

CITIZEN MONITORING OF SPRINGS VALUE TO WILDLIFE

IN MADREAN LANDSCAPE LINKAGES AND OTHER FOCAL AREAS

2018 Springs Ecosystem Symposium

Scott Wilbor, Conservation Science Director

Sami Hammer, Conservation Biologist

Meagan Bethel, Conservation Intern



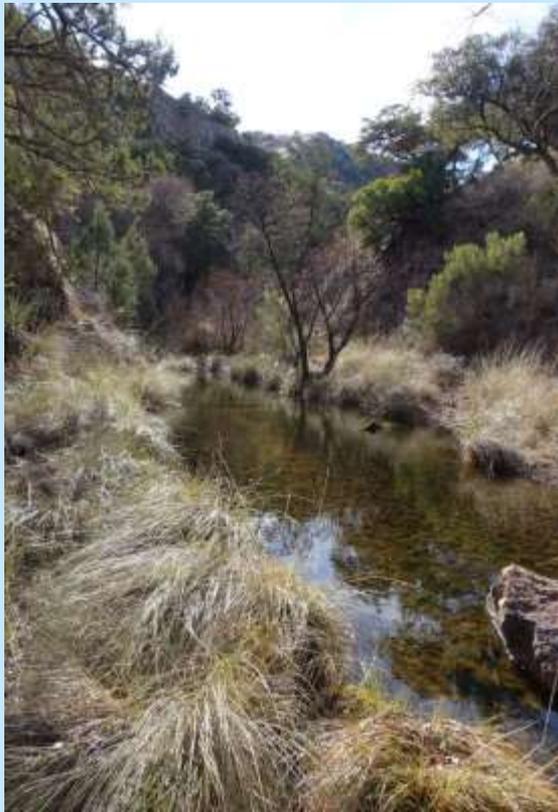
**SKY
ISLAND
ALLIANCE**



Value of Springs

Goal: Assess use of springs by wildlife in critical landscape linkages between Madrean Sky Islands

- Oasis of water in a dry environment for wildlife in movement
- Indicators of linkage value & ecosystem health

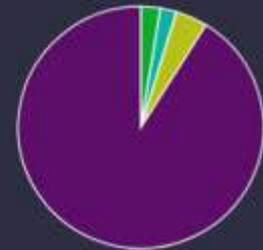


Focus Area: Bi-national Madrean Sky Island Region



Sky Island Alliance

United States, Mexico



Protected: 2.6%
 Semi-Protected: 2.1%
 Other Protected: 4.2%
 Not Protected: 91.1%
 Area: 8.9 Million Hectares

Description

Enhancing the adaptive capacity of the Sky Island Region through protection and restoration of keystone spring ecosystems.

Species

The region is a blend of tropical and temperate, harboring well over half the bird species of North America 29 bat species, over 3,000 species of plants, and 104 species of mammals--a diversity exceeding anywhere else in the U.S. Some important mammals include jaguar and ocelot.

<http://www.skyislandalliance.org>

SIA Integrated Programs

- Started Adopt-A-Spring Monitoring Program in 2014
- Combined Springs and Wildlife Linkage Monitoring in 2016
 - 9 Linkages monitored, 7 with springs



Seasonal Monitoring

- Does flow change seasonally?
- How is climate change affecting flow & other aspects?
- More complete data on flora & fauna
- Pre/Post restoration project assessment
- *(New) How do wildlife respond to springs and their conditions over the primary seasons of the year, over time, and in various landscape positions?
- *(New) Can we use our collected data to guide management in order to protect these critical ecosystem resources

