

Putah Creek Riparian Reserve

MONTH AND YEAR: March 2021



UNIVERSITY OF CALIFORNIA, DAVIS RESEARCH USE APPLICATION

Please check the part of the Reserve you wish to visit. Please call in advance to check for availability, then fill out one application per researcher, per area of the Reserve.

- ☐ Main Campus/South Fork Putah Creek
- ☐ North Fork Cutoff (Old channel of Putah Creek)
- ☐ Russell Ranch
- ☒ Experimental Ecosystem

Please email completed application to: Andrew Fulks, Putah Creek Riparian Reserve

Email: amfulks@ucdavis.edu

Prior to each visit to the Reserve, send a text message to the Reserve Steward, JP Marie, at 530-304-3251 to let him know you will be on site, or email jpmarie@ucdavis.edu.

1. APPLICANT INFORMATION:

APPLICANT: Katherine Lauck

APPLICANT'S TITLE OR ACADEMIC STATUS: PhD student

ADVISOR (If applicable): Daniel Karp

INSTITUTION (Do not abbreviate): University of California, Davis

DEPARTMENT (Do not abbreviate): Department of Wildlife, Fish, and Conservation Biology

OFFICE ADDRESS: 1072 Academic Surge

CITY/STATE/ZIP: Davis, CA 95616 OFFICE PHONE: _____

OFFICE FAX: _____ EMAIL: _____

2. PROJECT DURATION DATES (Month/year to month/year): March 2021 through July 2023

3. REQUESTED ARRIVAL AND DEPARTURE DATES

March 2021 – July 2021

4. FULL PROJECT/THESIS TITLE (Do not truncate):

The effects of vegetation structure and management on nest box temperature and the consequences for chick growth and survival

IF FOR DEGREE: ☐ BS/BA ☐ MS/MA ☒ Ph.D. Advisor's Name: _____

Daniel Karp

5. INTRODUCTION OF NON-NATIVE GENOTYPES

Does your project involve the transfer of animals, plants, and/or microorganisms from outside the Reserve to within the Reserve, or between different parts of the Reserve? ☐ Yes ☒ No

6. STATEMENT OF PROPOSED RESEARCH PROJECT.

Habitat loss to anthropogenic disturbance is the primary driver of species loss and endangerment. Efforts to increase biodiversity in working landscapes, such as installing nest boxes for cavity-nesting birds, may allow more species to thrive in human-dominated landscapes. However, as climate change progresses, human-dominated landscapes may expose birds to new temperature extremes because converting land to agriculture removes trees that insulate the understory from ambient temperature. In bird species with altricial young, nestlings are ectothermic, so both low and high temperatures divert energy from growth to thermoregulation. The lethal effects of cold are well-documented, but the effects of heat will also be salient in the future as climate change increases both mean and maximum temperatures. Accordingly, we will investigate the effects of climate change and land use change on nest temperatures as well as nestling growth and survival.

Questions

- *Question 1.* How does land usage affect temperature profiles inside and outside of a bird's nest?
 - *Hypothesis 1.* In habitats that have closed canopies (i.e. closed riparian and orchard sites) we expect nest boxes to show fewer and less severe temperature spikes over the nesting season. Forest canopies have the ability to insulate the area below the canopy from both high and low macroclimatic temperatures, so we expect that more closed canopies will offer a higher buffering capacity.
- *Question 2.* How do nest box temperature and land usage affect nestling growth and survival rates?
 - *Hypothesis 2.* Temperature spikes will be more frequent and more severe in open land uses (i.e. row crop and grassland systems) which will correlate with slower weight gain and lower survival rates in nestlings in those sites. Without the buffering capacity of a canopy, nest boxes in open land uses will suffer more frequent and severe temperature spikes. Nestlings are ectothermic and therefore vulnerable to temperature changes. High temperatures may cause hyperthermia, causing nestlings to expend more energy on maintenance and lowering their growth rates.

