

<p align="center"><b>SCIENTIFIC RESEARCH AND COLLECTING PERMIT</b></p> <p align="center">Grants permission in accordance with the attached general and special conditions</p> <p align="center"><b>United States Department of the Interior National Park Service</b></p> <p align="center"><b>Mojave</b></p>	<p>Study#: MOJA-00315</p> <p>Permit#: MOJA-2019-SCI-0010</p> <p>Start Date: Mar 31, 2019</p> <p>Expiration Date: Sep 29, 2019</p> <p>Coop Agreement#:</p> <p>Optional Park Code:</p>
---	--

<b>Name of principal investigator:</b> Name: Ms Malory Owen      Phone: 5132552369      Email: maloryowen@gmail.com		
<b>Name of institution represented:</b> York University		
<b>Additional investigators or key field assistants:</b>		
Name: Christopher Lortie	Phone:	Email: chris@christopherlortie.info
Name: Jenna Braun	Phone:	Email: cicadid@gmail.com
Name: Nargol Ghazian	Phone:	Email: nargolgl@my.yorku.ca
Name: Mario Zulianni	Phone:	Email: zulianimario96@gmail.com
Name: Alex Filazzola	Phone:	Email: alex.filazzola@outlook.com
Name: Stephanie Haas	Phone:	Email: smhaas014@gmail.com
<b>Study Title:</b> Linking Avian pollination and frugivory of Cactaceae to seed dispersal and successful facilitation		
<b>Purpose of study:</b> Double mutualism is a positive interaction where one taxonomic group provides services to a benefactor at two different life stages of the benefactor. Birds are known pollinators and seed dispersals for members of the Cactaceae family. These two positive interactions are limiting factors for seed dispersal, which impact a mother plant's seed shadow and reproductive success, particularly so when seed rain is deposited in beneficial conditions for germination (like under a facilitating benefactor shrub). In this study, we will examine the first step in the double mutualistic seed dispersal pathway of pollinating and frugivorous birds for the cactus species <i>Cylindropuntia anthrocarpa</i> . Determining visitation rates based on the species, size, flower/fruit production of cacti and the potential seed rain and seed shadow influenced by these double mutualisms could shed light on the potential reproductive success that cacti with different characteristics have. Mapping these pathways will improve our understanding of the impact of double mutualism on habitat structure and growth.		
<b>Subject/Discipline:</b> Ecology (Aquatic, Marine, Terrestrial)		
<b>Locations authorized:</b> Likely, we will be conducting most of the study at the Sweeney Granite Desert Research Center (34.8056°N, 115.6639°W), however, we may need to expand depending on the amount of rainfall that allows cacti blooming and fruiting. In this event, we will potentially expand to cacti-shrub lands near Sweeney Granite Desert Research Center (see map of highlighted area).		
<b>Transportation method to research site(s):</b> For further distances, we will use a field vehicle, but we will not go off road. As of yet, we do not know the license plates. To get into the actual field and cactus individuals, we will go on foot.		
<b>Collection of the following specimens or materials, quantities, and any limitations on collecting:</b>		
<b>Name of repository for specimens or sample materials if applicable:</b>		
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: General conditions for research in National Parks and conditions specific to Mojave National Preserve are attached.		
An Investigator's Annual Report will be due at the end of the year. Instructions for filing this report online will be sent near the end of the year.		
In addition, the park requires copies of all reports, data, and publications derived from this work.		

Contact Kelso Depot Visitor Center 760-252-6108 to obtain a Researcher's Placard for your vehicle and display in the windshield when leaving your vehicle unattended.

Access to wilderness is by foot or pack animal only. Mechanized transport and motorized equipment are prohibited in wilderness areas. All work inside wilderness areas is restricted to hand tools.

Extra precaution is required during active tortoise season. Check under your field vehicles for tortoise prior to starting and moving.

Recommended by park staff (name and title):

Approved by park official:

Title:

Superintendent

**ACTING**

Reviewed by Collections Manager:

Yes ☒

No ☐

Date Approved:

3.14.19

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

(Principal investigator's signature)

March 4, 2019

(Date)

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