U.S. Fish and Wildlife Service

Determination for Issuing a Single Source Financial Assistance Award

Instructions: In accordance with Service policy 516 FW 6, *Issuing Discretionary Grant and Cooperative Agreement Awards without Competition*, complete this form to document the justification for issuing a single source grant or cooperative agreement award. This form must be signed by both a program representative and the employee with signature authority for the award to be issued (see 516 FW 3, *Signature Authority for Grant and Cooperative Agreement Awards*). The completed and signed form must be maintained in the official award file.

Recipient Name: University of California, Riverside

Project Title: Santa Ana Sucker Feeding Preferences in Light of Urbanized Rivers

Program Contact: Kai Palenscar

Select all criteria that apply (from 505 DM 2):

	(1) Unsolicited Proposal: The proposed award is the result of an unsolicited application that represents a unique or innovative idea, method, or approach that is not the subject of a current or planned award, but is found to be advantageous to program objectives.
	(2) Continuation: The activity to be funded is necessary for the satisfactory completion of, or is a continuation of, an activity we are funding and holding a competition would have a significant adverse effect on continuing or completing the activity.
	(3) Legislative Intent: The language in the applicable authorizing legislation or legislative history clearly indicates the intent of Congress to restrict the award to a particular recipient or purpose.
✓	(4) Unique Qualifications: The applicant is uniquely qualified to perform the activity based on a variety of demonstrable factors such as location; property ownership; voluntary support capacity; cost-sharing ability, if applicable; technical expertise; or other such unique qualifications.
	(5) Emergencies: Because of a compelling and unusual urgency, or substantial danger to health or safety, there is not enough time to follow adequate competitive procedures.

Explain below why competition for this award is not practical. As applicable, summarize the program legislative history, unique capabilities of the proposed recipient, and any cost-sharing contribution offered by the proposed recipient. Be brief and specific:

This project will fund a study of Santa Ana sucker feeding preferences in urbanized streams. The University of California, Riverside (UCR), is leading a team of researchers who have expert knowledge and skills in the fields of phytology, ichthyology and aquatic ecology. UCR has local knowledge of the southern California rivers and streams in the project area, as well as permitted access to much of the Santa Ana River watershed. UCR is uniquely qualified to perform this work, as they have a working relationship with Riverside-Corona Resource Conservation District, who maintains the only captive population of Santa Ana sucker, and will provide UCR with the opportunity to perform this study. This project is contingent upon availability of funds.

I have determined that this project meets the requirements for a single source award and recommend that it be awarded to the recipient named above.

G. Mendel Stewart 7/2/15

Program Representative Sign and Date

G. Mendel Stewart, Field Supervisor

Printed Name of Program Representative

I, as the Service employee with signature authority for this award under 516 FW 3, have reviewed this program recommendation and find that it meets the requirements for a single source award.

7/7/15

Authorized Signator Sign and Date

Darrin Thome, Deputy ARD, ES, Region 8

Printed Name of Signator

U.S. FISH AND WILDLIFE SERVICE – 2015, REGION 8, RECOVERY FUNDING

TITLE: Santa Ana Sucker: Feeding Preferences in Light of Urbanized Rivers

FUNDING: $75,500 for research associated with the better understanding of Santa Ana sucker feeding preferences in the Santa Ana River as well as what processes are important to long-term persistence.

STATEMENT OF WORK

The Santa Ana Sucker (*Catostomus santaanae*, SAS) is a federally threatened species found only in the lower portion of the Santa Ana watershed and the upper portions of the Los Angeles and San Gabriel Rivers. Its native watersheds have been highly manipulated, urbanized, and subject to large amounts of water removal for municipal purposes. Further, treated municipal wastewater is fed back into the river, and this treated water is the only source of flow for most of the year. We suspect that wastewater is substantially influencing the historical temperature regime of the Santa Ana River, as well as many other physical properties present such as flow, dissolved oxygen, and nutrient content. With a highly altered physical habitat, the Santa Ana has been colonized by several opportunistic invasive species, such as mosquito fish (*Gambusia affinis*), and tropical filamentous red algae (*Compsopogon caeruleus*). Because of these documented changes to physical habitat and recent invasions, we suspect that the Santa Ana River food web has been highly altered. Though there is public concern about the future of SAS, relatively little is known about the feeding preferences of local SAS. Diatoms are known to contribute to the majority of Santa Ana sucker's diet, but there is a scarcity of research pertaining to the relationship between diatoms and Santa Ana sucker habitat. Studies conducted in Big Tujunga Creek showed diatom species varied with habitat conditions from 2010 to 2014, and specific diatoms were associated with SAS abundance and habitat. This work should be applied to the Santa Ana River population to determine how feeding preferences may be affected by rapid changes occurring to available habitat. By understanding SAS feeding preferences, we will better understand the mechanisms by which SAS may continue to persist in the Santa Ana (given alterations), or the processes that need to be restored in order for them to persist.

Objectives

We are interested in characterizing available food for the SAS upstream and downstream of the Rapid Infiltration/Extraction (RIX) facility in Colton, CA given that this section of the river has been determined as the optimal site for SAS, as well as how this might influence SAS populations. The RIX treatment plant expels large amounts of treated wastewater into the river and we are interested in how urban disturbances similar to the RIX facility influence habitat quality for SAS. In turn, we also seek to uncover the diet preferences of SAS. Working in concert with the *Riverside*-Corona Resource Conservation District (RCRCD), we will characterize the existing diatom species in several reaches where Santa Ana sucker are abundant in the Santa Ana River and carry out feeding preference lab experiments. RCRCD contains captive populations of SAS that we plan to utilize in feeding studies with natural substrate from the Santa Ana River. Habitat surveys and feeding trials will be used to parameterize models that can be used to inform SAS management.