Methods

To address question 1, we will monitor three nest boxes at each of three unique sites in each of four land use treatments (row crop agriculture, orchard agriculture, low canopy cover oak savannas, and high canopy cover riparian forests) for a total of 36 nest boxes monitored simultaneously beginning in late March. We will partner with the Bohart Museum of Wildlife and Fish Biology to access their existing Putah Creek Nest Box Highway, a network of 169 nest boxes along Putah Creek from Solano Diversion Dam past the English Hills. However, the Nest Box Highway does not include nest boxes in row crop agriculture, so we will secure permission from landowners to place 10 boxes each at three new row crop sites and one grassland site. We will use HOBO temperature loggers to measure and record temperature every 5 minutes inside and outside of the nest box. Specifically, we will place a HOBO on the inside and outside of each nest box after eggs are laid. We anticipate moving each HOBO to a new nest two more times during the nesting season after the end of each nest, for a total of 108 nests monitored from mid-March through the end of July. Sample size will vary according to availability of nestlings. Finally, after field work ends, we will compare the frequency and severity of temperature spikes between land uses using linear models.

To address question 2, we will partner with the Bohart Museum of Wildlife and Fish Biology to monitor nestling growth and survival. As part of a larger, long-term survey of bird use of the Putah Creek Nest Box Highway, Hanika Cook and her team will record mass, tarsus length, bill length, and wing chord of nestlings and band them at the appropriate time. Graduate student Katherine Lauck and I will also be trained to handle, measure, and band nestlings in March because we will monitor nests in additional nest boxes referenced above. We will compare the effects of land use and temperature on nestling growth and survival probability using linear models.

PCRR's role

We request permission to place 10 nest boxes in the Experimental Ecosystem area and monitor them as described above. Please find attached map of proposed nest box locations.

7. CONTRACT/GRANT INFORMATION (Please check all that apply to your project.)

☐ PROJECT IS SELF-FUNDED.

☒ PROJECT IS CURRENTLY BEING SUPPORTED BY A CONTRACT(S) OR GRANT(S)

☒ A CONTRACT(S) OR GRANT(S) APPLICATION HAS BEEN SUBMITTED BUT HAS NOT YET BEEN APPROVED.

☐ A CONTRACT(S) OR GRANT(S) APPLICATION WILL BE SUBMITTED IN THE FUTURE.

PLEASE LIST THE ESTIMATED PERCENTAGE OF THIS GRANT THAT WILL GO TOWARD YOUR RESEARCH DONE AT THE RESERVE: _____ 100% _____

If this project is currently being supported by a contract(s) or grant(s), please complete the following for each award received (attach additional sheets, if needed). If you receive funding for your project in the future, please update the Reserve manager.

PRINCIPAL INVESTIGATOR: Daniel Karp

PI'S AFFILIATION (Do not abbreviate): University of California, Davis

SPONSOR (Do not abbreviate): Selma Herr Fund

AWARD AMOUNT: \$5,000 DATE AWARD GRANTED: March 2020

PROJECT DURATION DATES (Month/year to month/year): March 2021 to July 2021

GRANT NUMBER: N/A

FULL PROJECT TITLE (Do not truncate): The effects of vegetation structure and management on nest box temperature and the consequences for chick growth and survival

8. PERMIT REQUIREMENTS

Please read and answer the following items carefully. Researchers will not be allowed access to the Reserve until they obtain the appropriate permit(s), or the Reserve has been informed by the agency(ies) involved that no permits are required for the project described in this application. It is the user's responsibility to obtain the appropriate permit(s) and to provide the Reserve manager with a copy. Please discuss permit requirements with the Reserve manager.

