

**Intermountain Region
Southwest Border Current Projects Report**

National Park Service
U.S. Department of the Interior



Big Bend National Park

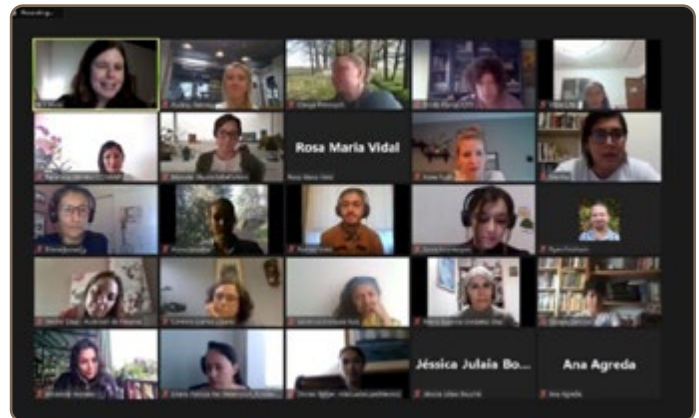
Colorado State University
Building Management Capacity in Mexican Northern Border Sister Parks Through Transfrontier Cooperation
Funding Year: 2019
Funding Amount: \$46,947

The Center for Protected Area Management at Colorado State University has been supporting the National Commission on Protected Areas of Mexico (CONANP), Mexico's equivalent to the National Park Service, in the process of building a park ranger system that will allow staff to obtain and retain mastery of key ranger skills, competencies, and abilities. This financial support through the SWBRPP brings benefits to the USA through better stewardship of shared watersheds, ecosystems, species and cultural heritage in National Park Service sites such as Big Bend NP, Coronado NM and Organ Pipe Cactus NM.

Currently the project is:

- Sponsoring 10 women from CONANP for virtual Women's Leadership in Conservation seminar focused on park ranger capacity development.

- Organizing a Sister Reserves Ranger to Ranger Forum at Big Bend NP which will include a series of presentations and field visits along with discussion about park ranger competencies that are required to face the challenges of monitoring, restoration, and interpretation of protected areas.
- Designing a collaborative park ranger training program between the US and Mexico with a focus on border region parks.



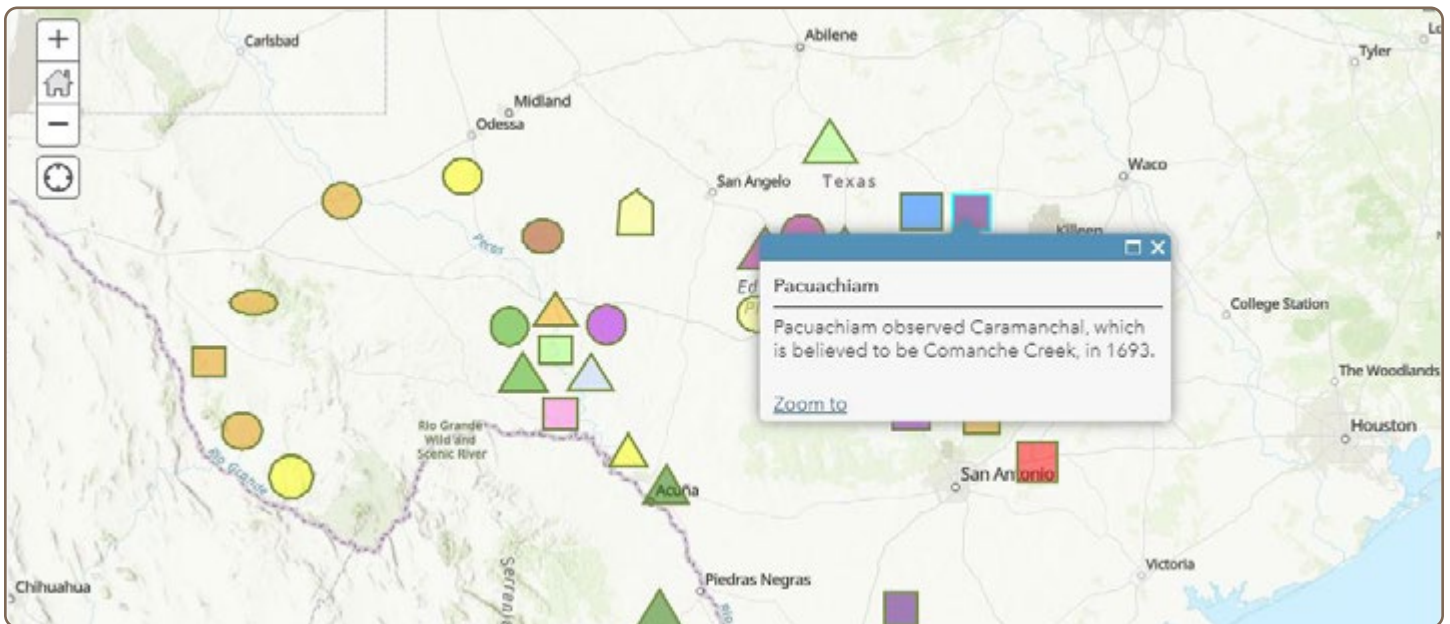
Virtual Women's Leadership in Conservation seminar focused park ranger capacity development sponsored by Colorado State University.

