them at home.

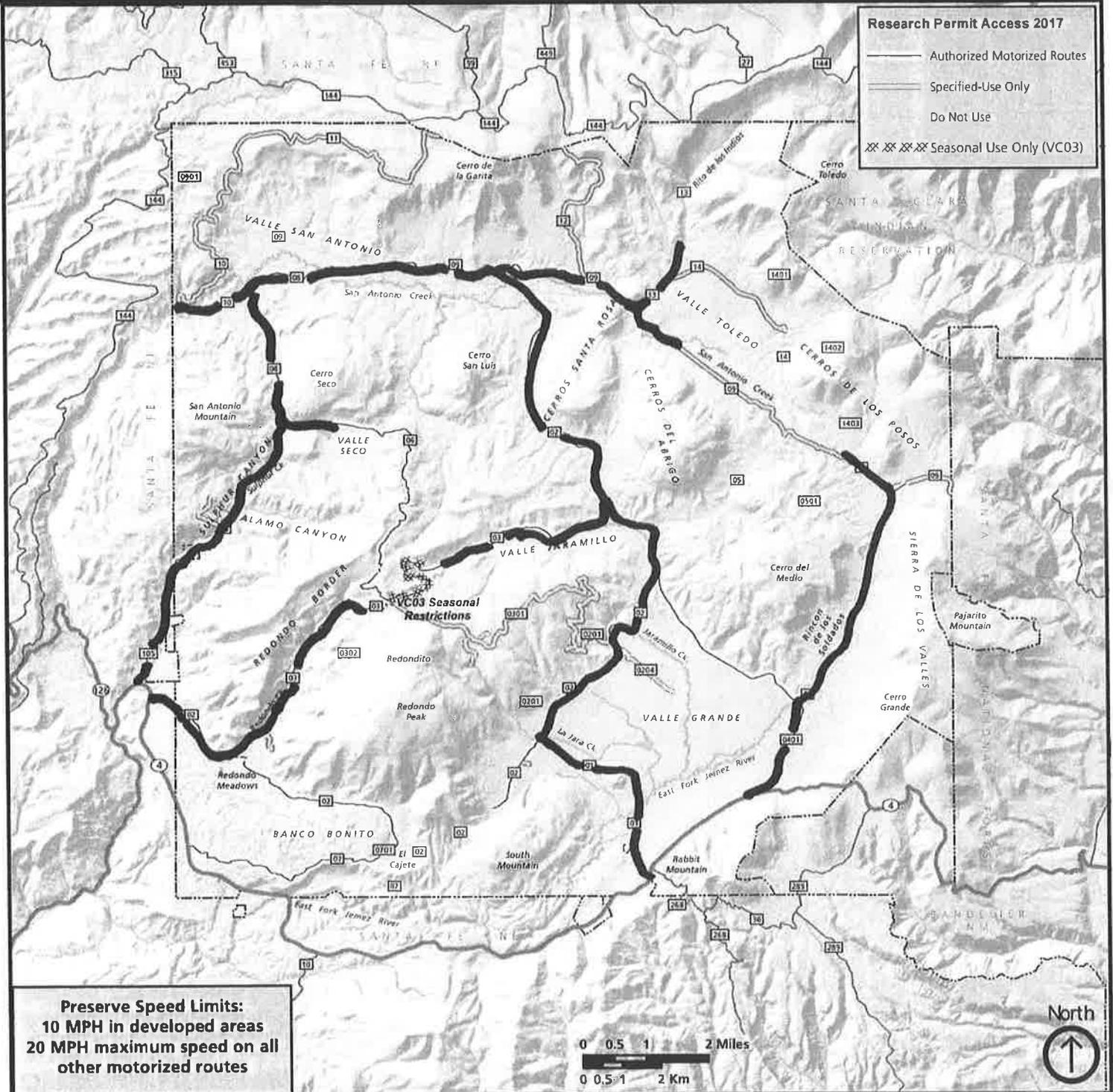
Respect others' vehicles, structures, equipment, and research projects.

