

Recovering the Endangered Red Siskin

NOTE: unless otherwise indicated, field work photos were taken by GONZALO MEDINA, JHONATHAN MIRANDA, ALEJANDRO MORENO AND SAMUEL TORO.



**RED SISKIN PAIR CONFISCATED BY AUTHORITIES
HOUSED AT PARQUE ZOOLOGICO Y BOTANICO BARARIDA
PHOTO CREDIT: LEONEL OVALLE MOLEIRO**

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Acknowledgements

The help and collaboration of the following are greatly appreciated: Audubon-Venezuela, Jonathan Ballou, Terry Chesser, Brian Davidson, Dilia García, Daniel González, José Antonio González, Russell Greenberg, Paula Hansen, Chris Huddleston, Sarah Kingston, Jose Gustavo León, Jesus Maldonado, Gonzalo Medina, Jhonathan Miranda, Alejandro Moreno, Jafet Nassar, Oficina Nacional de Diversidad Biológica, Ellen Paul, Robert Rice, Mark Robbins, Jon Paul Rodríguez, Franklin Rojas-Suarez, Samuel Toro and Noor White. We thank the American Museum of Natural History, Academy of Natural Sciences of Philadelphia, Kansas University Museum of Natural History, Louisiana State University Museum of Zoology, U.S. National Museum of Natural History and Yale Peabody Museum for recent genetic material grants. This project has received financial support from an anonymous private donor, American Bird Conservancy, IVIC, NFSS members, the National Aviary, Scion Natural Science Association, and the Smithsonian Institution.

THE RED SISKIN, *SPORAGRA (CARDUELIS) CUCULLATA*, is endemic to northern South America and highly endangered as a result of intense trapping for the cage bird trade. Despite decades of legal protection, trapping is still a major concern due to inadequate enforcement and a lucrative black market.

Saving the Red Siskin is a big challenge that will require better protection through close monitoring, stronger enforcement and more education as well as supplementation of wild populations through *ex situ* breeding and reintroduction. Fortunately, the plight of this charismatic species is increasingly well publicized and much native habitat remains, which is capable of supporting recovery.

This article provides an update on the international effort to conserve the Red Siskin that includes lead partners from the Smithsonian Institution National Museum of Natural History, Instituto Venezolano de Investigaciones Científicas, Parque Zoológico y Botánico Bararida, and the Venezuelan conservation NGO PROVITA, as well as universities, businesses, NFSS, community-based organizations, and other NGOs.

A central component of the Red Siskin Recovery Project has been the application of conservation genetics to inform strategy and management. Previous research (Rodriguez-Clark et al., 2011) examined genetic diversity of mitochondrial DNA among Red Siskins with different geographic origins using traditional DNA sequencing methods (Sanger sequencing and amplified fragment length polymorphisms).

Results show substantial differentiation between Red Siskins in Guyana and Venezuela, which suggests they should be managed as distinct conservation units that should not be used to supplement each other. Current research is focused on refining estimates of genetic diversity and developing genomic markers (ultra-conserved elements, microsatellites, single nucleotide polymorphisms) for management of an *ex situ* captive breeding program through the use of next-generation DNA sequencing (NGS) technologies.



WILD RED SISKIN IN VENEZUELA

NGS has dramatically transformed molecular genetics in recent years. Unlike traditional methods that are generally limited to sequencing only a tiny fraction of the genome, typically a few genes or small regions of DNA from one or few chromosomes or mitochondrial DNA, NGS enables sequencing of very large amounts of DNA quickly and at low cost. This approach is much more analytically powerful than pre-NGS methods.

Key objectives of the conservation genomics program are to maintain the full range of natural genetic diversity and avoid inbreeding, which can undermine the viability of restored wild populations. Another priority is to preserve the genetic identity of the species by carefully selecting only genetically pure Red Siskins for breeding.

This is a dominant concern for this project because Red Siskins have been intentionally hybridized for decades, particularly with canaries. If these hybrids escape or are released into wild populations, they can compromise genetic integrity and even reduce population viability. Therefore, any birds considered for inclusion in a breeding program will be screened via genomic assay to exclude those with hybrid ancestry.

One source for breeding birds may be wild birds confiscated by authorities from trappers. These birds may possess local adaptations that are important for successful recovery in the wild, and may have lower risk of hybrid ancestry or inbreeding; however, confiscations have been infrequent. Therefore, captive birds held by private breeders may also be a valuable source for founders.

A promising site for the breeding program is Parque Zoológico y Botánico Bararida, located in the city of Barquisimeto in Lara state, Venezuela. The Red Siskin is the state bird in Lara and Bararida has a government mandate to conserve the species. Bararida also has a history of success in *ex situ* breeding and a vibrant conservation education program built around the Red Siskin. Currently, they have two pairs of red siskins that were confiscated from trappers; however, existing facilities are inadequate to support a full scale *ex-situ* conservation program.



FIELD RESEARCHERS SEARCHING FOR RED SISKINS AND RECORDING VOCALIZATION

An architectural firm based in Boston, Ruhl Walker, has offered *pro bono* services to design a new Red Siskin Conservation Breeding and Education Center in collaboration with Venezuelan architects. Ruhl Walker has a reputation for generous support of conservation programs, including the recently completed and award-winning Hawai'i wildlife center, a rescue and rehabilitation facility for endangered native species.

In addition to making progress on developing a captive breeding program, the Red Siskin Recovery Project has also been exploring reintroduction strategies. One possibility is based on the Smithsonian Migratory Bird Center's "Bird Friendly" coffee certification program. This program marries economic development with conservation by providing market incentives for farmers to adopt agricultural practices that improve habitat and support biodiversity.



CAPTURED RED SISKIN BEING RELEASED FROM MIST NET

This approach has been successful at increasing revenues and species diversity in Latin America but has not yet been tailored for recovery of an endangered species. The Red Siskin provides an excellent candidate for this approach because it is known to feed and nest in coffee farms and there are large plantations within the historic range of the species with conservation-friendly management.

Another important element of the recovery effort is field research. In Venezuela, field researchers are conducting surveys to collect blood samples for conservation genomics and to better understand population distribution, breeding ecology, and potential reintroduction sites and strategies. A recently awarded grant from Scion Natural Science Association will enable field research to continue throughout the breeding season this year. In Guyana, a local conservation NGO recently received a grant from BP Conservation Leadership Programme to continue surveys and monitoring of Red Siskins and provide conservation education to villages in remote areas.

This commitment to education also extends to project partners in Venezuela and the United States. Bararida has an innovative education campaign with diverse elements including visits to schools, and on-site programs that aim to create “green citizens” who are knowledgeable advocates on conservation issues. Smithsonian partners are working to produce a television program about the Red Siskin Recovery Project, and web-based education resources are planned for the future. Project members have also been providing field and laboratory research training and other significant professional development opportunities to promising young conservationists from South America.



RED SISKIN MARKED WITH LEG BANDS FOR FUTURE IDENTIFICATION



COLLECTING MORPHOMETRIC DATA

Finally, this summer the Recovery Project will host multiple meetings of scientists, passerine breeders, architects, and other experts. Meeting objectives are to develop *ex situ* breeding strategies, start designing the breeding and education center, and draft a comprehensive conservation management plan. This plan will help support fundraising to sustain progress and guide the conservation effort through recovery.

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IMMATURE MALE MOLTING INTO ADULT



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IMMATURE JUVENILES



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RED SISKIN NESTLINGS

EDITOR'S NOTE: I would like to thank Brian Coyle for submitting this excellent, informative article for publication in the NFSS Journal. I especially appreciate Brian helping me get it ready for our readers.