National Trails Office

Researching Indigenous Communities along El Camino Real de los Tejas NHT in Central and Southwest Texas
 Funding Year: 2019
 Funding Amount: \$35,010

The National Trails Office is completing a well-documented narrative history of the indigenous populations that lived in the vicinity of the Camino Real de los Tejas, which goes from Coahuila, Mexico to Central Texas and dating back to first entradas in the 1820s, when Spanish rule ended. At present, there is an information gap. The research is identifying the various groups of Native Americans, their locations and movement within Northeast New Spain and Texas corridor, and their interactions with each other and with the Europeans with whom they made contact.

The project is slated to be finished by the end of 2022. Once completed, a 250-page narrative of the study will be shared with trail partners in Mexico, Texas, and Louisiana. The study will raise awareness about the historical and cultural connections between the indigenous groups that were impacted by the Tejas camino, but who also greatly influenced the people, places, and cultures that evolved along the trail.



Snapshot of an interactive digital map being created to highlight narrative history of the indigenous populations that lived in the vicinity of the Camino Real de los Tejas.

University of Idaho
Demographic and Genetic Monitoring of the Endangered Sonoran Pronghorn in Organ Pipe Cactus National Monument, Mexico, and Surrounding Areas Using Fecal DNA Sampling
Funding Year: 2019
Funding Amount: \$49,693

The University of Idaho received funding from SWBRPP to study the Sonoran pronghorn using noninvasive genetic sampling (NGS) of fecal pellets. The collected data will be used to estimate population size, survival, genetic diversity, gene flow, and connectivity in Organ Pipe Cactus National



Sonoran Pronghorn located in Southern Arizona near Organ Pipe NM. In the last decade, 241 have been released into the wild.



Current distribution of Sonoran pronghorn in the United States and Mexico. A listed endangered species in both countries, it is only found in 12% of its historic range.

Monument (ORPI), El Pinacate Biosphere Reserve, Mexico and surrounding areas. The Sonoran pronghorn is one of the most endangered subspecies on the US Endangered Species List and is found only on US federal lands in southwest Arizona, including ORPI.

Currently, the University of Idaho is collecting and analyzing fecal pellets collected from OPRI, El Pinacate, Mexico, and other federal lands in Southwest Arizona. When the project is completed, it will provide ORPI managers with additional data to add to a total of 7 years of critical baseline information on pronghorn numbers, genetic diversity, connectivity, and responses to visitors, border activity and climate.

Sky Island Alliance
Citizen Science in National Parks Across the US-Mexico Border
Funding Year: 2020
Funding Amount: \$71,637

Sky Island Alliance, together with 16 partners including Saguaro National Park, launched Sky Island FotoFauna to unite community scientists across the U.S.-Mexico border in wildlife monitoring that will aid NPS park management. The project seeks to document the monthly occurrence of 44 native species across the region by volunteers using continuously running wildlife cameras. Since the project launched, the program has expanded to include 21 collaborating park and non-profit partners, over 283 independent camera locations, and over 1,100 monthly checklists submitted from the U.S. and Mexico.

Due to growing participation in both countries around Saguaro National Park, Coronado National Memorial, Chiricahua National Monument, and Área de Protección de Flora y Fauna Bavispe, the



Sky Island Alliance Wildlife Fellows shows the 2021 Bilingual Internship Cohort from Universidad de la Sierra. How to set up and check wildlife camera around Moctezuma, Sonora.



An interactive map that shows the distribution of camera locations and associated species lists by camera and locale.