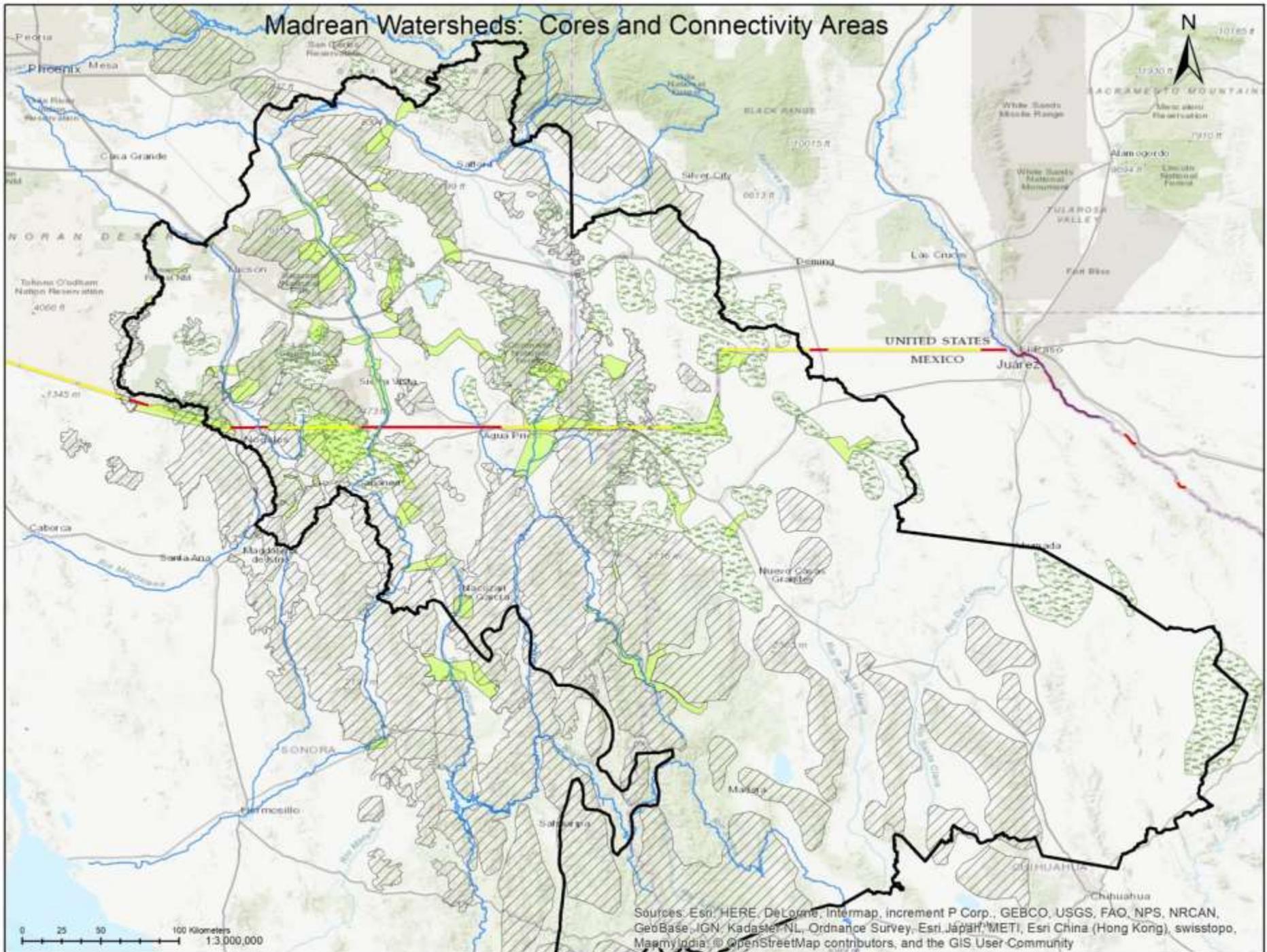


Citizen Science - Methods

- Team-based
- Survey 5 times a year (3 week “survey windows”)
 - Winter, Spring, Dry Summer, Monsoon, Fall
- SSI Level 2 Survey:
 - Water quality, flow, soil moisture, flora and fauna
- Data entered into SSI database
- Camera data collected and submitted to SIA, we apply metadata and analyze



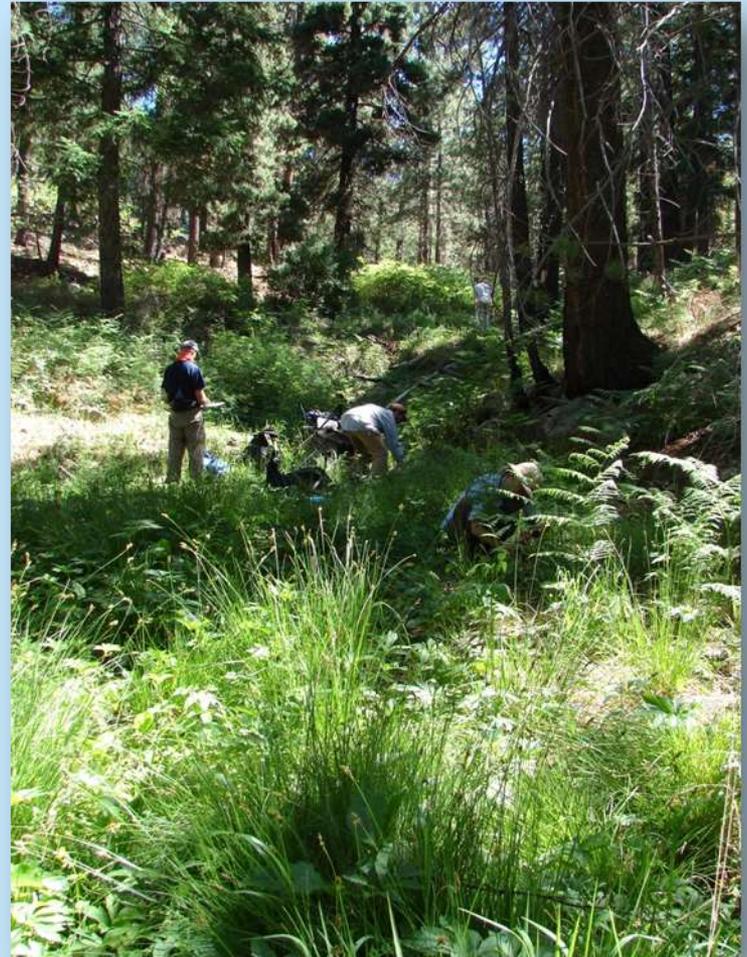
Madrean Watersheds: Cores and Connectivity Areas



Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri, Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Citizen Science - Participation