Road hazards, damaged fencing, injured animals, or anything unusual should be reported to the Preserve office. As part of our efforts to preserve and restore native habitats on the VALL, we also request that any new colonies of invasive plants and non-native animal sightings be reported.

Valles Caldera National Preserve

Research Permit Access Roads 2017

Intermountain Region
National Park Service
U.S. Department of the Interior



Research permit access roads: Road access may change due to Preserve closures, weather, or fire conditions. Permittee must check with the Chief of Resource & Science Stewardship to obtain updated road information prior to entering the Preserve.

2/2017

- Research permittee is permitted to drive on all Authorized Motorized Routes as shown on this map.
- Research permittee is permitted to drive on only those roads specified with additional notations on this map.

Authorized by: Jorge Silva-Banuelos, Superintendent

2/15/17
Date

**STATE PARK SCIENTIFIC STUDY PERMIT
TEXAS PARKS AND WILDLIFE DEPARTMENT
NATURAL RESOURCES PROGRAM**

Telephone: 512/389-4679
FAX: 512/389-4495
Email: david.riskind@tpwd.state.tx.us

Permit No: 2017- R1-19
Date: 14 December 2017

Permit Period: From : 15 December 2017 To: 31 December 2019.

Permit Scope: To collect plankton and other aquatic microflora and fauna at springs and other water sources within Balmorhea, Bastrop, Big Bend Ranch, Davis Mountains, Enchanted Rock, Franklin Mountain, Inks Lake, Lake Somerville, McKinney Falls State Parks, Heco Tanks State Park & Historic Site, and Devils River State Natural Area - Del Norte Unit. Water samples and specimens of aquatic vegetation may be collected in association with sampling. Collections may be taken with hand held plankton net kept in spring source water. Permittee is required to contact park in advance of collecting trip and coordinate collecting sites with park staff.

Permittee: Elizabeth J. Walsh
Department of Biological Sciences
500 W. University Ave.
University of Texas at El Paso
El Paso, TX 79968

General Provisions: The permittee agrees to the following provisions (1) discretely conduct such studies so as not to unduly disturb or destroy any physical, natural or aesthetic features within said park (other than the specimens collected) or disturb park visitors; (2) to notify the Park Superintendent upon arrival at the site; (3) to abide by any special directives issued by or through the Park Superintendent concerning the area(s) in which studies may be conducted; (4) The permittee understands that no study shall take place in the park before or after the permit period designated above; (5) that all studies be conducted by the requestee or by collaborators or assistants as designated above; (6) that none of the specimens may be sold or used for barter or trade; (7) that the permit issued may be revoked by the Texas Parks and Wildlife Department at any time; and (8) a copy of this permit must be available for inspection during field work at park site. (Please refer to permit number in all correspondence.)

Special Provisions: (1) The permittee agrees to furnish the Texas Parks and Wildlife Department a complete summary of the studies conducted under the provisions of this permit by March of the year following this permit and an established account resulting from investigations authorized by this permit, (2) the permittee agrees to furnish the Texas Parks and Wildlife Department a list of all collections made during this study and as well must furnish the Department with the name and location of the institution or collection in which the specimens are deposited, and (3) the permittee shall acknowledge the Texas Parks and Wildlife Department in any published article regarding research carried out under the terms of this permit. The acknowledgement shall include the appropriate permit number(s).

Waiver: See park superintendent for scientific study/educational day-use entrance fee waiver.

By affixing his signature hereon,
the permittee agrees to all terms
and conditions of this permit.

Elizabeth J. Walsh
Signature

1/2/18

Date: _____

Approved by the Texas Parks
and Wildlife Department.

Nickolas Hawlik

for DHR
Signature David H. Riskind

Natural Resources Program Date: 14 December 2017