Sky Island FotoFauna network has now observed 36 of the 44 checklist species. In 2021, Sky Island Alliance trained over 30 students and volunteers on how to use wildlife cameras and loaned out 24 cameras to students and families at Universidad de la Sierra (Moctezuma, Sonora), Tohono O'odham Community College (Sells, Arizona), and the Copper Queen library (Bisbee, Arizona). In total, 224 bilingual communication pieces have been distributed to the citizen science community including 11 Fototfauna email newsletters, 185 social media posts, and 14 blogs.

University of New Mexico
Design Concepts and Visualization of El Camino Real de Tierra Adentro Oñate
Funding Year: 2020
Funding Amount: \$49,979

University of New Mexico is partnering with University of Arizona and Universidad Autónoma de Ciudad Juárez, Mexico to develop ideas and designs to address the current state El Camino Real de Tierra Adentro’s National Historic Trail’s (ELCA) Oñate Crossing Site including Hart’s Mill and Old Fort Bliss buildings. Oñate Crossing has significant historical impact and there are connections between this site and associated Camino Real sites in Cd. Juárez, Chihuahua, Mexico. However, in its current state, the site is not an inviting destination for the nearby community members. The connection between the Juárez and El Paso areas make this a prime site for partnership between the two countries, where the proposed project will attempt to identify ways to re-envision the area, increase public knowledge regarding the sites’ historical significance, and partnering with institutions in Mexico to further international historical cultural activities.

In Fall 2021, Landscape Architecture and Preservation students from three universities, University of New Mexico (UNM), University of Arizona (UofA), and Universidad Autónoma de Ciudad Juárez, Mexico (UACJ), developed ideas and designs to address the current state of the Oñate Crossing site. All involved students proposed many strategic design strategies for El Camino Real de Tierra Adentro sites on both sides of the border



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through a multi-disciplinary design studio and site visits. The hope is by the end of Spring 2022, UNM students will compile and develop a publication with all the design strategies and research, which will be translated to Spanish by students from UCAJ, Mexico. This will be provided NPS El Camino Real de Tierra Adentro’s National Historic Trail’s staff with a final report that includes the schematic design visuals and drawings that can be used to make decisions regarding future rehabilitation for the site and revitalization of the landscape.

University of Arizona
Binational Avian Monitoring, Research, and Capacity Building in the Pinacate and
Organ Pipe Cactus National Monument Biosphere Reserves
Funding Year: 2020
Funding Amount: \$48,889

Aaron Flesch, Research Scientist at the University of Arizona, is partnering with the National Park Service and the National Commission of Protected Areas in Mexico (Comisión Nacional de Áreas Naturales Protegidas or CONANP) on a broad suite of objectives focused on avian monitoring, understanding changes in avian communities since the late 1980s in Organ Pipe Cactus National Monument (ORPI), linking monitoring in ORPI with that in Pinacate Biosphere Reserve in adjacent Mexico, training park staff and cooperators in the U.S. and Mexico in field methods, and providing education and outreach to local human populations in the borderlands of Mexico.

To date, the project has accomplished many objectives:



Avian field training in Mexico in Feb 2021 led by UA project staff Aaron Flesch and Miguel Grageda (CEDO).



