

# **CITIZEN MONITORING OF SPRINGS VALUE TO WILDLIFE**

## ***IN MADREAN LANDSCAPE LINKAGES AND OTHER FOCAL AREAS***

### **2018 Springs Ecosystem Symposium**

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# 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



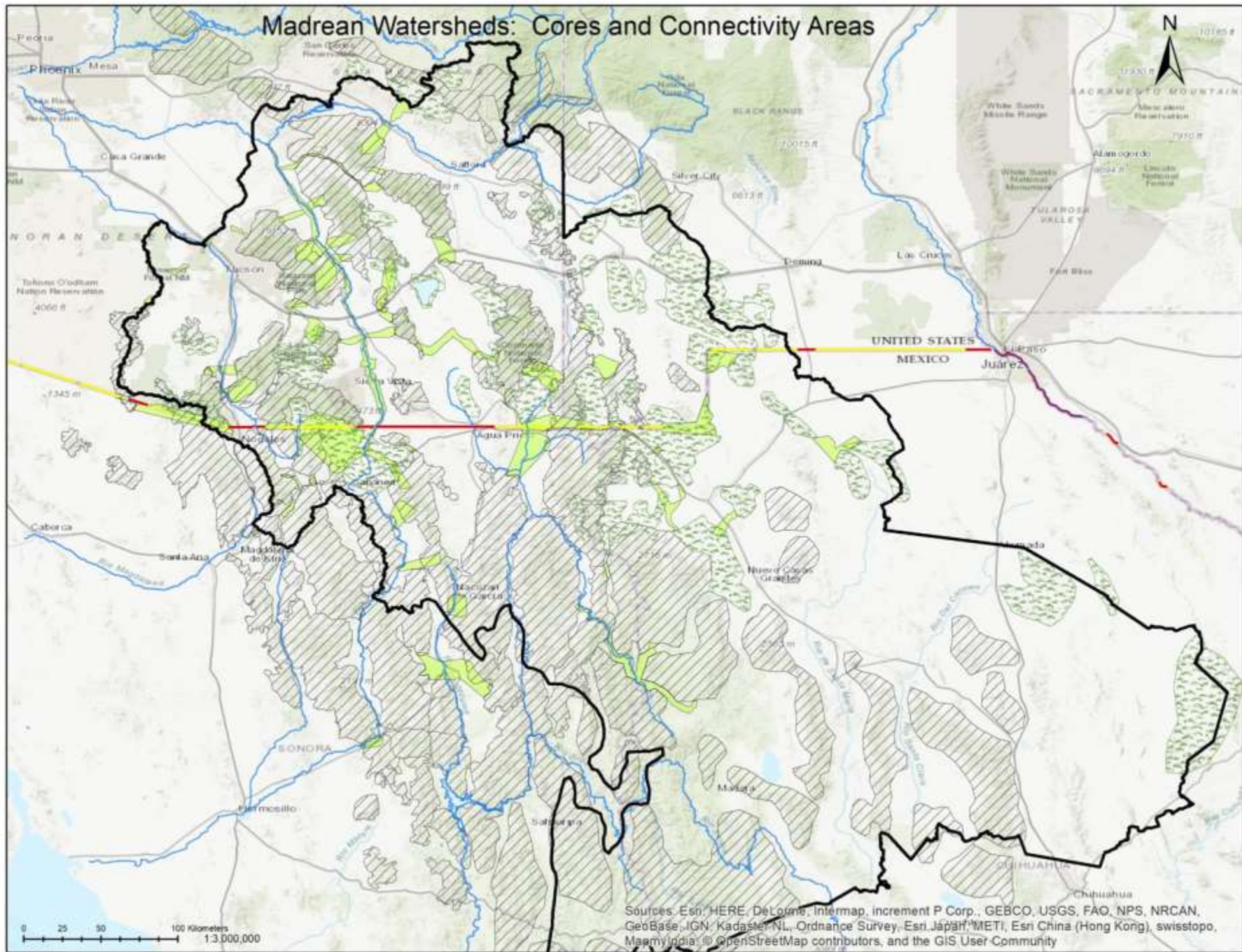


# Citizen Science - Methods

- 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 SLA, we apply metadata and analyze