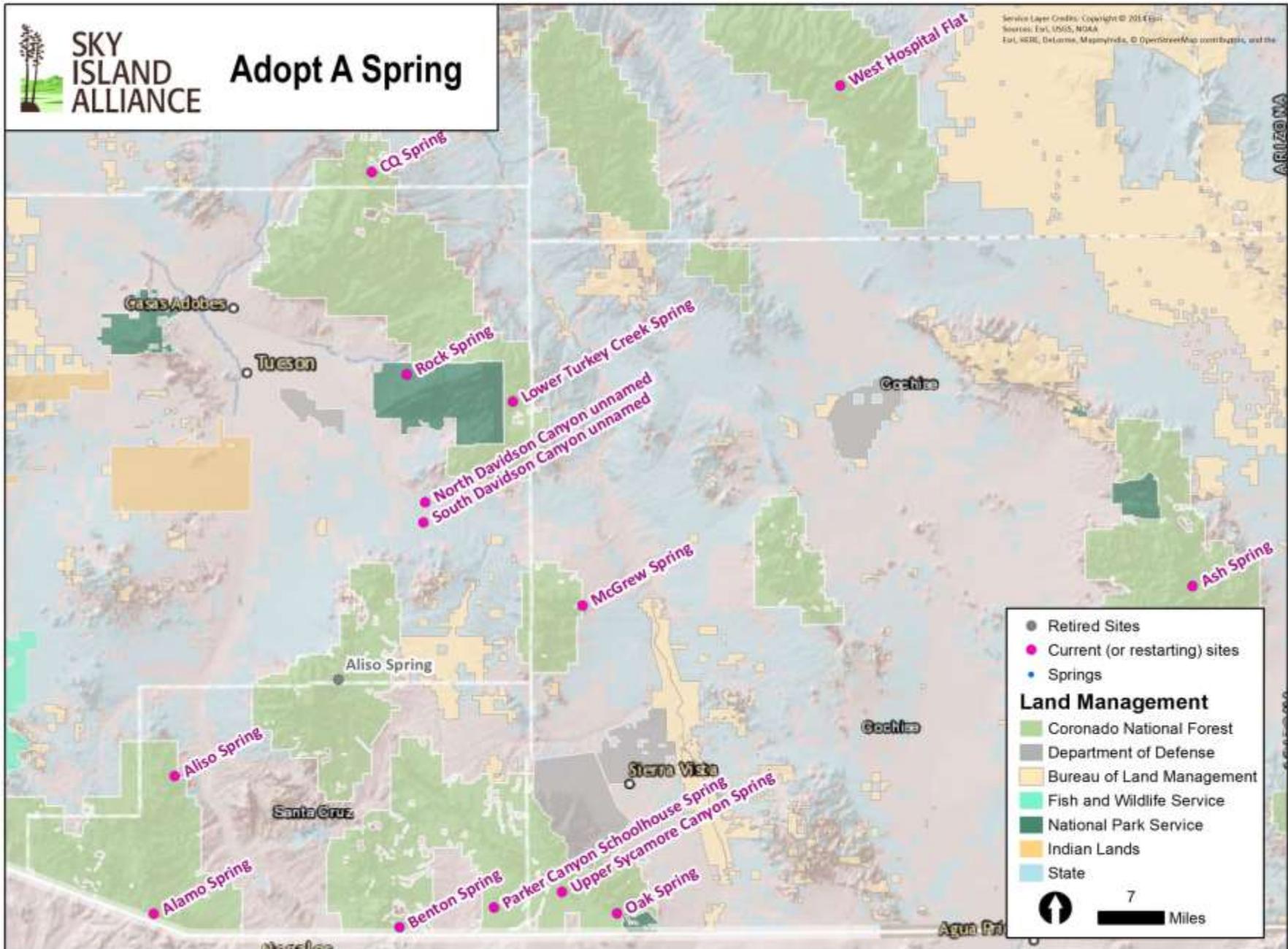
- Adopt-A-Spring Surveyors: 23
- Wildlife Camera Monitors: 27
- Overlap of participants: 13





Adopt A Spring

Service Layer Credits: Copyright © 2014 Esri
Sources: Esri, USGS, NOAA
Esri, HERE, DeLorme, Mapbox, © OpenStreetMap contributors, and the



● Retired Sites
● Current (or restarting) sites
● Springs

Land Management

- Coronado National Forest
- Department of Defense
- Bureau of Land Management
- Fish and Wildlife Service
- National Park Service
- Indian Lands
- State

7 Miles

Wildlife and Water

- Wildlife Cameras to remotely monitor biodiversity, added July 2017
 - 6 wildlife cameras at spring sites (plus 2 more recently)
 - Cameras checked on same seasonal schedule (cover time period since previous survey)



Results:

Wildlife Cameras at Springs



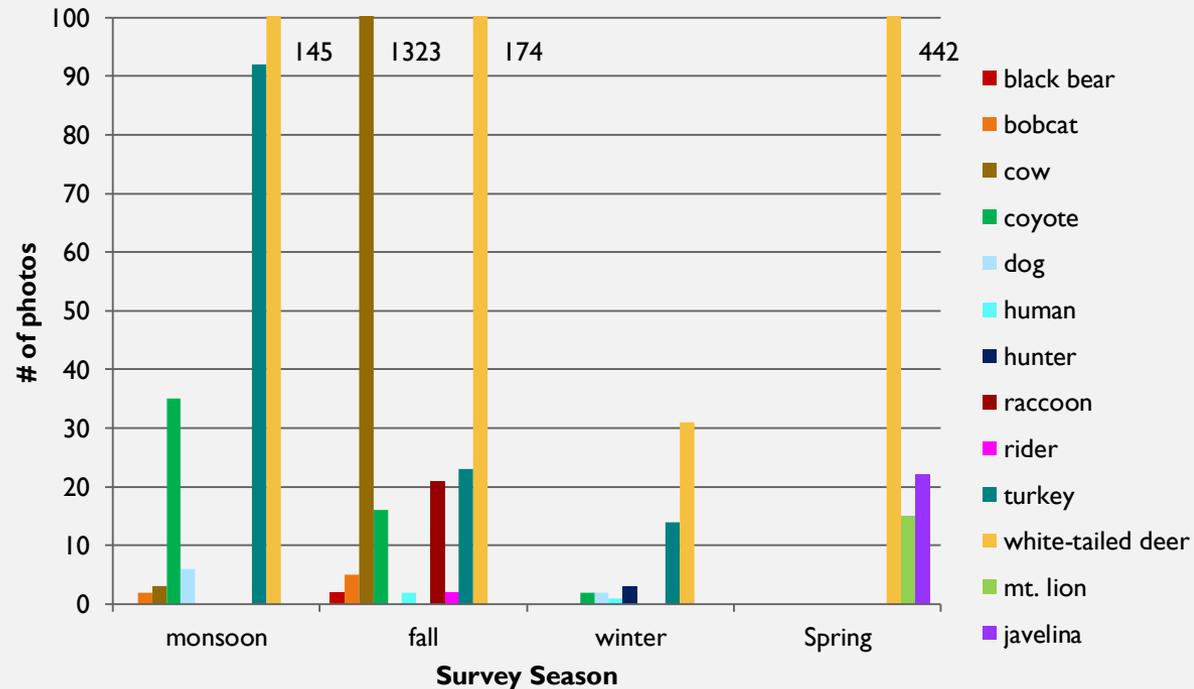
Linkage: S. Huachuca Mtns to Sierra Chivato, MX