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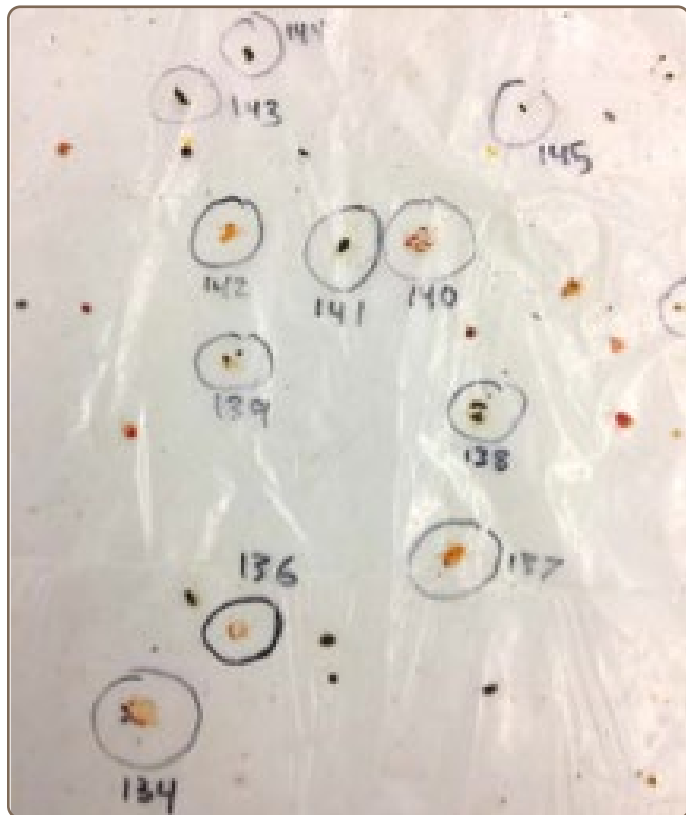
- Trained a field crew to sample bird communities in Pinacate and completed educational workshops for CONANP, students, and Mexican community members.
- Trained three NPS ORPI biologists and one University of Arizona technician in field methods and completed three morning visits to 25 point-count transects located across ORPI.
- University of Arizona staff is now using past and current avian monitoring data along with environmental data from ORPI regarding weather, vegetation and disturbances to conduct analyses and prepare a report on breeding bird community changes, what has caused the changes, what is distribution and abundance of birds in Pinacate and ORPI with a focus on priority species. All these studies inform the implications to management and resource conservation at the parks in US and Mexico.

University of Arizona
Increasing the Effectiveness of Monitoring Abundance, Migratory Patterns, and Border Impacts
of a Rare Pollinator, the Lesser Long-Nosed Bat.
Funding Year: 2019, 2020 and 2021
Funding Amount: \$49,744

University of Arizona Professor Robert Steidl has partnered with Organ Pipe Cactus NM to provide estimates of lesser long-nosed bats at maternity and post-maternity roosting sites along the US-Mexico border and to provide insight on the bats distribution and migratory patterns. Using fecal samples to monitor the bats, the study will help the NPS understand their central role in maintaining connectivity between maternity and post-maternity roosts.



DNA sampling of a Lesser long-nosed bat.



Representative sheet containing fecal splats after 1 night of exposure at Organ Pipe NM.

Since the project began in 2019, the university of Arizona team has been working within Organ Pipe Cactus NM. To date, they have:

- Recorded 79 bats as they emerged from three maternity roosts and seven transient roosts distributed throughout the border region. The researcher team is in the process of quantifying the number of bats emerging as a key step towards characterizing the abundance, distribution, and phenology of bats across the border region.
- Marked 168 lesser long-nosed bats with tags at a maternity roost in Organ Pipe Cactus NM and at hummingbird feeders across southern Arizona.

- Found that DNA concentrations from fecal samples were comparable to, or better than, cheeks swabs processed in the same manner as fecal swabs. This is significant as collecting fecal samples is less intrusive and more cost-effective than cheek sample collection.
- Developed and implemented a pilot version of a one-day DNA analysis workshop at the University of Arizona. They developed protocols, reading materials, presentations, laboratory modules, and discussions to provide field biologists with a fundamental understanding of the principles and procedures relevant to molecular ecology of vertebrates.



Researchers using camera to capture Lesser long-nosed bats at El Pinacate y Gran Desierto de Altar Biosphere Reserve in Mexico.

University of Arizona
Anthropogenic Fire, Threatened Forests, and Threatened Species in Southwest Borderlands
Funding Year: 2020 and 2021
Funding Amount: \$42,227 and \$49,990

Chiricahua National Monument (CHIR) and their abundant natural resources therein are threatened by increased anthropogenic fire. In 2011, the human-caused Horseshoe 2 fire, the 5th largest in the state at the time, impacted all of CHIR; 55% of the Monument experienced moderate to severe burn severity and assessment of how unique mammalian assemblages, particularly species of



Ganesh Marin adjusts a wildlife camera trap at Silver Spur Meadow spring in Chiricahua National Monument, Arizona. Following camera trap set up in the fall of 2020, we sampled this and other springs within the Monument for eDNA in spring of 2021.

conservation concern, within CHIR have responded to recent fire and subsequent changes to forest composition was needed.