# Madrean Watersheds: Cores and Connectivity Areas

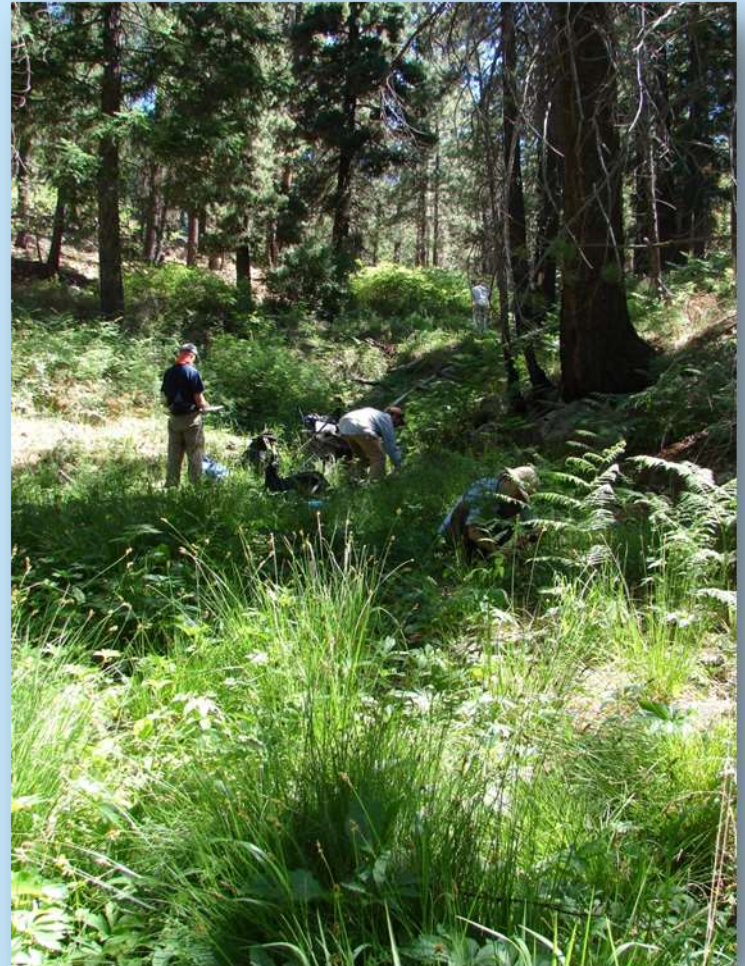


Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community



# Citizen Science - Participation

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