Parker Schoolhouse Spring

- Black bear
- Bobcat
- Cattle
- Coyote
- Dog
- Coyote
- Dog
- Javelina
- Raccoon
- Turkey
- White-tailed deer



Number of photos by species by survey season for Parker Schoolhouse Spring



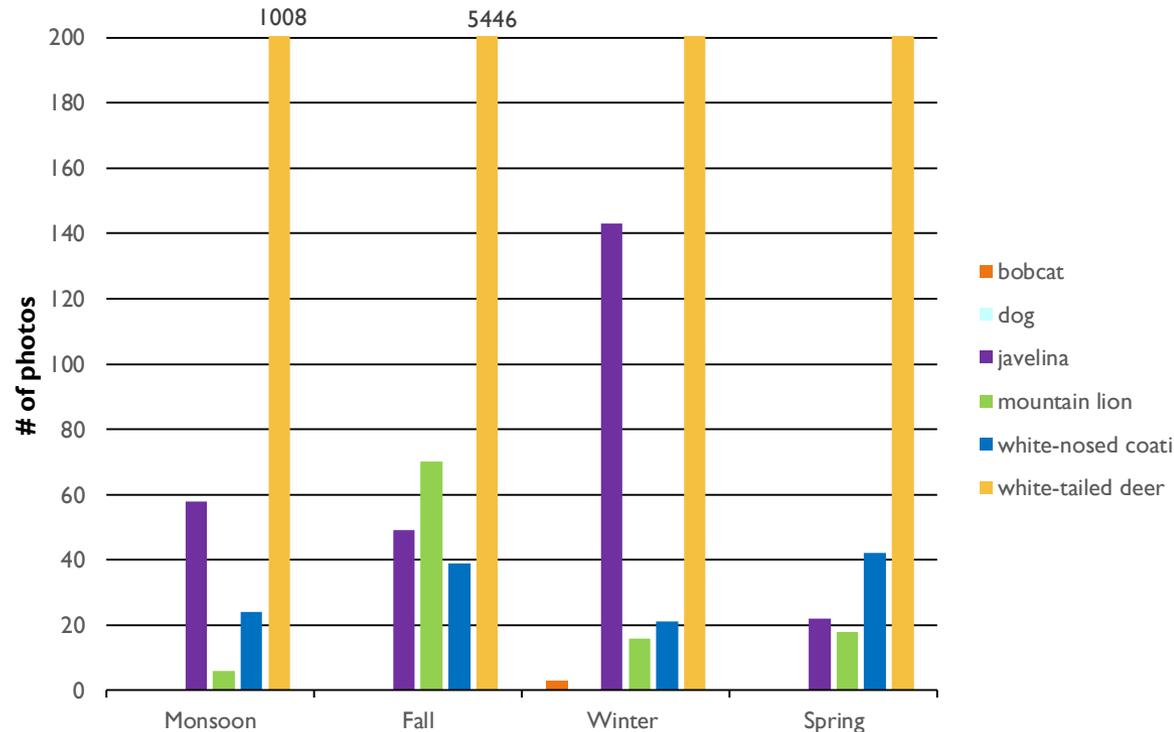
Linkage: Pajarito Mtns to Cibuta, MX

Alamo Canyon Spring

- Bobcat
- Coyote
- Dog
- Javelina
- Mountain lion
- White-nosed coati
- White-tailed deer