Through the SWBRPP funding, Melissa Merrick, Adjunct Professor at the University of Arizona strives to assess the current status and occupancy of the Chiricahua fox squirrel within CHIR following recent anthropogenic fire, assess the effectiveness of noninvasive sampling methods to detect threatened species at CHIR and transboundary conserved lands of Cuenca Los Ojos and to evaluate species richness and detections relative to burn severity and forest composition. To date, the researcher has not detected any sign of Chiricahua fox squirrels within CHIR. They have conducted surveys in fall, spring, and early winter – times when they hypothesized would be the most likely activity periods to increase chances of detection. There is also no perennial flowing water in CHIR, and for most of the year, water is concentrated in several springs. Therefore, they have focused their non-invasive sampling to these water sources and locations of most recent Chiricahua fox squirrel detections (2014). They have collected data from wildlife cameras in addition to eDNA to document vertebrate diversity. They have reviewed camera trap images from fall –winter 2020 and spring 2021 and received eDNA metabarcoding results from samples collected at CHIR in spring 2021 – and still no Chiricahua fox squirrels have been detected.

Arizona State University**A New Vision for Sustainability in the Southwest Borderlands: How Ecological Restoration Work:
Can Invite Tourism, Regional Economic Opportunities, and Improved Cross-border Relations****Funding Year: 2020****Funding Amount: \$47,475**

Arizona State University is working towards natural and cultural resource stewardship, tourism research, and education along the U.S.-Mexico Border (Arizona-Sonora) that would provide greater awareness about and access to protected sites on both sides of the border by general travelers as well as geo-and-voluntourists. To encourage improved stewardship, awareness of and visitation to natural areas by travelers, a geo-sustainable tourism plan is being developed to guide tourism development that features NPS sites (Chiricahua NM, Fort Bowie NHS and Coronado NMEM) and Cuenca Los Ojos (CLO) ranches, the partner organization operating in Sonora, Mexico. The plan will guide tourism and prescribe increased stewardship.

This project is well on its way to fulfilling its stated goal to create a sustainable tourism plan for the Sky Island borderlands region. Project team members have had extensive conversations through

interviews and focus groups with NPS staff from Saguaro National Park and Southeast Arizona NPS sites, CONANP, nonprofits from both the U.S. and Mexico, and local tourism businesses where they discussed strategies for increasing visitation to these parks.



Cave Creek, AZ

**Texas Tech
Sonoran Desert Tortoise Monitoring
Funding Year: 2021
Funding Amount: \$50,000**

Texas Tech University is partnering with Organ Pipe Cactus National Monument (ORPI) to establish a Sonoran Desert Tortoise monitoring program, design a preliminary rapid survey protocol and examine tortoise behavioral ecology and space use. Organ Pipe Cactus NM biologists are extremely busy with other inventory and monitoring efforts and the documentation produced in this Texas Tech project is especially critical as the threatened or endangered listing decision for the tortoise approaches.

Through 2021, 54 long-term tortoise monitoring plots have been established, 15 tortoises have been equipped with radio transmitters and GPS collars for spatial ecology understanding and a training protocol for ORPI staff has been completed which included directions to monitoring plots.



TTU tortoise team is pictured holding a Sonoran desert tortoise equipped with a radio transmitter and GPS location logger.

Rio Grande Joint Venture
Developing a Binational Understanding of Spring Flow from a Transboundary Aquifer along the Rio Grande
Funding Year: 2021
Funding Amount: \$49,627

The Rio Grande Joint Venture (RGJV) project is evaluating groundwater contribution to streamflow in the Rio Grande within three National Park Service (NPS) units: Big Bend National Park (BIBE), the Rio Grande Wild and Scenic River (RIGR), and Amistad National Recreation Area (AMIS). This project brings together the Rio Grande Joint Venture, a binational conservation organization that advances balanced stewardship and use of both public and private lands in the US and Mexico. With this funding Sul Ross State University (SRSU) and NPS scientists can develop a scientific understanding of groundwater contributions to base flows within the Big Bend segment of the Rio Grande/Río Bravo del Norte (RGRB), as it is known in Mexico.

Flows in the RGRB basin have diminished to such an extent that the cultural and natural resources (aquatic and riparian habitats) of the area have been severely impacted. The aquatic and riparian habitats, once adapted to large and rapid fluctuations in flow, are now subject to lower and more constant flows. Several native fish and mussel species have

been extirpated or significantly reduced in number. Decisions concerning the management of critical aquatic resources at BIBE, RIGR, and AMIS (e.g., repatriation of the endangered Rio Grande Silvery Minnow) require specific information about water quality, quantity, and the stability of flows in Rio Grande.