- A) Does your project involve vertebrate animals? ☒ Yes ☐ No
- If "Yes,"
- Indicate all that apply: ☐ Reptile ☐ Amphibian ☐ Fish ☒ Bird ☐ Mammal
 - Will any animal be captured? ☒ Yes ☐ No
 - Will any animal be held longer than 12 hours? ☐ Yes ☒ No
 - Will any animal be held longer than 24 hours? ☐ Yes ☒ No
 - Will any birds be banded and/or color marked? ☒ Yes ☐ No
 - Will any animal's skin be broken (needles, tags, surgery, etc.)? ☐ Yes ☒ No
 - Will any animal's movement in the environment be restricted? ☐ Yes ☒ No
 - Is there potential for any animal's behavior to be altered? ☐ Yes ☒ No
 - If this is a renewal, has there been any change in the project? ☐ Yes ☐ No ☒ N/A

Prior to beginning a research project involving the capture, marking, or physical contact with of vertebrate animals, you must receive approval from the animal care committee at your home

institution. (This is often the same committee that oversees the care of laboratory animals.) Please append written approval to this application.

I am currently awaiting approval of my addition to the Bohart Museum IACUC. I will not capture, handle, or band any birds before this approval is received.

- B) Does your project involve the collecting (including banding and/or color marking) of vertebrate wild animals or invertebrates? ☐ Yes ☒ No

If "Yes," you will need to obtain a scientific collecting permit from the California Department of Fish and Game. Please append permit. A permit is not required to collect freshwater plants.

Does your project involve the collection, banding, and/or color marking of birds? ☒ Yes ☐ No

If "Yes," you will need a federal permit from the U.S. Fish and Wildlife Service. Please append permit.

*I am currently awaiting approval of my sub-permittee status under Andrew Engilis at the Bohart Museum of Natural History, and will provide this proof when I receive approval. Prior to this approval, I will not capture, handle, or band any birds.

Does your project involve working with plants or animals that are California state listed species of special concern, threatened, or endangered species? ☐ Yes ☒ No

If "Yes," you will need to obtain a memorandum of understanding (MOU) from the California Department of Fish and Game. Please append permit.

Does your project involve taking plants or animals that are Federally listed threatened or endangered species? ☐ Yes ☒ No

If "Yes," you need to obtain a federal permit from the U.S. Fish and Wildlife Service. Please append permit.

PERMITS CAN TAKE AT LEAST 30-60 DAYS TO BE APPROVED, SO CALL IMMEDIATELY FOR AN APPLICATION.

9. IN CASE OF EMERGENCY:

Contact: Evie Smith

Phone: 678-462-2889

10. PUTAH CREEK RESERVE REGULATIONS

- If the research application is approved, the user must comply with all applicable University regulations, including those that are Reserve-specific, and provide all required state and federal permits.
- All publications resulting from the use of the Putah Creek Reserve must acknowledge the University of California and the Putah Creek Reserve. Please submit two copies of all publications (only one bound copy of a thesis or dissertation is required) to the Reserve manager.
- All researchers must provide on an annual basis, at a minimum, a text file that describes each data set derived from their work on the Reserve and a summary of research results. Minimum required metadata includes the title of each data set, the investigator's name, mailing address, e-mail address, and an abstract. All researchers are strongly encouraged to provide copies of mature data sets derived from work on the Reserve, which will be archived at the Reserve.
- Material(s), including resulting fragments, subunits, progeny, products, genetic material, mutants and derivatives, approved for collection by the Putah Creek Reserve belongs to the University of California. You and your institution/company will use the material(s) only in that scientific research activity described in this application and will not allow the material(s) to be transferred to any other party or use them for commercial purposes without the express written consent of the University of California.

- Visitors may not bring animals (domestic or wild) to the Reserve, unless they are part of an approved research project or are necessary to help a disabled user. Please notify the Reserve manager if you have a special need.
- Firearms are forbidden at the Reserve, unless the University has granted special permission.
- All users are requested to leave the land and any facilities cleaner than you found them.

I have read and agree to abide by the Putah Creek Reserve use regulations listed above and any Reserve-specific rules appended to this application, and am aware that it is my responsibility to ~~disseminate this information to all members of my party~~

	1 March 2021
Applicant's Signature*	Date
Reserve Manager's Approval	Date

* Receipt of application via email is comparable to applicant's signature.