Number of photos by species by survey season for Alamo

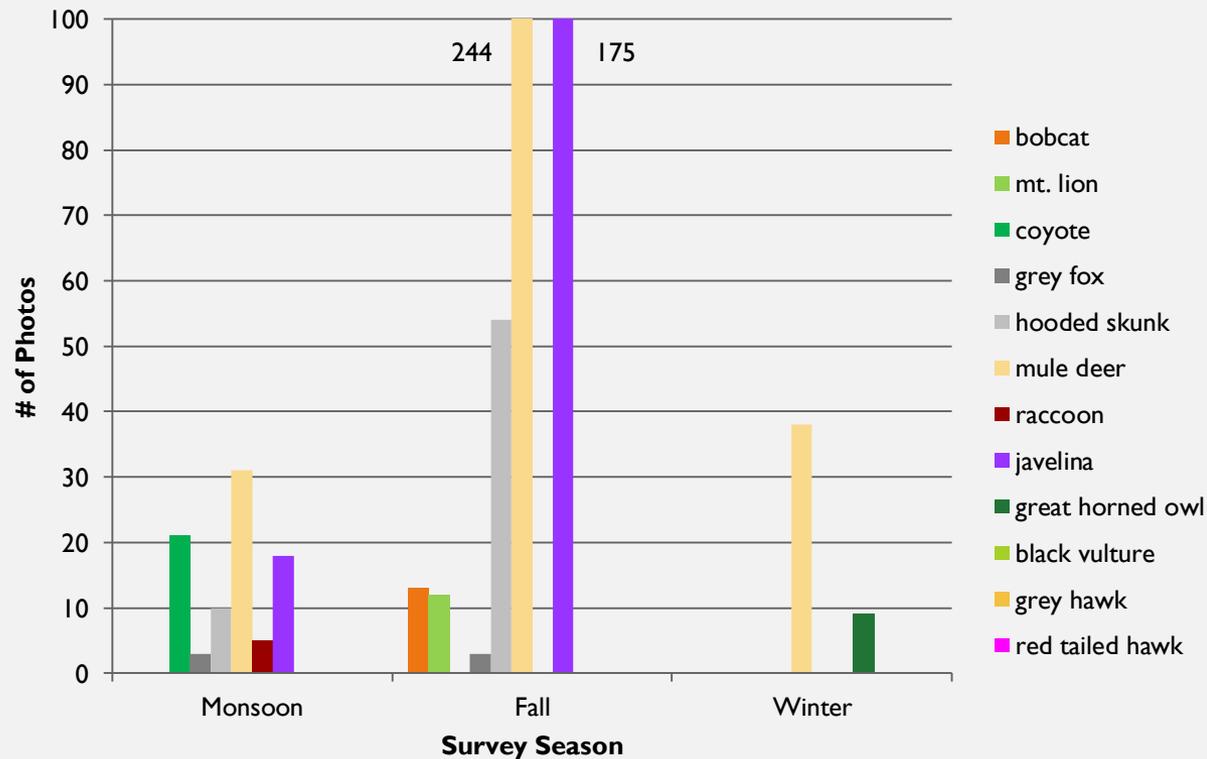


Linkage: Santa Rita Mtns to Rincon Mtns, S. Davidson Canyon Spring



- Black vulture
- Bobcat
- Coyote
- Grey fox
- Grey hawk
- Great-horned owl
- Hooded skunk
- Javelina
- Mountain lion
- Mule deer
- Raccoon
- Red-tailed hawk
- White-tailed deer

Number of photos by species by survey season for South Davidson

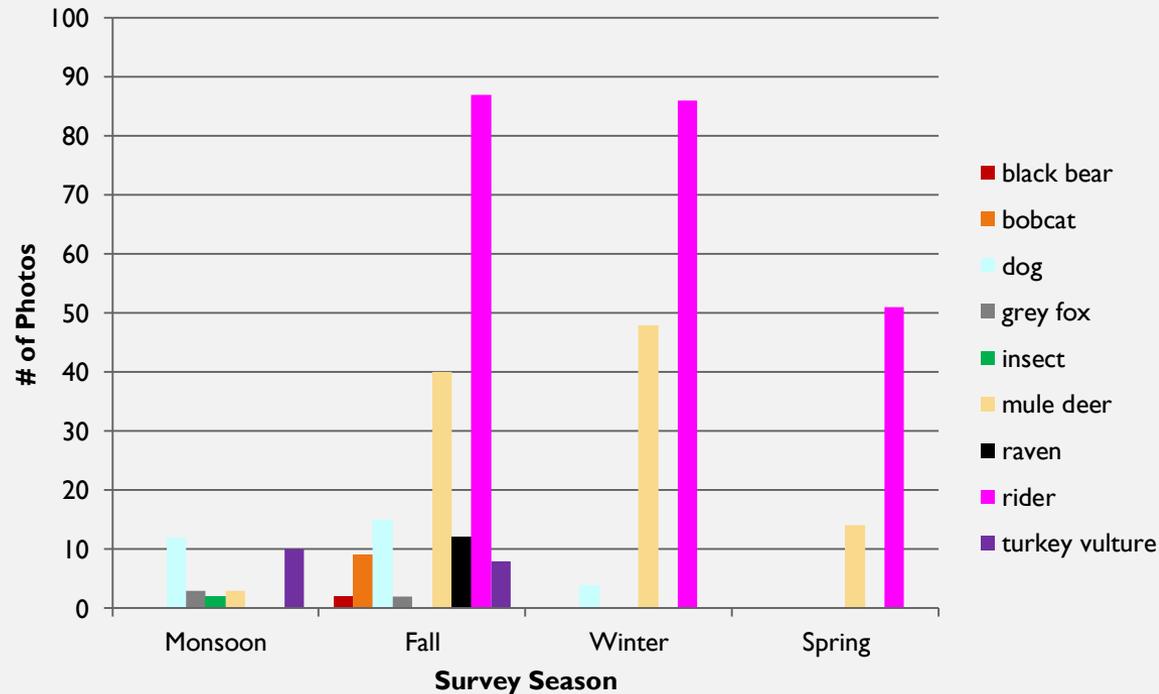


Linkage: Santa Rita Mtns to Rincon Mtns, N. Davidson Canyon Spring

- Black bear
- Bobcat
- Dog
- Grey fox
- Mule deer
- Raven
- Turkey vulture
- Human traffic
+400 each season



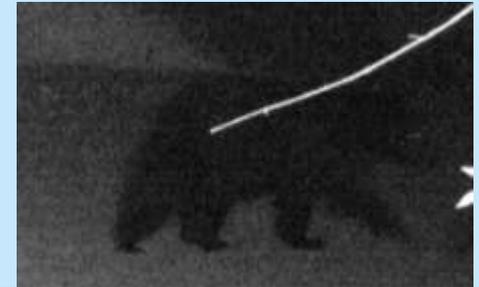
Number of photos by species by survey season for North Davidson



