

The Arizona-Sonora Desert Museum's Conservation Work in NW Mexico.

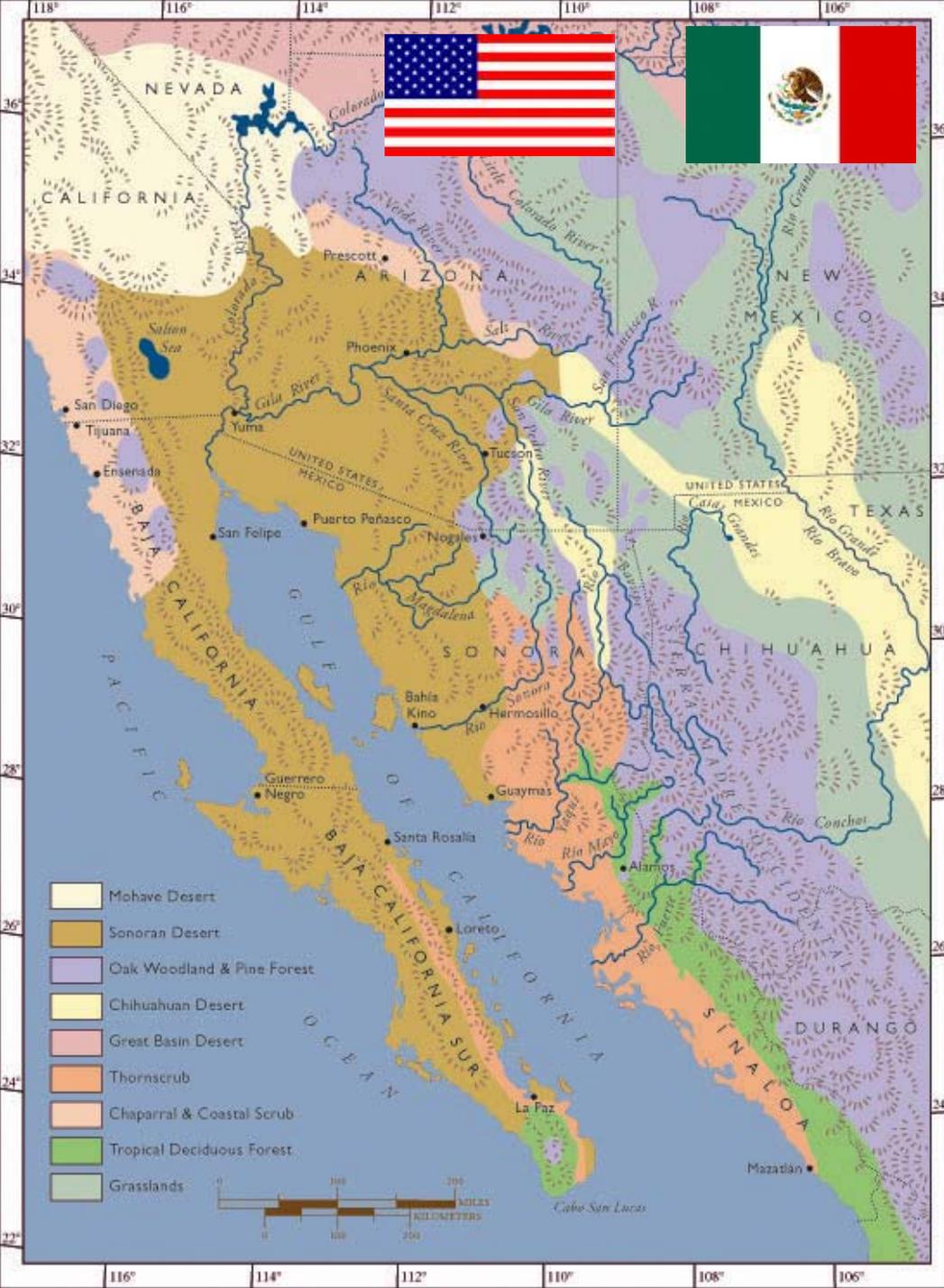


Arizona-Sonora Desert Museum

A living museum, with animal & plant exhibits organized in natural desert habitats, and with conservation, research and education programs focused on the Sonoran Desert Region.

Founded 1952





- 2/3 of the Sonoran Desert is in Mexico (in 5 states)

- 50% of the Sonoran Desert is marine!

Land = 100,000 sq mi

Gulf of California = 100,000 sq mi

- Summer monsoons derive principally from Gulf of California

- Sonoran Desert is only maritime desert in North America.

- About half of the Museum's research and conservation work is in Mexico.



ASDM's major research and conservation programs:

- Migratory Pollinators Program (especially bats & hummingbirds)
- Freshwater biodiversity (e.g., California Floaters, Santa Cruz River biodiversity)
- Sea of Cortez Conservation
- Invasive Species ("Invaders of the Sonoran Desert" program)
- Biological Surveys
- Tropical Deciduous Forest (TDF) Protection in Alamos region of southern Sonora
- Cultural Conservation (e.g., Padre Kino Fruit Trees Project)



- (1) Understanding the Fall Migration of the Endangered Lesser Long-Nosed Bat (*Leptonycteris curasoae*)
- (2) A 10-year monitoring program to assess migratory bats of Chiricahua National Monument and Fort Bowie National Historic Site.
- (3) Developing Migratory Pollinator Gardens at Tumacácori National Historic Park (Arizona) and San Lázaro (on the Santa Cruz River, Sonora)
- (4) Development and Publication of a Field Guide to Sonoran Desert Pollinators
- (5) Invertebrate Biodiversity Surveys of the Santa Cruz River, in Sonora (Mexico) and Tumacácori National Historical Park (Arizona)
- (6) The Kino Heritage Fruit Tree Project
- (7) Establishment of the Hummingbird Monitoring Network

Understanding The Fall Migration Of The Endangered Lesser Long-Nosed Bat (*Leptonycteris curasoae*) An Extension of the ASDM's Migratory Pollinator Program

Principal Investigator:
Karen Krebs (ASDM)

Collaborators:

Tim Tibbitts
Organ Pipe Cactus National Monument

Ami Pate
Organ Pipe Cactus National Monument

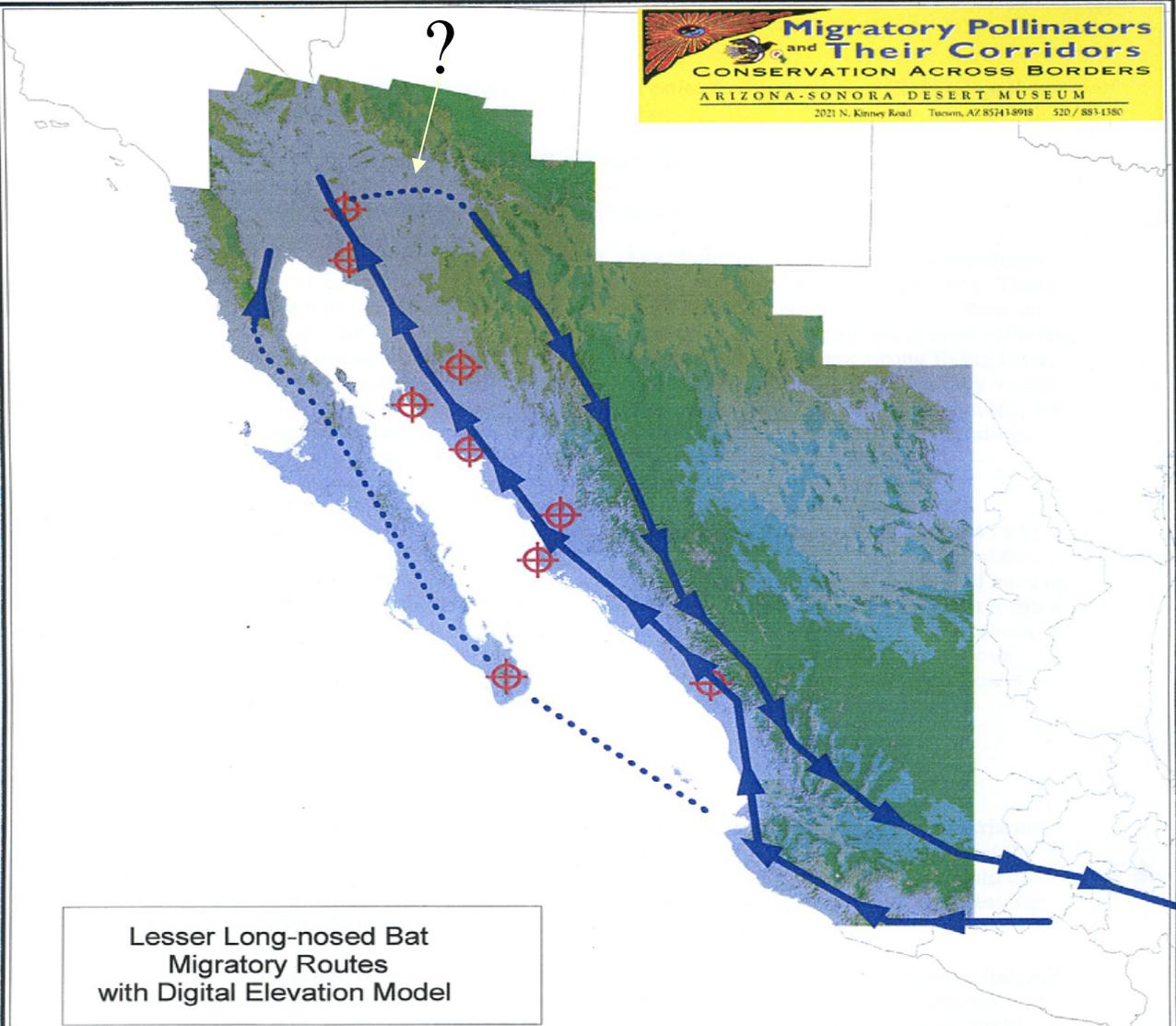
Curtis McCasland
Cabeza Prieta National Wildlife Refuge

Rodrigo Medellín
Instituto Ecología, UNAM (Mexico City)



Leptonycteris curasoae (lesser long-nosed bat)

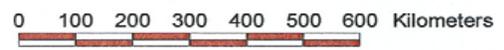
- Federally listed (endangered) in the U.S. and Mexico.
- Arrive in Arizona in mid-April from wintering grounds in southern Mexico. Leave to return to Mexico in September and October. Northward migration fairly well understood.
- Females congregate in late spring in maternity roosts in NW Mexico and S Arizona; young are born in May.
- Forage on, and pollinate, columnar cacti (saguaro, organ pipe, cardon, etc.) and agave. Bats follow “nectar corridors.”



Lesser Long-nosed Bat
Migratory Routes
with Digital Elevation Model



Known Maternity Roosts North of Chamela
Unknown/Estimated Routes
Lesser Long-nosed Bat Documented Routes



OBJECTIVES

- Test different marking techniques on captive CA leaf-nosed bat (*Macrotus californicus*): PIT Tags (“microchips” = passive integrated transponders), radio transmitters, wrist bands, necklaces, fluorescent powders. Then utilize the best marker(s) on *L. curasoae* in the field.
- Mark-recapture to obtain information on the movements of *L. curasoae* in AZ once bats depart their maternity roosts.
- Collect DNA from *L. curasoae* at the maternity roosts where the bats were marked. Test feasibility of using cheek swabs for DNA collection (instead of the standard wing punches).

DNA COLLECTION

- DNA samples collected with cheek swabs.



- 106 bats were marked at 2 maternity roosts (Copper Mountain & Bluebird Mine; July & August 2004-2005)
- 22 Radio Transmitters
- 84 PIT Tags (micro-chips)
- 141 DNA Cheek Samples



Micro-Chip Antenna (Biomark Inc.)

- Standard Portable Pole Antenna Utilized in 2004.
- Customized Antenna System Utilized in 2005.



