



INVESTIGATOR'S ANNUAL REPORT

United States Department of the Interior
National Park Service

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

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

Reporting Year: 2013	Park: Craters Of The Moon National Monument and Preserve	Select the type of permit this report addresses: Scientific Study
Principal Investigator: Mr Patrick Gorrington		Office Phone: 617 496 4076
Mailing Address: 26 Oxford St., 406A Cambridge, MA 02138		Office Fax:
		Office Email: pgorrington@fas.harvard.edu
Additional investigator or key field assistants (first name, last name, office phone, office email)		

Study Title (maximum 300 characters): Systematics and determinants of diversity in conifer woodboring Beetles			
Park-assigned Study or Activity #: CRMO-00060	Park-assigned Permit #: CRMO-2013-SCI-0002	Permit Start Date: Jun 04, 2013	Permit Expiration Date: Dec 31, 2013
Scientific Study Starting Date: Jun 04, 2013		Estimated Scientific Study Ending Date: Dec 31, 2013	
For either a Scientific Study or a Science Education Activity, the status is: Continuing	For a Scientific Study that is completed, please check each of the following that applies: ☐ A final report has been provided to the park or will be provided to the park within the next two years ☐ Copies of field notes, data files, photos, or other study records, as agreed, have been provided to the park ☐ All collected and retained specimens have been cataloged into the NPS catalog system and NPS has processed loan agreements as needed		
Activity Type: Research			
Subject/Discipline: Invertebrates (Insects, Other)			

Purpose of Scientific Study or Science Education Activity during the reporting year (maximum 4000 characters): from proposal, in part: Plants and the insects that feed upon them represent more than half of all described eukaryotic species. This project focuses on conifers and the beetles that are their parasites. Representatives of all conifer feeding species of Monochamus beetles will be collected and a phylogenetic estimate created. With this data, and pure genetic sequencing information, species can be delineated. Their biogeographic history, potentially perturbed by climate change or host-plant range shifts, can also be realized through the molecular data derived from beetles sampled. When combined with host plant records from nature, these results will inform the hypothesis that host affiliation can spur speciation. By collecting from multiple populations through each species' range, distinction of populations and their relationship to one another, and the environment, can be appreciated. Addition: In addition to determining if native beetle species are present in the park, this study will find other information valuable to park
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resources. First, non native species may be discovered which will allow for action in controlling these insects. Another benefit will be the addition of host plant knowledge for these beetles. If a plant species is at risk it is valuable to know those insects feeding on it and if the insects may be at risk as well.

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

Collections for the year 2013 occurred from July 12- July 13.

Collecting activities within the Craters of the Moon National Monument were successful. My target taxon was *Monochamus clamator*, a pine feeding longhorned beetle. The last collections of this species in the area took place in the mid 1960s. This location was particularly interesting because *Pinus flexilis* is the only hospitable pine host plant in this isolated area. This beetle was found in large numbers through a combination of trapping and hand collecting.

Three methods were used to collect beetles in 2013. Panel traps baited with a combination of tree based and beetle derived chemicals were set out in areas around the loop road and near 'Grassy Cone'. These traps imitate a dying pine tree with various beetles visiting. These traps attracted ~2 *Monochamus* each in a day's time. The second method of collection was ultraviolet light. A blacklight was set up on a sheet after dark to attract these nocturnal beetles. This was productive with a handful being attracted. Hand collecting was also done on a dying *Pinus flexilis* discovered in one of the parking lots. This tree had many male *M. clamator* guarding it. There were also some females and other species attracted to dying pines.

The specimens collected are currently with the researcher at Harvard University. They are destined for DNA/RNA extraction and sequencing in conjunction with a PhD thesis project. This project investigates the influence of plants on beetle speciation and diversity. These specimens are not currently cataloged.

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

Yes

Funding specifically used in this park this reporting year that was provided by NPS (enter dollar amount):

\$0.00

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

\$0.00

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

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

Yes

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

All specimens are at Harvard University. They are preserved frozen, at -80 C or in 100% ethanol.

Paperwork Reduction Act Statement: A federal agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. Public reporting for this collection of information form is estimated to average 1.38 hours per response, including the time for reviewing instructions, gathering and maintaining data, and completing and reviewing the forms. Direct comments regarding this burden estimate or any aspect of this form to Dr. John G. Dennis, Natural Resources (3130 MIB), National Park Service, 1849 C Street, N.W., Washington, DC 20240.

Privacy Act Notice: Scientific research, education and collecting activities within units of the National Park System that may impact parks invoke a permitting and reporting requirement per regulations at 36 CFR 1.6 (Permits), 36 CFR 2.1 (Preservation of Natural, Cultural and Archeological Resources), and 36 CFR 2.5 (Research Specimens). The National Park Service collects information about permit applicants and permittees to administer and document research, collecting, and reporting activities within parks. The information disclosed on this form is required and may result in denial of permit applications if not provided.