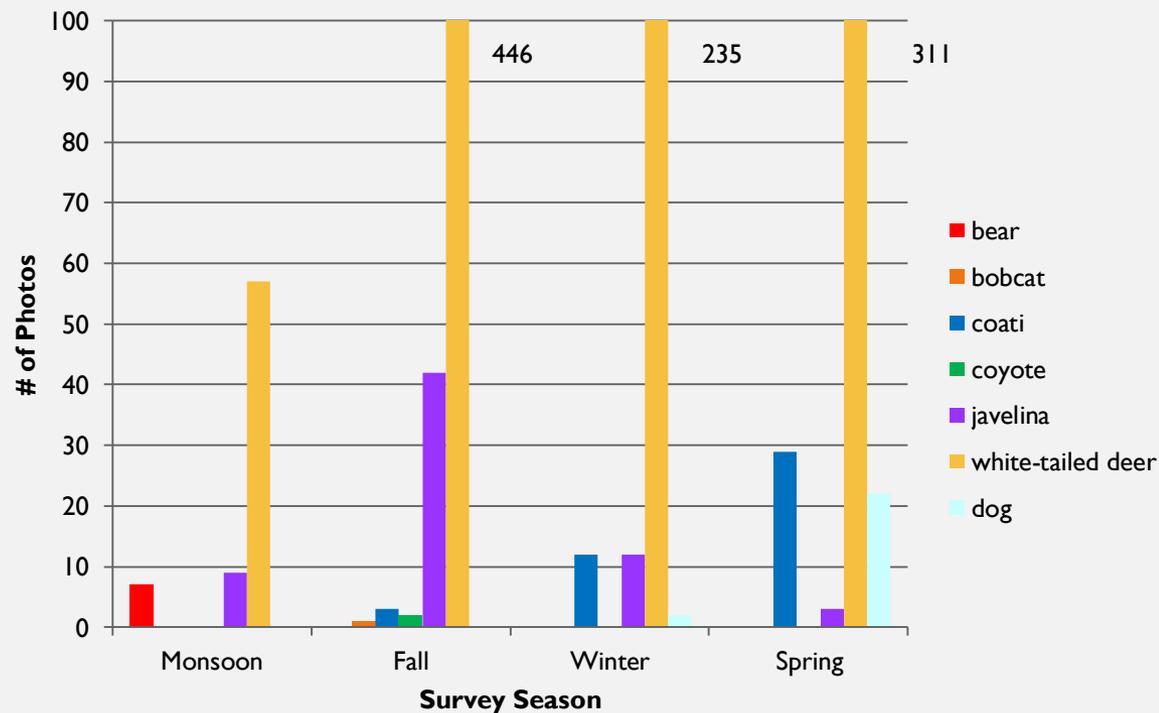
Linkage: S. Huachuca Mtns to Sierra Chivato, MX

Oak Spring

- Black bear
- Bobcat
- Coyote
- Dog
- Javelina
- White-nosed coati
- White-tailed deer



Number of photos by species by survey season for Oak Spring

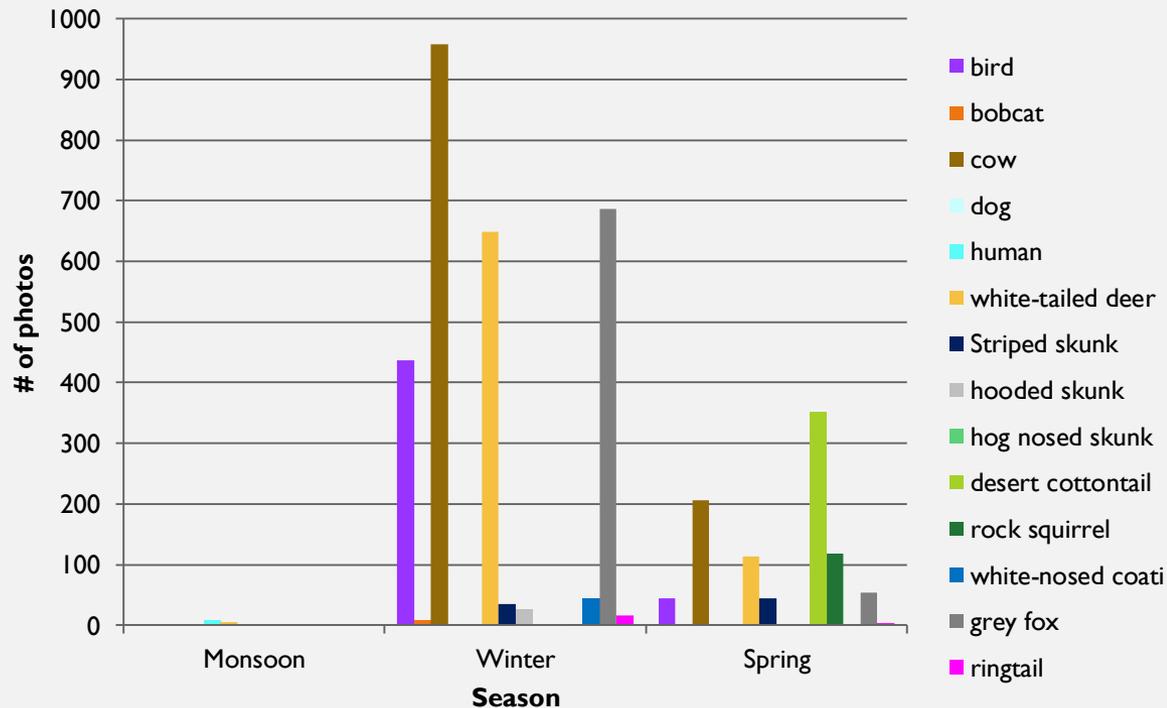


Linkage: Rincon Mtns to Galiuro Mtns, Lower Turkey Creek

- Many small bird species
- Bobcat
- Cottontail
- Cattle
- Grey fox
- Hooded skunk
- Hog-nosed skunk
- Ringtail
- Roadrunner
- Rock squirrel
- Striped skunk
- White-nosed coati
- White-tailed deer