Locations of Marked Bats in Southeast Arizona

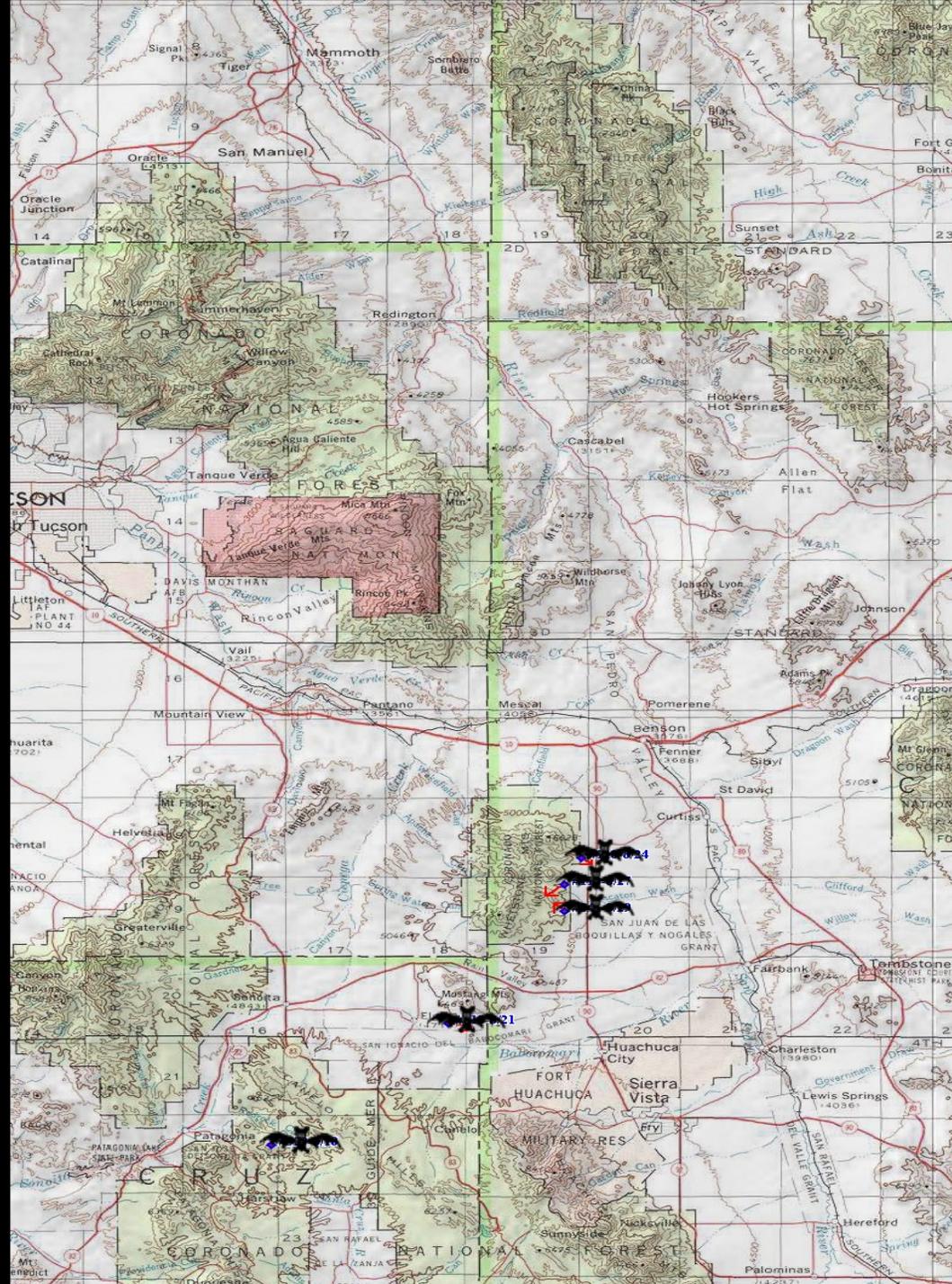
Only 5 of 106 marked bats were recovered (5%).

Distance from Copper Mountain Mine (Organ Pipe National Monument):

Patagonia Mtns. - 211 km

Mustang Mtns. - 228 km

Whetstone Mtns. - 243 kms



Results

- State of Texas Mine (Coronado Natl. Monument) is an important transient roost for Lesser long-nosed bats, and the mine should be protected.
- Lesser long-nosed bats forage (exclusively?) on *Agave palmeri* once they leave the maternity roost and begin to prepare for their migration south.
- At least some *L. curasoae* individuals do fly east in AZ before beginning their return to southern Mexico (5 out of 5 recovered bats).

Bat Monitoring, Surveys, Training, and Education in the Tropical Dry Forest (TDF) of Alamos, Sonora (Mexico)

Principal Investigators (ASDM):
Karen Krebs & Yajaira Gray

Collaborator: Comisión Nacional de Areas Naturales Protegidas (CONANP)



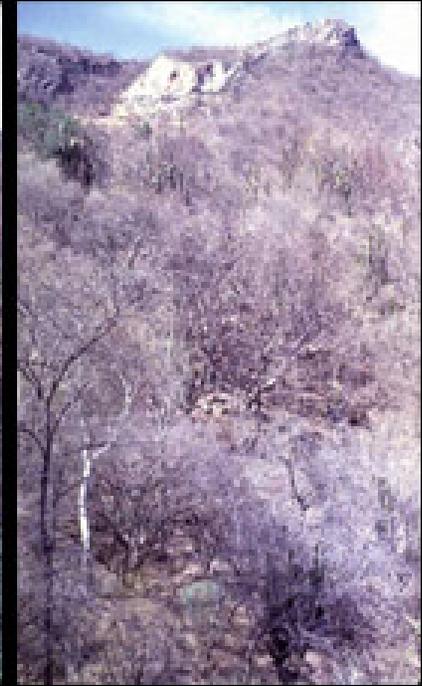
July
(Early rainy season)



September
(Late rainy season)



December
(Early dry season)



April
(Late dry season)

Photos: Stephanie Meyer



Monitoring and Survey, June 2007

La Aduana Mine, Alamos Region



DNA COLLECTION

- Cheek swabs are utilized for DNA samples.
- U.A. graduate student, Judith Ramirez, is analyzing the DNA samples.





■ Education and Outreach

- Develop bat conservation/education programs for different audiences in Alamos area (children, adults).
- Provide material and training to “*Promotores*” in bat education programs, with an emphasis on migratory pollinators and vampire bats.
- Provide educational programs to ranchers and rural communities.
- Present safe eradication methods for vampire bats to cattle ranchers.