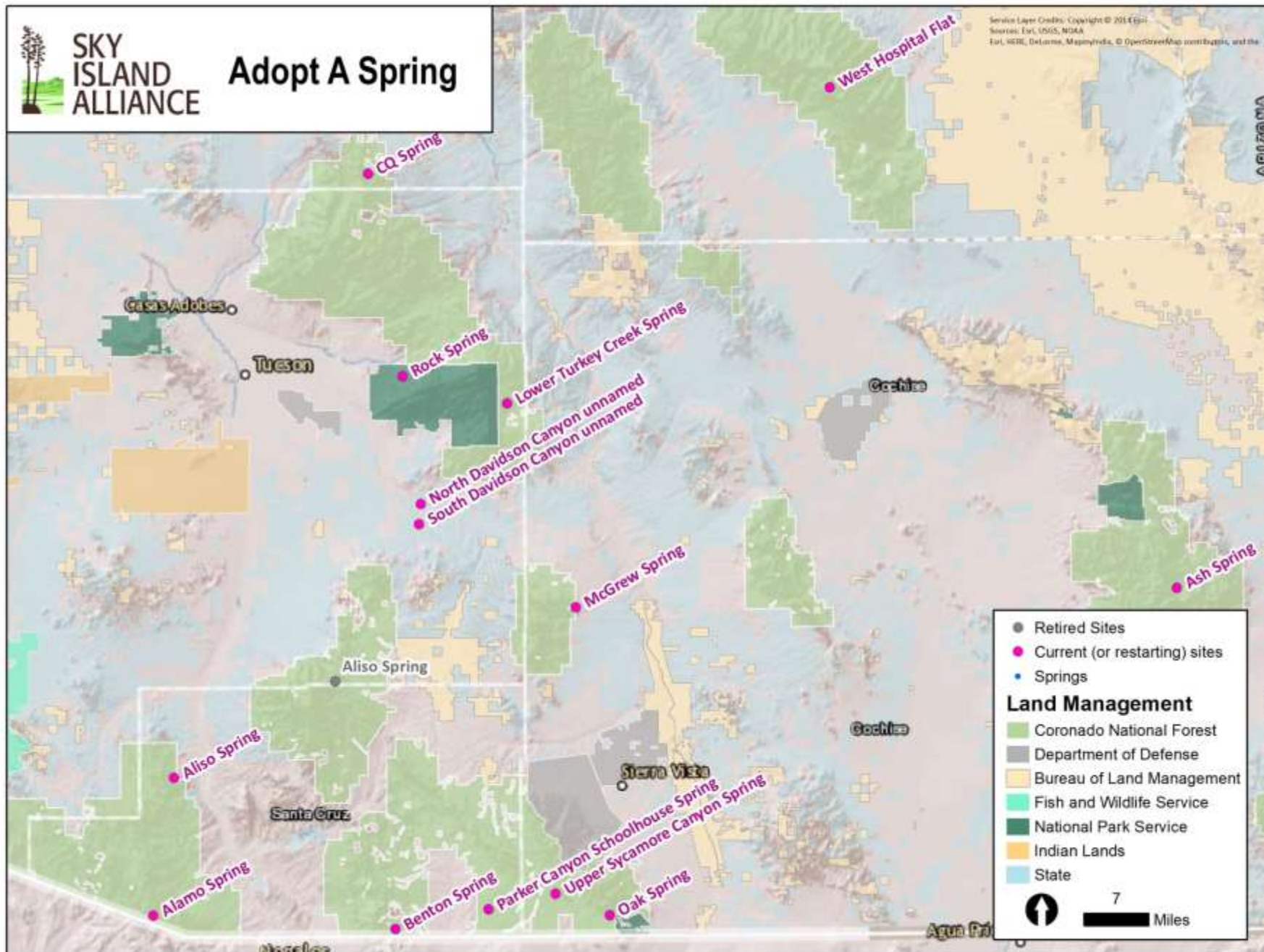






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## Adopt A Spring



# 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



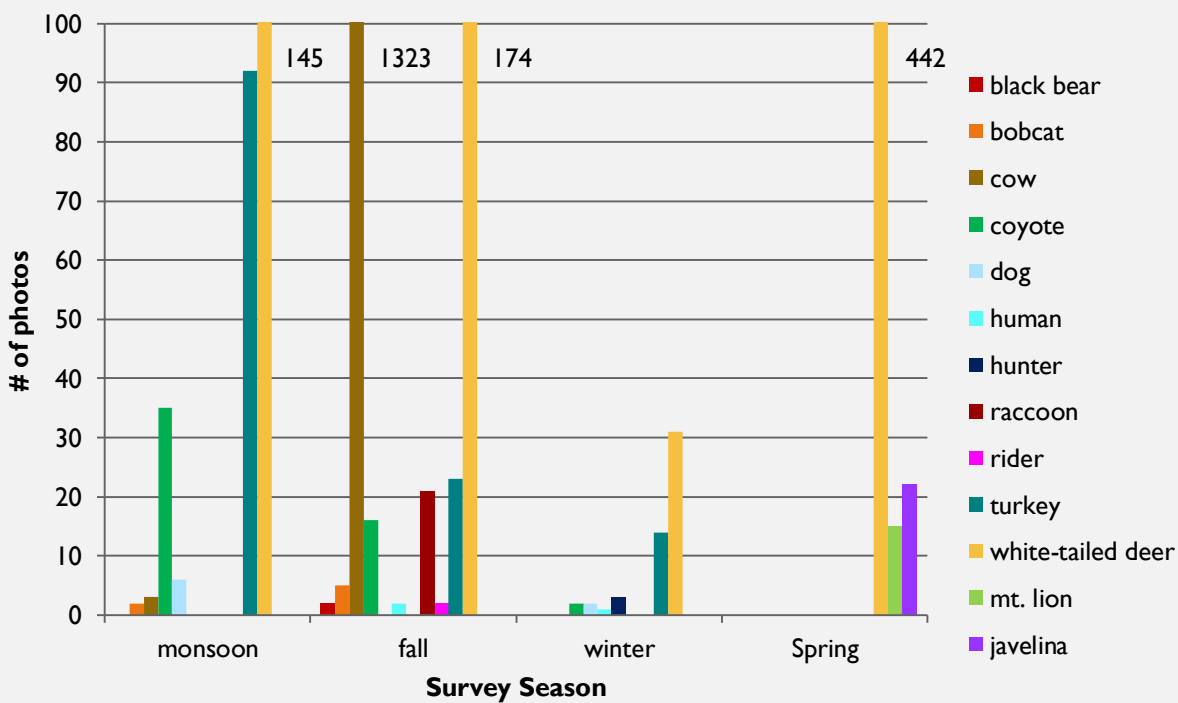
# Linkage: S. Huachuca Mtns to Sierra Chivato, MX