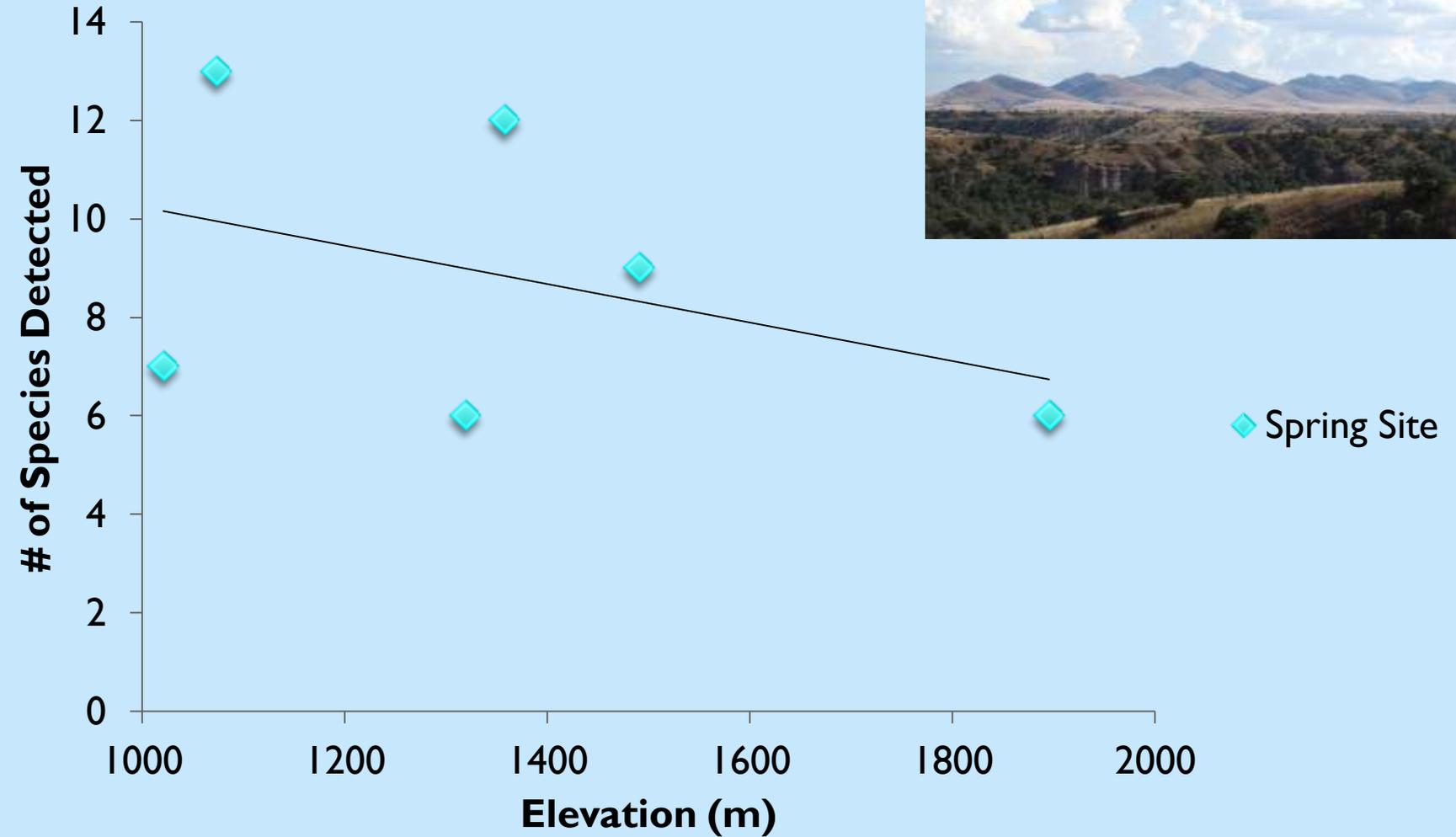
Number of photos by species by survey season for Lower Turkey Creek



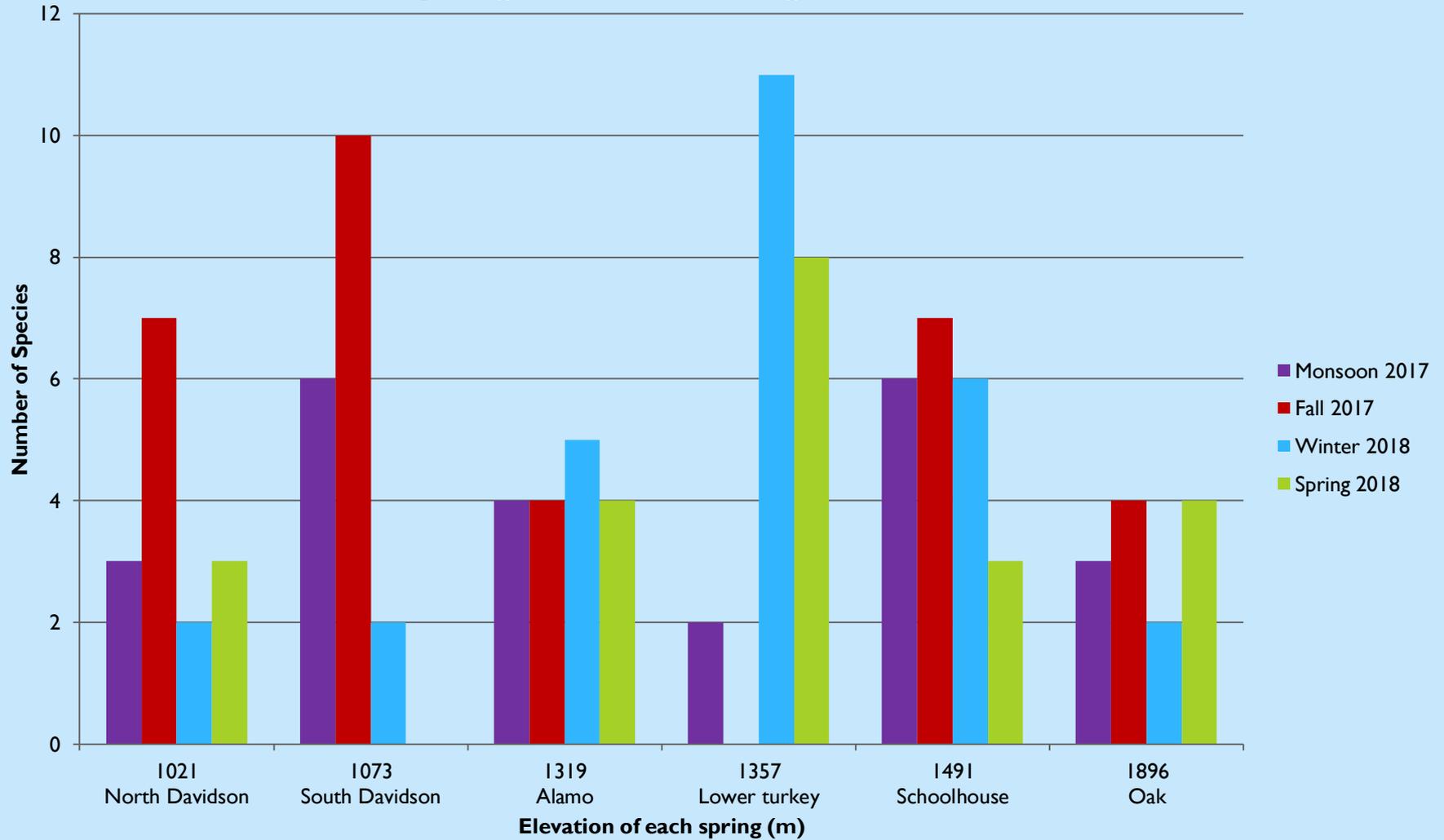
Nocturnal wildlife species use of springs