This project sets out to characterize water quality from selected springs and surface water, determine year-to-year variations in spring flow, identify geologic structural controls on groundwater movement in the study area, promote binational cooperation in scientific studies of shared resources. In Spring 2021, Jeff Bennett, the RGJV Conservation Delivery Specialist, and Dr. Kevin Urbanczyk, a Professor of Geology at Sul Ross State University, brought together all previous groundwater related work into a paper that has been submitted to American Fisheries Society for publication. Moving into Summer of 2021, Technical Advisory Team has been developed to design a sampling method and calendar to that will work towards the project's objectives.



Rio Grande Wild and Scenic River

University of Arizona
Trail Camera Monitoring in Chiricahua National Monument for Jaguar Detection
Funding Year: 2021
Funding Amount: \$47,064

The University of Arizona Wild Cat Center is working to improve the overall understanding of jaguar's movement in Chiricahua National Monument (CHIR), with specific emphasis on providing local, detailed information on the protected wild cats to park managers whom are charged with protecting them in this prime habitat. By combining knowledge, trail camera techniques, and utilizing the citizen science efforts, they hope to gain additional important knowledge of habitat utilization, behavioral ecology, and additional detection and monitoring for the endangered jaguar in Arizona.

As of Fall 2021, the University of Arizona Wild Cat Center has placed cameras in CHIR by obtaining the required permits for camera work in not only CHIR but also Fort Bowie National Historic Park (FOBO) and Coronado National Monument (CORO), performed the GIS analyses, and discussed the

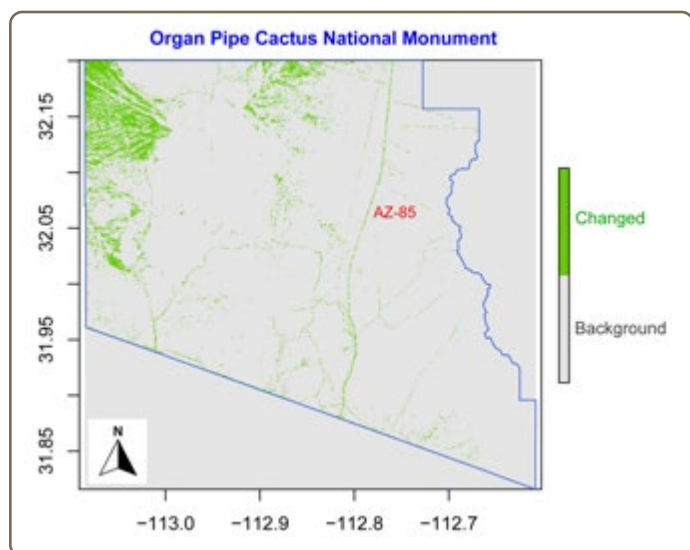
preliminary site selections with those having expert information on access. Going forward, cameras will be placed for a 1 year-long study.



Researcher setting up camera in Chiricahua National Monument for detecting and monitoring the endangered jaguar in Arizona.

New Mexico Tech
Investigate Special-Temporal Dynamics for Vegetation in the SW Border Region
Funding Year: 2021
Funding Amount: \$30,768

New Mexico Tech is using high-resolution remote sensing land cover data to investigate the spatial-temporal dynamics of vegetation cover with the goal of setting a benchmark for other more focused studies with national parks in the Southwest border region. In the first stage,



Land cover change from 2009 to 2019 in Organ Pipe Cactus National Monument. The land cover changes indicated in the image (in green color) can be explained by one or more of the following potential reasons: (1) changes in the remote sensing imagery classification algorithm and the associated system measurement errors; (2) climate variability (e.g., monsoon dynamics); (3) human activities (e.g., trails and land development).

their data analysis and model development will be region-wide while accounting for fine enough spatial heterogeneities (e.g., hotspots of land cover change) by relying on statistical methods such as the fixed effects panel data model. The second stage will focus on field validation of the models and identify managerial applications within park units in the border region. This collaborative process will incorporate the park visitation data and other observational field data collected by the NPS units and conduct field validation selectively.

So far, the New Mexico Tech team has started the literature review process and working towards the data analysis goal by (1) exploring the availability of 5-meter and 10-meter resolution remote-sensed land cover data for the study region and options on how to incorporate them into model development in the next stage; (2) communicating with the resources manager at Organ Pipe Cactus National Monument to explore the possibility of incorporating observational field data collected at the park with remote-sensed data in model development.



National Park Service
U.S. Department of the Interior