## Parker Schoolhouse Spring

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



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





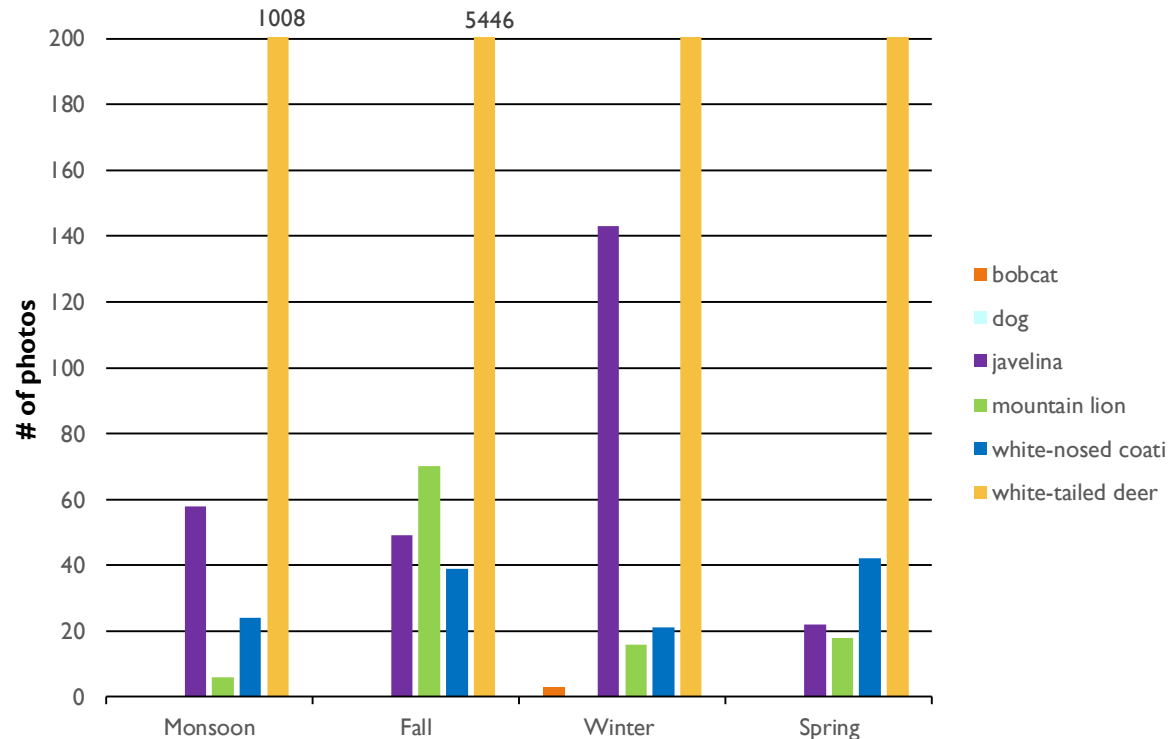
# Linkage: Pajarito Mtns to Cibuta, MX

## 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

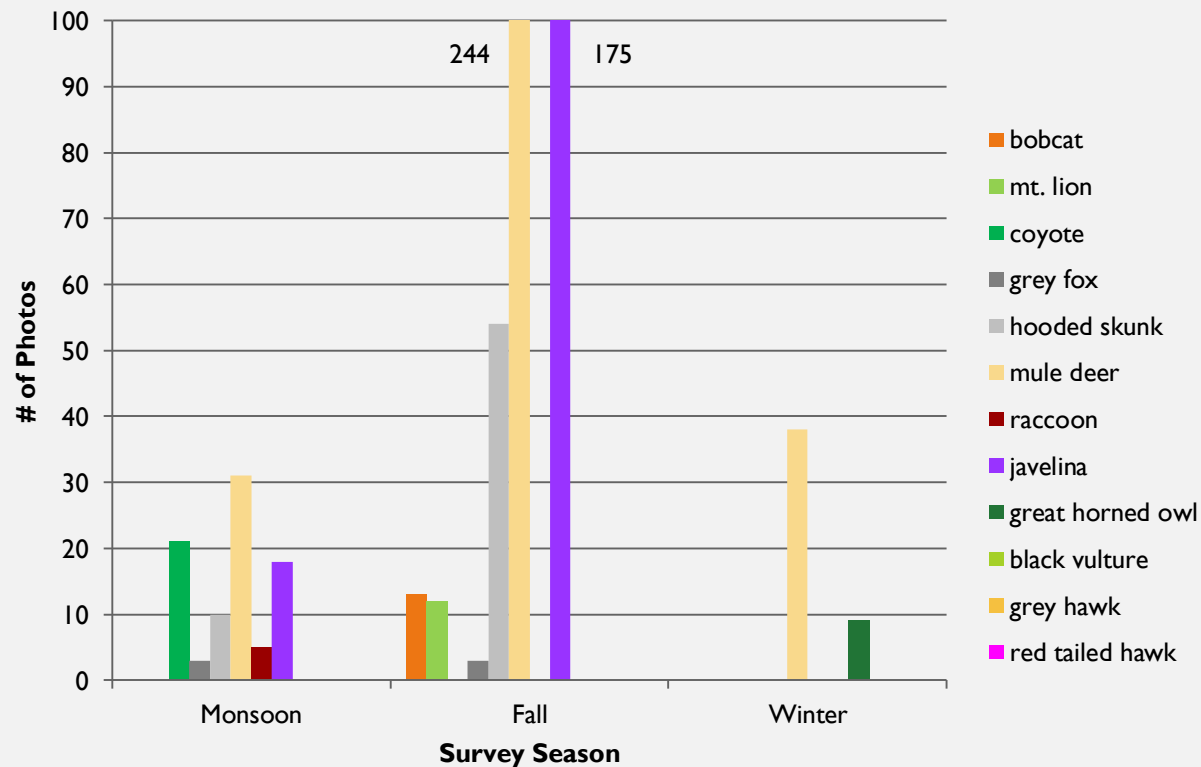


# Linkage: Santa Rita Mtns to Rincon Mtns, S. Davidson Canyon Spring



- 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**