Photo by Merlin Tuttle



Leptonycteris curasoae (lesser long-nosed bat)

Vampire bat
(*Desmodus rotundus*)



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A 10-Year Survey of the Bats of Chiricahua National Monument & Ft. Bowie National Historical Site

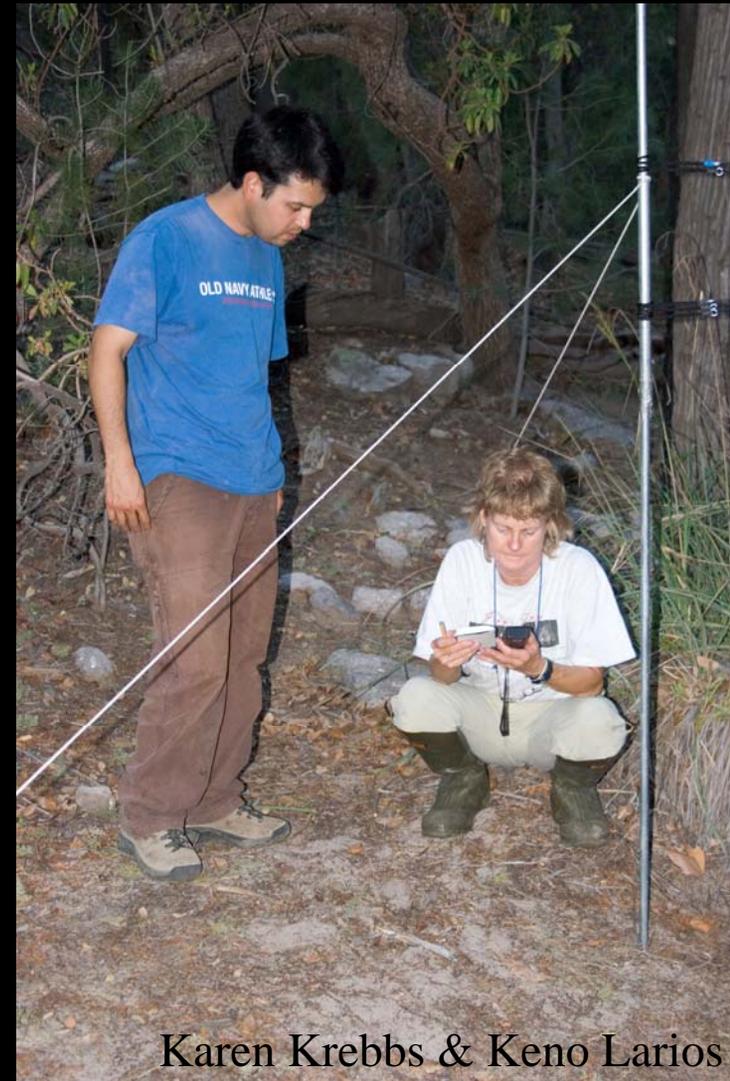
An Extension of the ASDM's Migratory Pollinator Program

Principal Investigator:
Karen Krebs (ASDM)

Collaborator: Eugenio (Keno) Larios
Biologist, Pinacate Biosphere Reserve (Sonora)



Pallid & Townsend's big-eared bats



Karen Krebs & Keno Larios



Townsend's big-eared bat

Mexico is home to 160 species of bats; Arizona has 28 species

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ASDM Migratory Pollinators Program

Pollinator Gardens for Tumacácori National Historical Park and San Lazaro, Sonora (Mexico). A partnership with NPS and Sonoran Institute.

Volunteers working on the "Hummingbird Plaza" in San Lazaro, Sonora



Part of a large, bi-national effort to establish islands of pollinator habitat and pollinator educational programs throughout the Sonoran Desert (Arizona & Sonora).



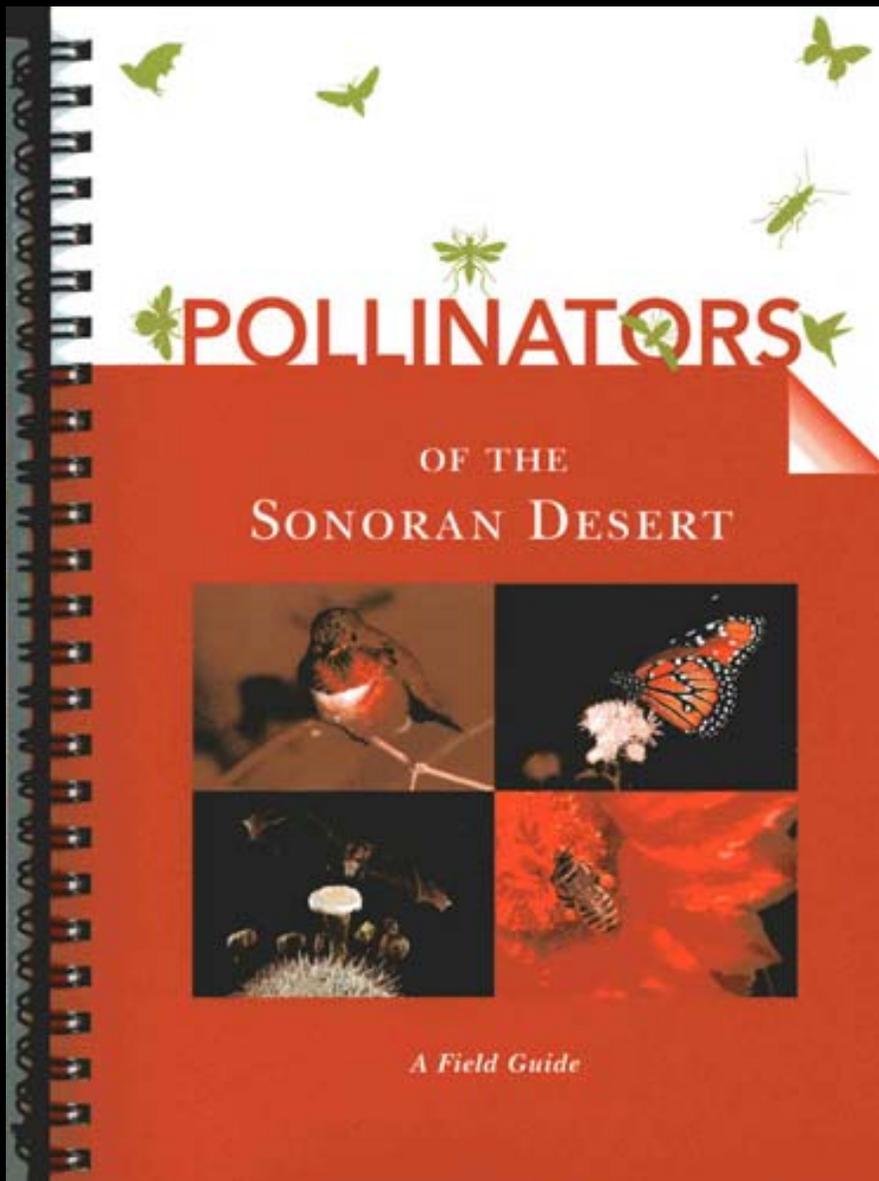
Public education about pollinators in Plaza Colibrí, San Lazaro, Sonora