Number of Species by Elevation



Number of Species detected by season, Spring sites increasing in elevation

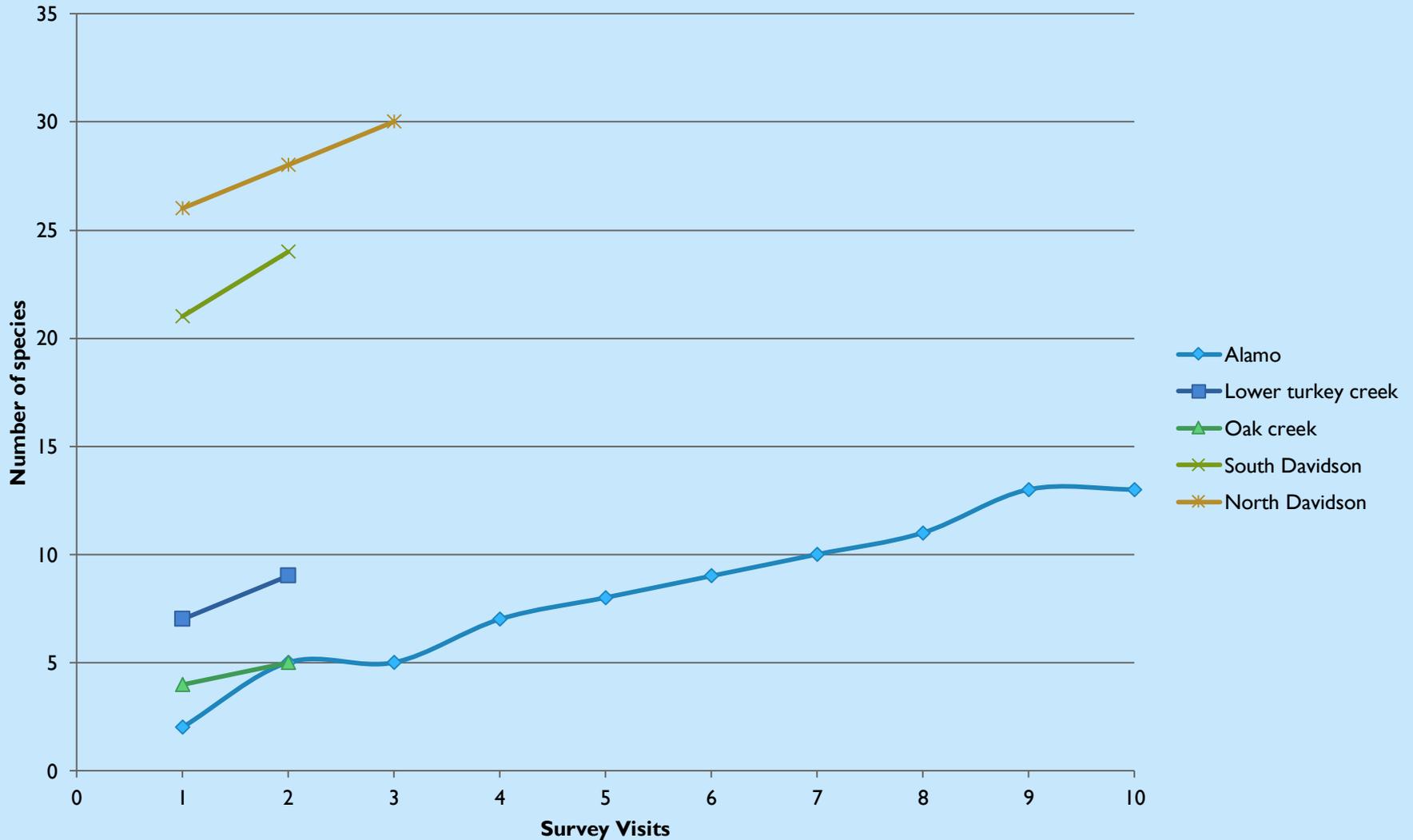




Results:

AAS Observer Detections - Fauna

Species Richness Data Accumulation for AAS Sites



Preliminary Spring Health Indicators for Madrean LCD Monitoring

- **Spring-dependent Species:** amphibians, Sonoran mud turtles, spring snails, other aquatic inverts, riparian vegetation
- **Flow:** Discharge, extent wetted area, persistence of flow
- **Human use:** Disturbance/Development/Wildlife accessibility
- **Animal use:** Herbivory impact/Livestock presence
- **Invasive species:** e.g., Bullfrogs
- **Spring-shed condition:** Departure from fire regime, local hydrology alteration, local soils condition
- **Depth to groundwater:** Sub-watershed level



Acknowledgements

Field Assistance:

- Bryon Lichtenhan, Sky Island Alliance
- Aaron Mrotek, Northern Arizona University

Support:



Scott Wilbor, Conservation Sci. Dir.

Scott@skyislandalliance.org

THANK YOU!



**SKY
ISLAND
ALLIANCE**