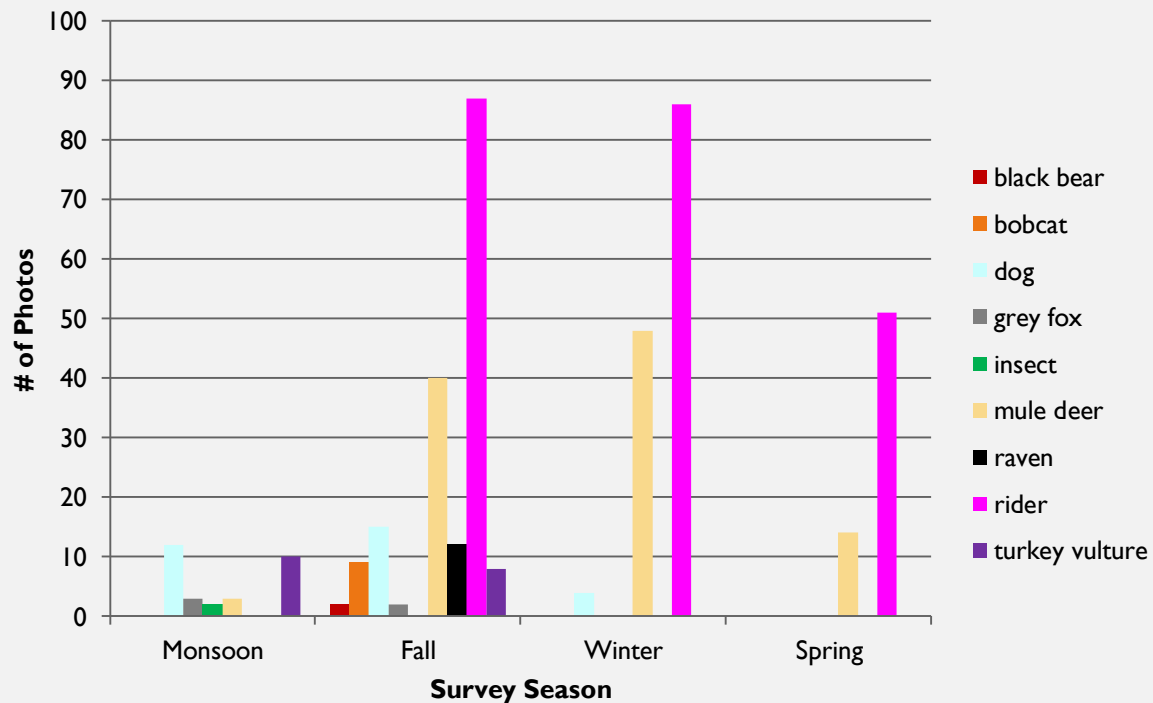


# Linkage: Santa Rita Mtns to Rincon Mtns, N. Davidson Canyon Spring

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



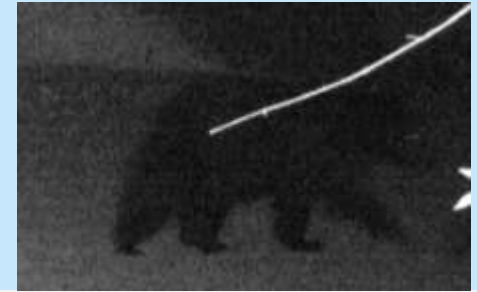
**Number of photos by species by survey  
season for North Davidson**



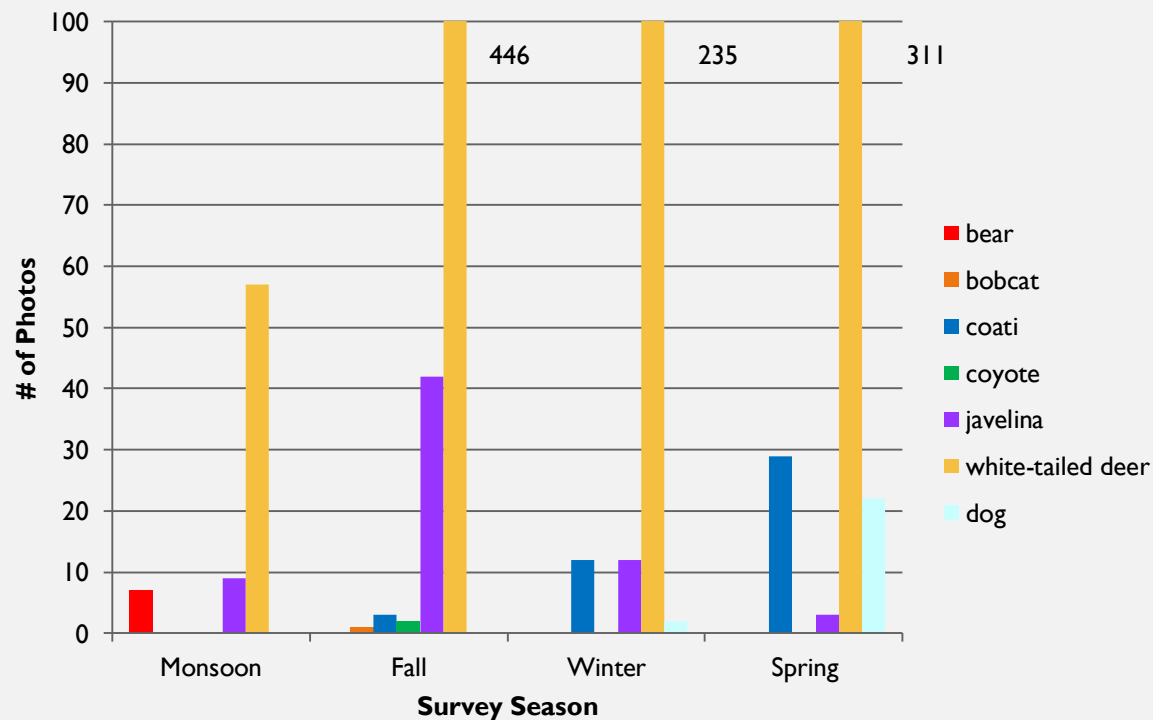
# Linkage: S. Huachuca Mtns to Sierra Chivato, MX