Inauguration of Plaza Colibrí, San Lazaro

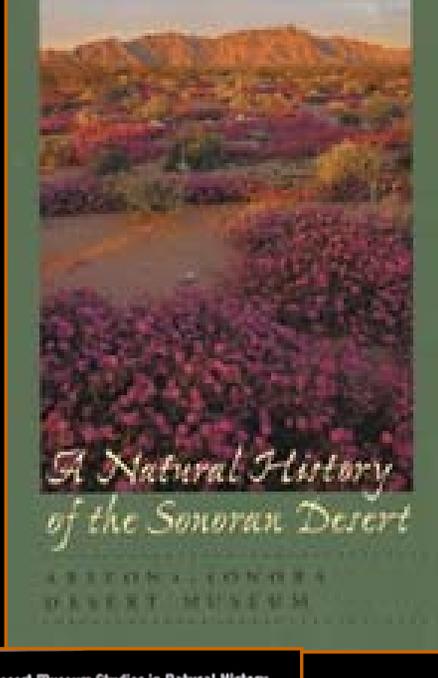
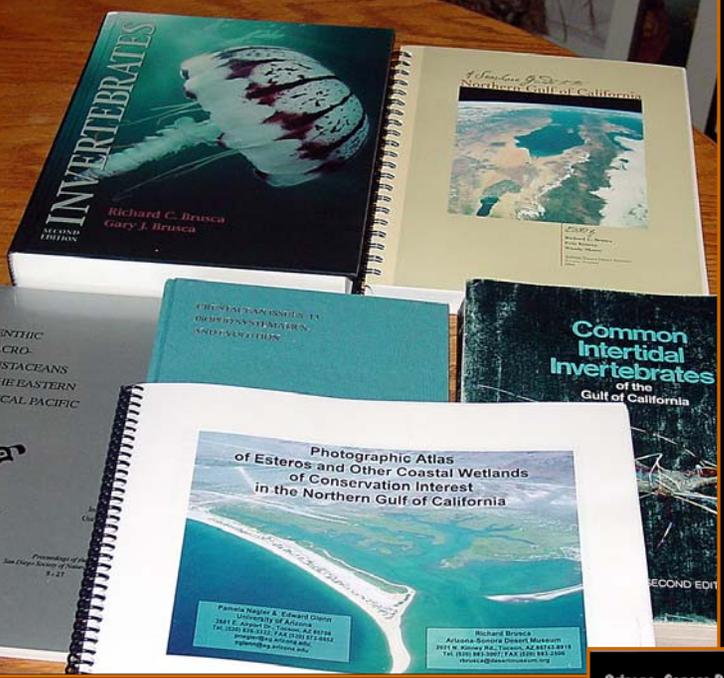


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A bilingual field guide
to pollinators of the
Sonoran Desert

A joint publication of ASDM
and ISDA (International
Sonoran Desert Alliance)



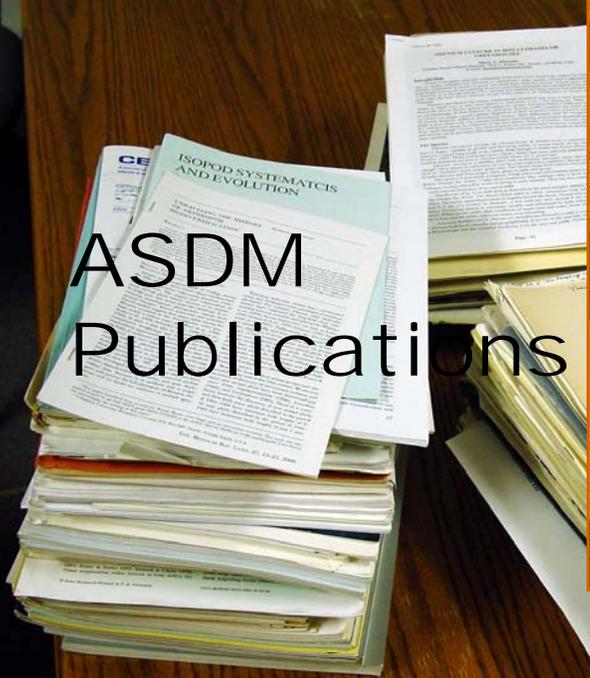
Arizona-Sonora Desert Museum Studies in Natural History



