

The National Academies of
SCIENCES • ENGINEERING • MEDICINE

*Committee on Assistance to the U.S. Fish and Wildlife Service on Taxonomic Studies of the Red Wolf:
A Review of Applications to Carry out Research and Development of a Research Strategy*

Request for Applications

*Research to Determine the Taxonomy of Wild Canid Populations in Regions of the United States Where Recent Evidence Suggests the Potential Presence of Red Wolves (*Canis rufus*)*

Overview

In 1980, the red wolf (*Canis rufus*) was declared extinct in the wild. However, there have been several recent reports of “red wolf” sightings in the southeastern United States, where the last known wild red wolf populations resided. Preliminary evidence suggests that these wild canines, originally thought to be coyotes, may at a minimum carry some red wolf alleles or, at a maximum, may be overlooked populations of wild red wolves. Genetic analyses of two deceased canines on Galveston Island, Texas, revealed shared alleles with the captive breeding red wolf population in North Carolina and also some genetic variation that is distinct from any known wild North American canine (Heppenheimer et al. 2018). Analyses of DNA microsatellite variation from wild canine scat, hair, and tissue samples from southwestern Louisiana suggest that several animals have more than 40 percent red wolf ancestry, and at least one animal has 100 percent red wolf ancestry (Murphy et al. 2019).

Because the red wolf is a critically endangered species, determining the identity of the wild canines in southern Louisiana and adjacent areas is a top priority for the U.S. Fish & Wildlife Service (FWS). In 2020, FWS plans to allocate funds to support research to replicate and expand existing work, potentially by sampling a greater number of individual animals and collecting and analyzing additional genetic, genomic, and morphological data. Such an investigation will require a team of researchers to trap live animals to take morphometric measurements and biological samples suitable for DNA extraction for analyses. The investigation will require genomic analyses that assess the generality of the conclusions of Murphy et al. (2019). For the safety of the animals, live trapping will need to occur in the coolest months of the year.

To ensure an unbiased assessment of applicants, FWS asked the National Academies of Sciences, Engineering, and Medicine (the National Academies) to act as an independent authority to carry out the solicitation of applications to conduct the research and review the proposed study designs and the planned genomic and morphological analyses. An ad hoc committee created and appointed by the National Academies will rank received applications according to their scientific merit and provide comments on additional scientific factors for FWS to consider. FWS will select one research team to submit a full proposal and it will allocate the funds to complete the work.

Project Goals

1. Collect and analyze morphological, genetic, and genomic data to clarify the taxonomic identity of the wild canid populations in southwestern Louisiana and other geographic areas in the southeastern United States that red wolves were historically known to inhabit.
2. If feasible, deliver results to FWS within 8 to 12 months from the receipt of funding.

Eligibility

Any scientist (individuals or collaborative teams) affiliated with an accredited non-federal research institution is eligible to apply.

Please note that an individual may serve as principal investigator on only one application.

Submission Requirements

Each application must include all of the following components. Applications that are missing any of these requirements will not be reviewed.

1. Project Description. The project description should not exceed four pages. Please include the following details in the project description:

- a. Project title
- b. A clear description of the study design, collection of genetic, genomic (e.g., whole genome sequence), and morphological data, and the planned analyses of those data. Include an estimate of the minimum number and type of samples that will need to be tested as well as the marginal cost, benefit, and added time to collect additional samples. The description of planned analyses should indicate whether outgroup reference genomes are available for other canids that can be used to compare with the wild canid population(s) under study. For example, if genotyping-by-sequencing or RAD-Seq is the proposed approach, the proposal should include how comparable data will be obtained from coyotes and other relevant canid lineages to ensure that phylogenetic proximity to different canids and hybrid class of each individual in the population can be evaluated. If comparative data are available, explain how they will be obtained. If no comparable data are available, describe whether biological samples from other canid have been secured to obtain such data, or if samples from other canids will need to be collected.
- c. A clear plan for sampling animals without causing harm. State whether the protocol for the project has been approved by an Institutional Animal Care and Use Committee (IACUC) or, if not approved, whether it has been submitted or will be submitted to an IACUC committee for review. State which institution's IACUC approved the protocol or will review the protocol.
- d. A statement of intent about publishing the results and making the data publicly available.
- e. Expected timeframe needed to complete the study beginning from the receipt of funds and including reporting the results to FWS and publication(s) in a peer-reviewed journal. If feasible, FWS would like final results to be delivered to them within 8 to 12 months of receipt of funding. The selected research team will have the opportunity to justify grant extensions should sampling or data analyses prove insufficient to confirm the identity of the canids in southwestern Louisiana within 8 to 12 months.