## 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**



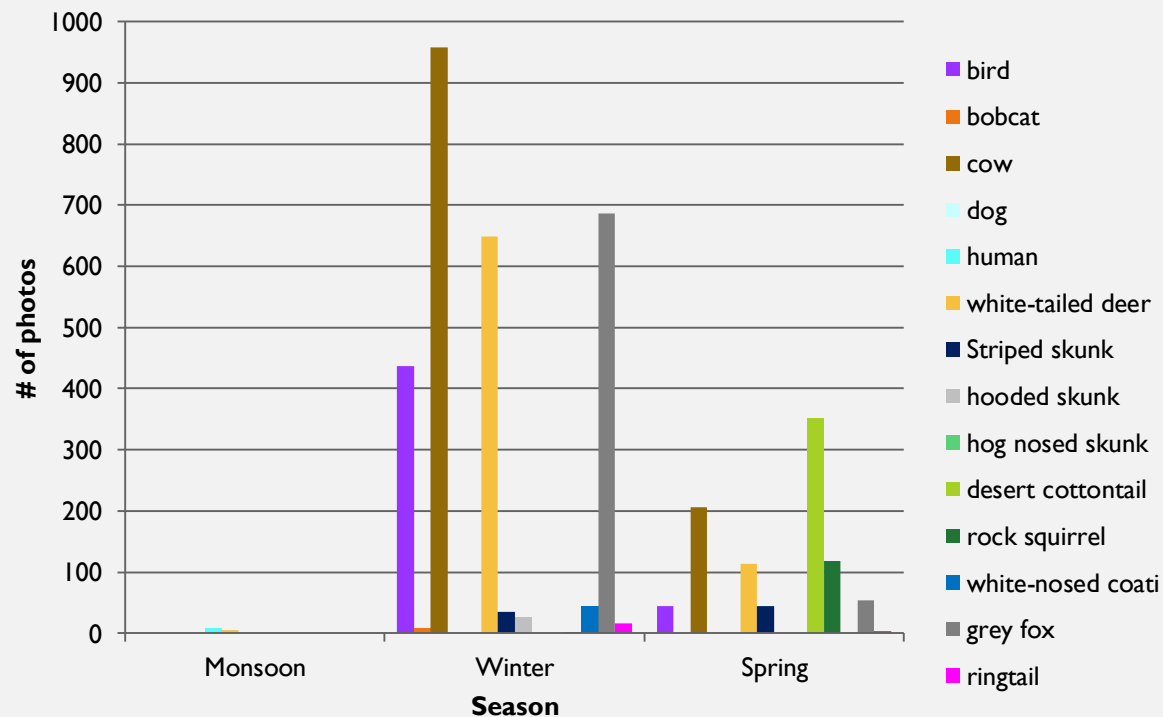


# Linkage: Rincon Mtns to Galiuro Mtns, Lower Turkey Creek

- 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**

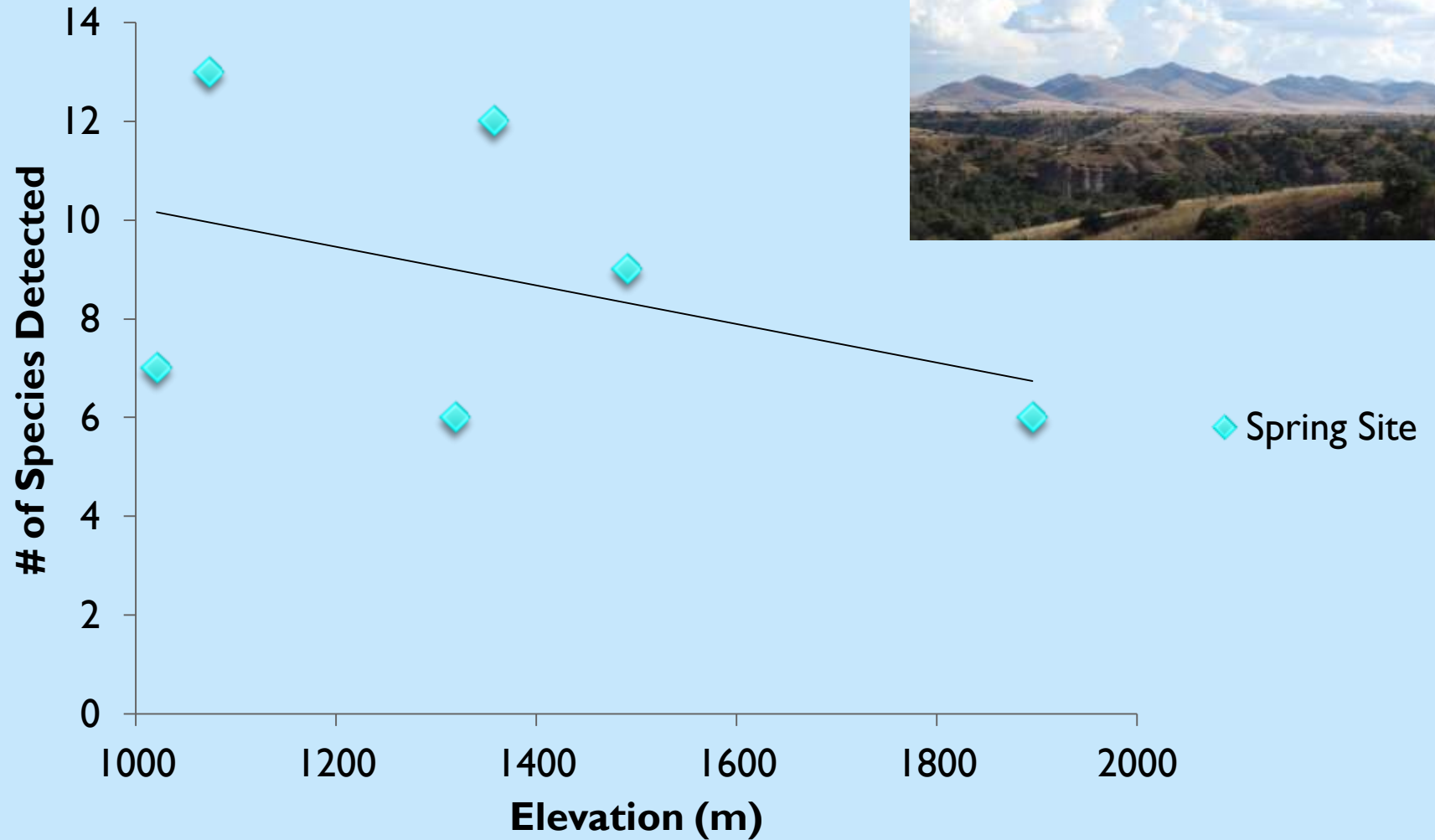