Methods & Timeline

Objective 1: Field surveys characterizing available SAS food in the Santa Ana River.

SAS habitat quality is partially defined by available food supplies. We propose to characterize available food sources for SAS using existing natural and artificial substrates. In addition, we will analyze fecal excretions to identify utilized resources.

a. September 2015 and March 2016: We will identify 4 locations and place ceramic tiles for diatom collection and collection from rocks according to the sampling strategy of the Surface Water Ambient Monitoring Program (SWAMP) procedure. The placement of these tiles will be timed approximately 3-6 weeks before USGS performs their SAS habitat survey. Ceramic tiles will be placed just above the stream bed to prevent them from being covered by shifting substrates. Diatoms and soft-bodied algae will be carefully removed from rocks and tiles using a new tooth brush for each sample. Soft-bodied algae will also be collected from adjacent areas to help in the identification process. All algae samples will be split into three subsamples (A, B, C). Sample A will be preserved with gluteraldehyde and sent to CSU San Marcos for enumeration. Sample B will be taken to Pomona College to attempt creating pure cultures of the algae. Sample C will be taken to Pomona College for DNA extraction. If pure cultures can be established, they will be described using microscopy and their DNA extracted and sent for 18S rDNA analysis.

b. September 2015 and March 2016: We will conduct a pebble counts and measure other standard physical properties alongside tile collection in reaches where SAS are abundant to quantify the measurement of substrate. This data will be compared to diatom abundance and diversity to determine physical habitat drivers of diatom community structure.

c. May 2016: DNA extractions from September and March sample dates will be sent to MR (Molecular Biology) DNA (Andover, Texas) and analyze for 18S rRNA with diatom primers using a Diversity Assay bTEFP® and sequenced using an illumine 2 x 300 base-pairs with an average read of 20k. We will then use various bioinformatics methods to identify and characterize the diatom diversity.

d. July 2016: We will send Samples A and pure cultures of Samples B to CSU San Marcos to enumerate the soft-bodied alga and diatoms present in SAS natural and artificial substrates. CSU San Marcos is a SWAMP approved lab and will enumerate the algae to the lowest taxonomic level as possible (using Standard Taxonomic Effort criteria).

Objective 2: Wild SAS diet analysis

To supplement algal analyses of areas SAS inhabit, we will collect fecal samples from SAS during fish surveys carried out by USGS in the field upstream and downstream of RIX.

a. September 2015: We will work in tandem with USFWS and USGS to gather fecal material from fish that are caught as a part of an SAS survey that the two aforementioned entities will be conducting. The fecal material will be stored and preserved. Fecal samples will be analyzed for all consumed material with assistance from Parsa at UCR and Carl at Bon Terra.

Objective 3: Captive SAS feeding/diet experiment

We will utilize RCRCD's captive population of SAS to conduct feeding trials of SAS on tiles colonized by Santa Ana River biota. Feeding trials with captive populations will provide visual indicators to SAS feeding preferences and allow documentation of SAS diet with fecal analysis in a controlled environment.

a. September, December 2015 and March 2016: Tiles will be placed in the same areas as ones used for algal analysis. Tiles will be colonized for 3-6 weeks.

b. October 2015 and January, April 2016: Tiles will be collected, placed in water and immediately transported to RCRCD. Tiles will be placed in experimental flumes containing captive SAS with similar physical habitat as areas the tiles were gathered. Feeding preferences of SAS will be documented for 48 hours with HD video recordings. After 48 hours, fish will be removed and their fecal matter will be preserved and analyzed. Fecal analysis results of captive SAS will be compared to wild populations at the Santa Ana River and wild populations at Big Tujunga Creek.

Objective 4: Statistical analysis and modeling of gathered data/available datasets

We will gather relevant environmental and SAS data from local watersheds working in concert with consulting firms, government agencies, and academic institutions. Then, we will combine gathered data with our own assembled dataset and use these data to construct models to inform future SAS management.

a. August 2016: All SAS data will be assembled in a publicly available form. Information on life-history characteristics, habitat and food preferences

b. October 2016: We will develop individual-based models calibrated by feeding trials and observed habitat preferences in the field. These models will be use to predict longer-term SAS/habitat associations in the field and how these may respond to management decisions.

c. October 2016: Mathematical models based on SAS life-history knowledge, SAS feeding/habitat relationships reveled in data analyses and individual based

modeling will be constructed. We will perform mechanistic modeling to understand which processes are most influential in determining SAS success and which data gaps are most necessary to close in future research to minimize uncertainty in management outcomes.

Draft annual reports will be sent to USFWS by December 2016, and a final report by January 2017.

PARTNERSHIPS AND ROLES:

University of California, Riverside
Dr. Kurt Anderson (professor)
Project administration and mathematical modeling
Dr. Jonah Piovia-Scott (professor)
Advisor in experimental design and analysis
Parsa Saffarinia (PhD student)
Graduate student researcher funded by USFWS participating in all logistical components of the project

US Fish and Wildlife Service
Dr. Kai Palenscar
Experimental oversight and logistical assistance

RCRCD
Kerwin Russell
Provider of stream runways at RCRCD and captive populations of SAS

US Forest Service
Dr. Bret Harvey (Fisheries Biologist)
Individual-based modeling and advisor in experimental analysis

Pomona College
Dr. Marc William Los Huertos (professor)
eDNA specialist and algal analysis

Bon Terra Consulting
Dr. Carl Demetropoulos (Fisheries Biologist)
Diatom specialist and SAS fecal excretion analysis

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