2. Research Team Description. Please include the following details in the research team description:

- a. The full roster of names and affiliations of all members of the research team. Please indicate the principal investigator, co-principal investigator(s), senior research team members, and the primary point of contact.
- b. A two-page biographical sketch for each principal investigator, co-principal investigator, and senior personnel. The biographical sketch should include a description of the individual's

experience and expertise *relevant* to the proposed research project and a list of their relevant publications. Do not include a C.V.

- *Brief biography.* What expertise and experience does the applicant have to address the research questions? Please be specific about the individual's skillsets necessary for the research team (e.g., trapping wild canids for collecting samples; collecting and analyzing genomic data; collecting and analyzing morphological data).
- *Publications.* A short list of *relevant* publications that demonstrate the breadth and depth of expertise. At a minimum, include the first, the most recent, and the most significant relevant work in one or more of the following areas:
 - i. Expertise on the subject matter (e.g., wolves, coyotes, speciation, admixture, and hybridization)
 - ii. Methodological skillset (e.g., field and laboratory work)
 - iii. Analytical skillset (e.g., morphometrics, population genetics, species admixture analysis, etc.)

3. Statement of Intent to Accession Biological Samples. Please indicate where and when biological samples will be accessioned into an established biological collection or biorepository. Include an acknowledgment that biological samples taken from canids determined to be red wolves will need to be accessioned in accordance with the Endangered Species Act. Note that biological samples of endangered species belong to FWS. FWS will request that those samples be shipped and stored at Arkansas State University's Arkansas Center for Biodiversity Collections (ACBC), the repository for red wolf samples and specimens. Authorization for shipment to ACBC, and shipping protocols, will be provided by FWS.

4. Estimate of the Total Cost of the Project. If possible, please provide estimates for each major aspect of the proposed research (e.g., trapping and processing animals, morphometric analyses, DNA analyses, etc.). Do not submit a detailed budget. The proposed research and cost to accomplish it are dependent on one another. For this reason, FWS has not yet designated a cost range. However, the cost estimates will aid FWS in its selection of the research team, but will not be part of the initial review by the National Academies.

Evaluation Criteria

Applications will be evaluated based on the following criteria:

1. Efficiency and thoroughness of the sampling plan.
2. Appropriateness of the proposed genomic and morphological methods.
3. Power of the proposed analyses.
4. Qualifications and experience of principal investigators and senior personnel.
5. Potential to provide results to FWS within 8 to 12 months from the receipt of the award.

Submission Process and Deadline

The deadline for applications is **December 3, 2019**; 11:59 P.M. Pacific Standard Time

An independent expert committee appointed by the National Academies will review the applications to carry out the research. Applications will be ranked based on the scientific merit of the proposed research and evidence of the ability of the research team to successfully carry out the proposed studies.

FWS will select one team to submit a full proposal, taking into consideration the National Academies' recommendations and internal agency factors. FWS will notify applicants of its decision as soon as feasible in January 2020.

Contact Information

For general questions regarding this RFA, please contact Keegan Sawyer (ksawyer@nas.edu).

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References

NASEM (National Academies of Sciences, Engineering, and Medicine). 2019. *Evaluating the taxonomic status of the Mexican gray wolf and the red wolf*. Washington, DC: The National Academies Press.

Murphy, SM, JR Adams, JJ Cox, and LP Waits. 2019. Substantial red wolf genetic ancestry persists in wild canids of southwestern Louisiana. *Conservation Letters* 12(2):e12621.

Heppenheimer, E, KE Brzeski, R Wooten, W Waddell, LY Rutledge, MJ Chamberlain, DR Stahler, JW Hinton, and BM vonHoldt. 2018. Rediscovery of red wolf ghost alleles in a canid population along the American Gulf Coast. *Genes (Basel)* 9(1):e618.