Conserving Migratory Pollinators and Nectar Corridors in Western North America



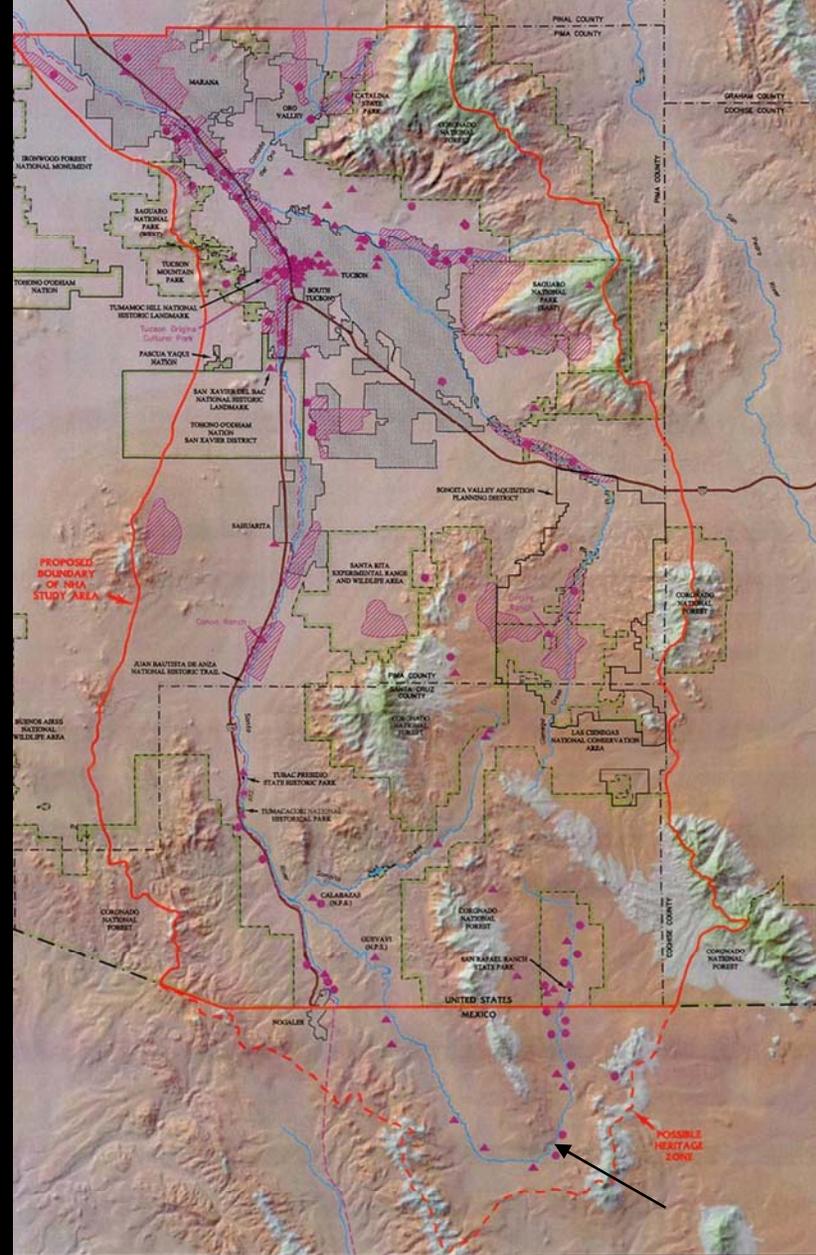
Edited by Gary Paul Rabhan
 Technical Editing by Richard C. Brusca and Louella Hotter



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The Santa Cruz - a Binational River

- Headwaters in Arizona (San Rafael Valley).
- Flows south into Sonora (Mexico), turns north to flow back into Arizona.
- Flows through Nogales and Tucson.
- Four “perennial” stretches remain (2 of which are wastewater recharge).



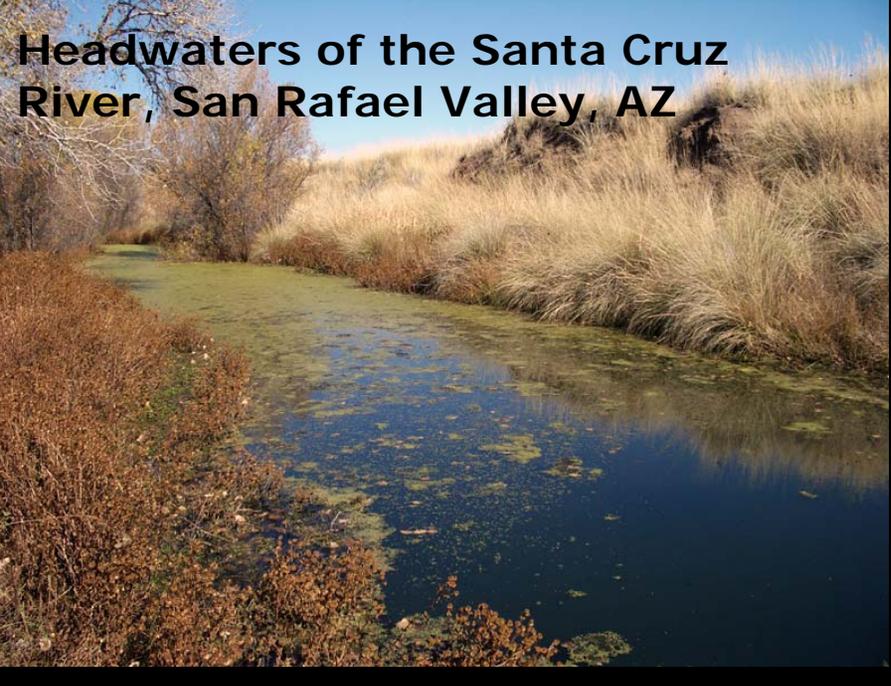
Santa Cruz River Project

Aquatic Invertebrates of the Santa Cruz River

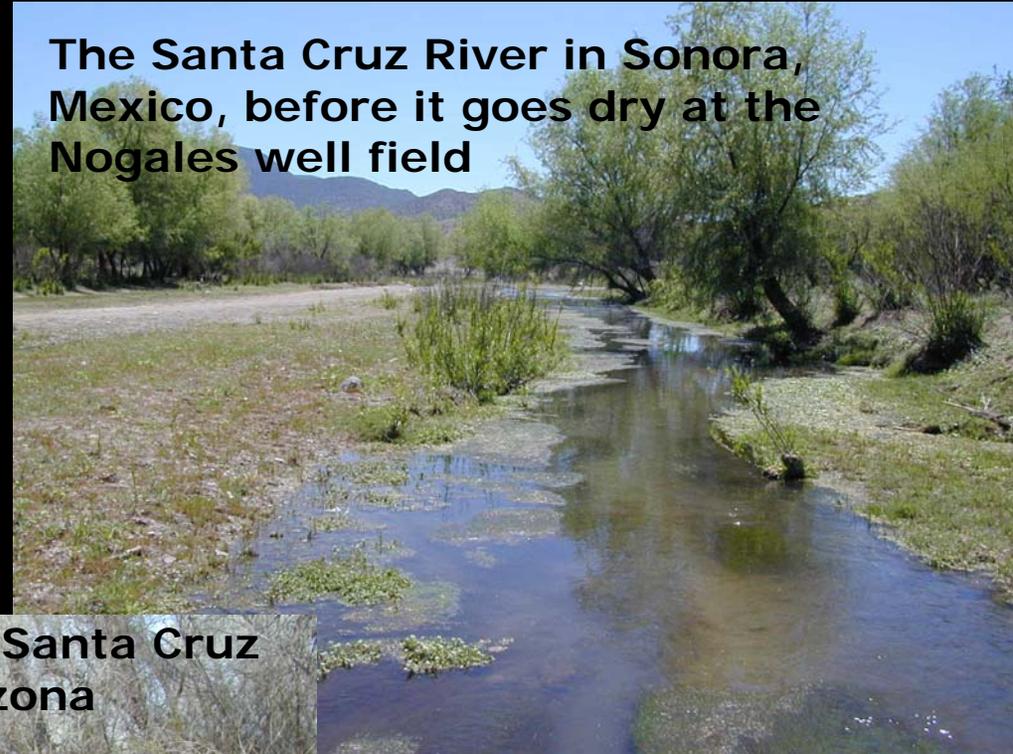
- San Rafael Valley (headwaters)
- South of the border, in Sonora (~400 species)
- Nogales - Tubac (discharge restored, ~200 species) - 15 million gallons/day from Nogales Treatment Plant