# Nocturnal wildlife species use of springs

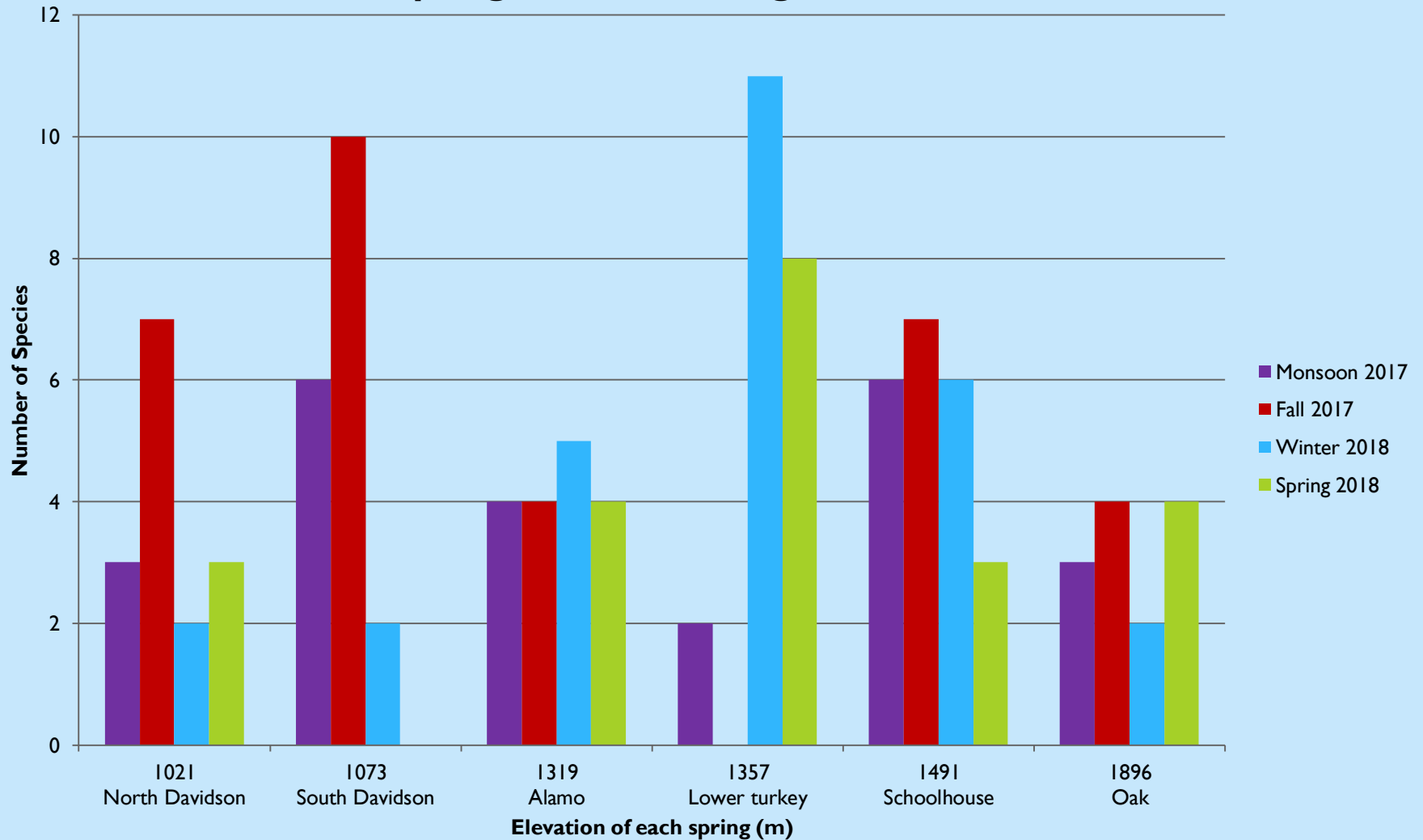




## Number of Species by Elevation



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



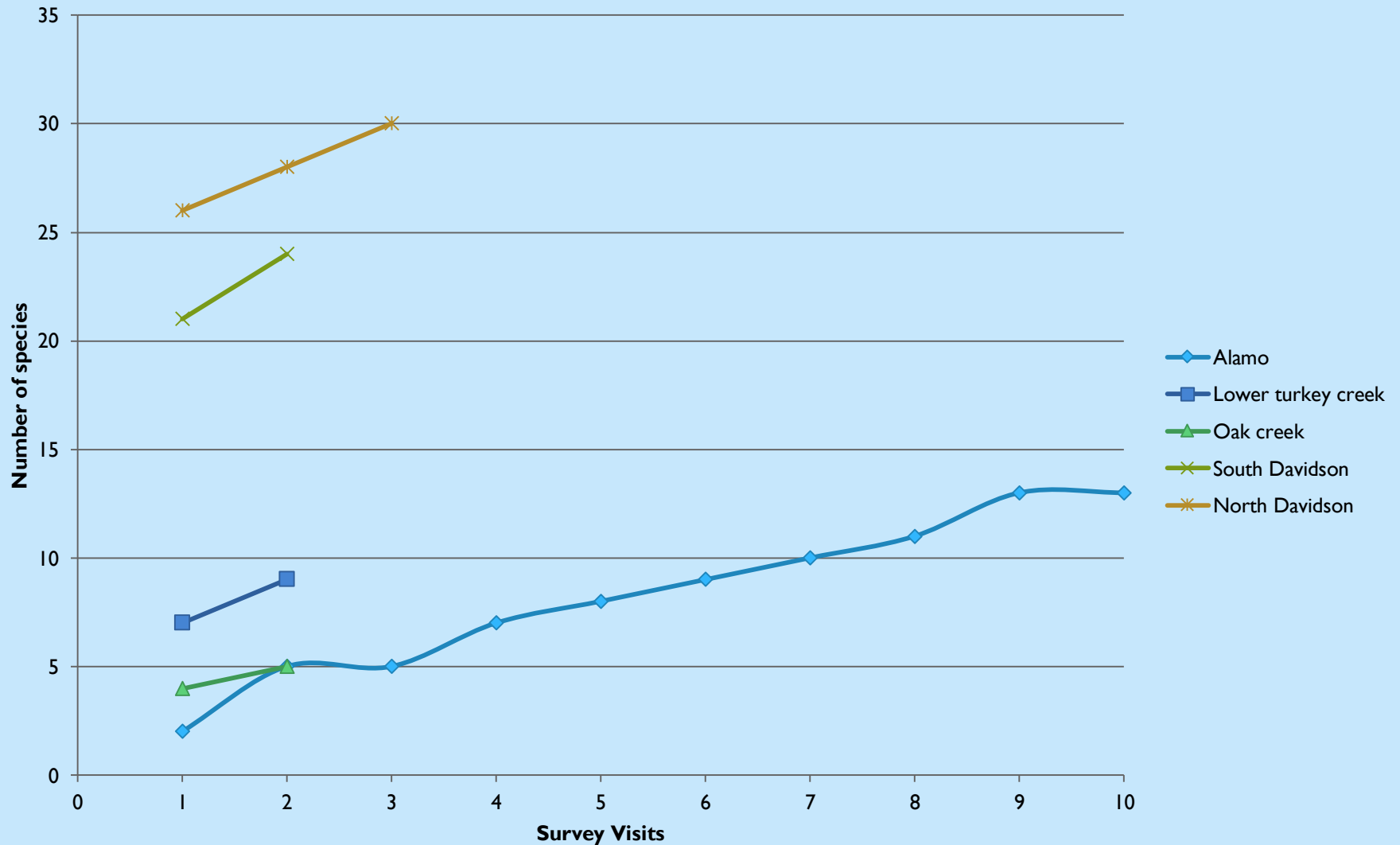




# Results:

## 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

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WATERSMART

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THANK YOU!



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