Headwaters of the Santa Cruz River, San Rafael Valley, AZ



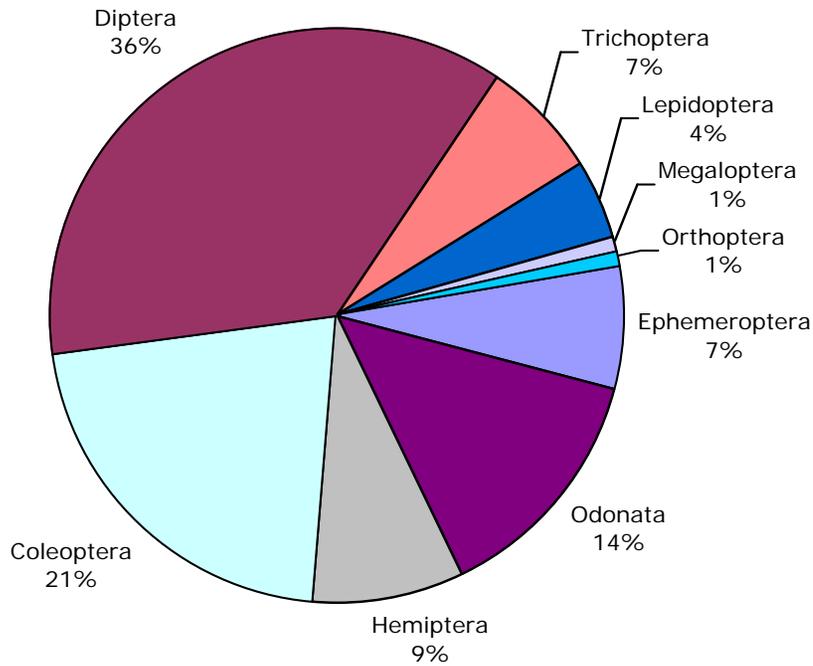
The Santa Cruz River in Sonora, Mexico, before it goes dry at the Nogales well field



"Restored" (effluent) Santa Cruz River Tumacácori, Arizona



Three flowing stretches of the Santa Cruz River



Percent of insect species, by order, in the free-flowing Sonora sector of the Santa Cruz River.

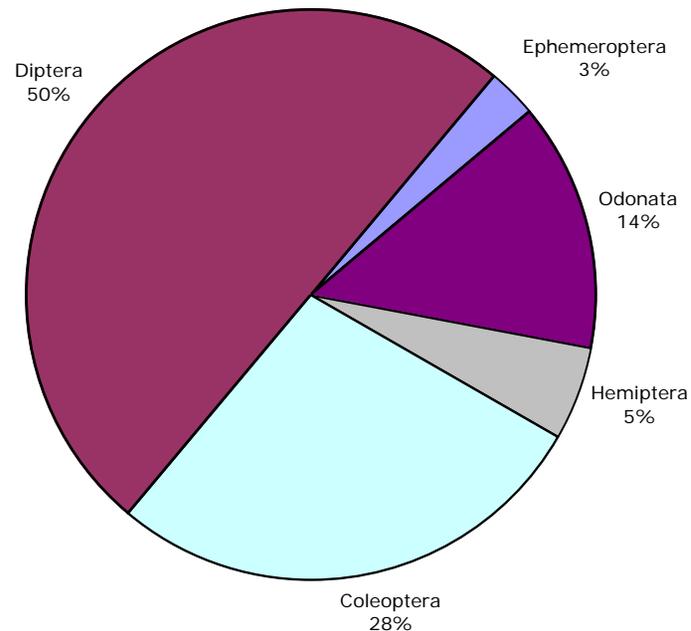
LARGEST TOP INVERT CARNIVORE:

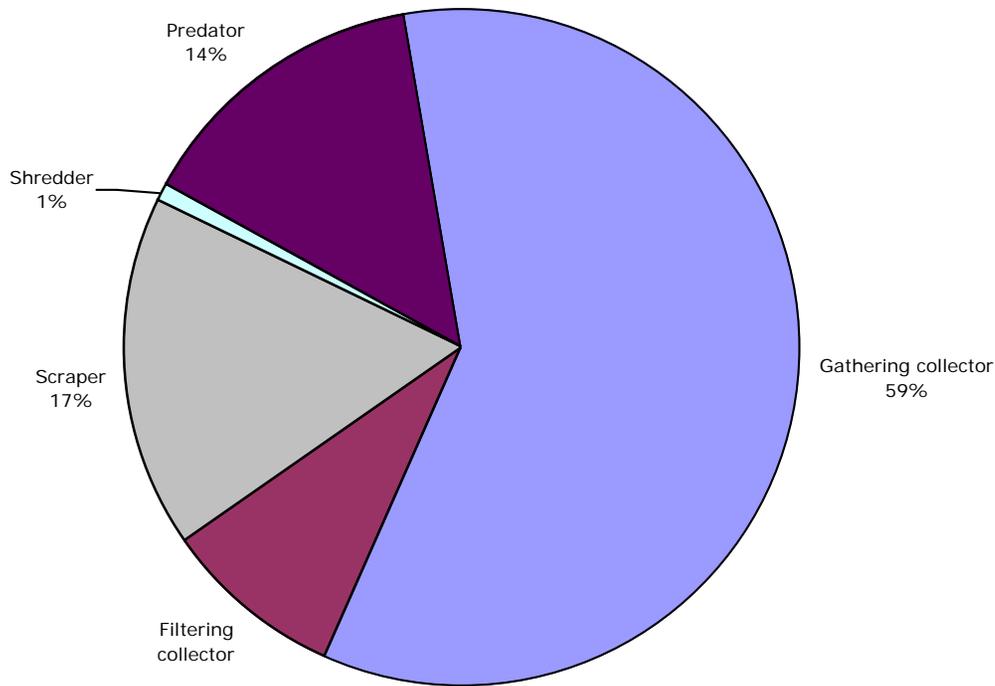
Predatory insects

Percent of insect species, by order, in the Tumacácori sector of the Santa Cruz River.

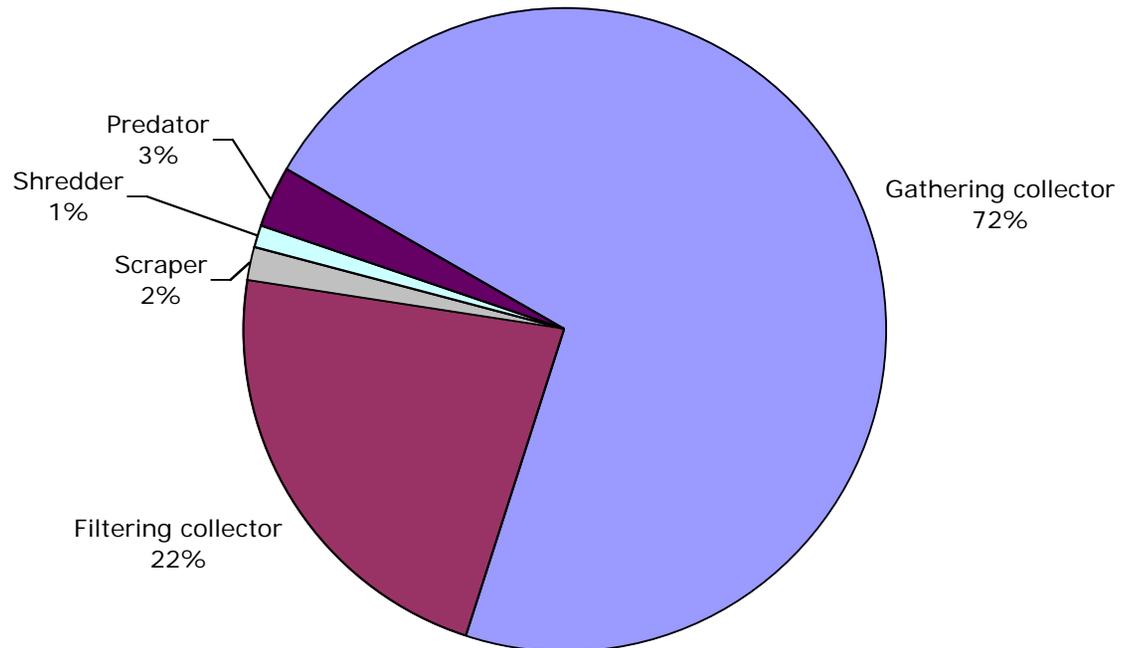
LARGEST TOP INVERT CARNIVORE:

Predatory leeches





Percent of individuals in each functional feeding group found in the Sonoran sector of the Santa Cruz River. (Chironomidae not included, as their feeding groups vary by species.)



Percent of individuals in each functional feeding group found in the Tumacácori sector of the Santa Cruz River.

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The Kino Heritage Fruit Tree Project

Seeking to locate and preserve Spanish Colonial Era European fruit tree stock (e.g., quince, fig, pomegranate, peach, pear, apple, pecan, walnut). P.I. = Jesús García

A partnership between the Desert Museum, Tumacácori National Historical Park (NPS), INAH (Instituto Nacional de Antropología y Historia, Mexico), and Native Seeds/SEARCH.



Colonial Quince



Colonial Pomegranate

In the late 17th century, Europeans first introduced many species of Old World plants and animals to the American Southwest - at the Tumacácori mission, and other nearby mission sites.

The earliest introductions were under the supervision of the Jesuit missionary Padre Francisco Eusebio Kino.

Part of the “Columbian Exchange” of crops, livestock, pests, diseases and technologies between Europe and the New World.



Black Mission Fig

- Re-introducing Spanish colonial fruit tree stock will enhance the interpretive, educational and preservation objectives of Tumacácori National Historical Park (a colonial-era orchard has been reconstructed).
- “Kino Fruit Trees” will also be introduced at the newly recreated San Agustín mission site on the Santa Cruz River, in downtown Tucson. Perhaps also at the San Xavier Mission and Tubac Presidio.
- Many of these fruit tree stocks come from old Spanish land grant homesteads and ranches in Sonora, Mexico.



Street vender in Sonora,
with quince and
pomegranate

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Funding from DS-CESU to the Desert Museum supported the founding of The Hummingbird Monitoring Network, now with monitoring stations in Mexico and throughout Latin America



The banner features a large, stylized hummingbird silhouette in flight, with a smaller, detailed hummingbird perched on a flower to the right. The text 'the HUMMINGBIRD Monitoring Network' is prominently displayed in the upper left. The phrase 'Protect the Joy' is written in a cursive font in the upper right. The main body of the banner contains a central text block describing the organization's mission, flanked by decorative starburst symbols.

the
HUMMINGBIRD
Monitoring Network

Protect the Joy

HMN is a nonprofit conservation organization that supports projects to improve hummingbirds' ability to survive and reproduce.

Home
About Us
Monitoring
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Preservation
Education
How to Help
Resources

Who We Are
A science-based, project-driven, nonprofit organization dedicated to the conservation of hummingbird diversity and abundance throughout the Americas.

Our Objectives
Support efforts that **Preserve** hummingbird habitats.

Conduct and support **Research** that increases our knowledge about hummingbirds and promotes their conservation.

Maintain long-term **Monitoring** sites and estimate abundance so trends in their populations can be detected.

Educate by disseminating information.

We received 501(c)(3) non-profit status on August 26, 2004. Now you can make tax deductible **donations** to our projects.

This website was made possible by a grant from the National Park Service DSCESU program.

A Spanish language version of this website will be available soon.

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Projects in Living Collections

Tarahumara frog - reintroduction to the U.S. (Arizona)

Chiricahua Leopard frog - captive assurance colonies

Mexican garter snake - captive assurance colony

California floater -

- determining breeding season in the wild
- attempt captive breeding
- provide public education



Collaborators: AZGFD, USFWS, U of A, ASU, BoR, IMADES (Instituto del Medio Ambiente del Estado de Sonora), Andrés Villareal, Charlie Sanchez