

## **SAGUARO NATIONAL PARK RESEARCH NEEDS**

Following is a list of the kinds of research, by general topic, park management is especially interested in. It is by no means comprehensive.

### **ECOSYSTEM**

- Ecosystem conversion/Role of exotic plants post fire
- Wildlife corridors/connectivity to habitats/areas outside of Park
- Saguaro National Park as a reference/control site for climate change studies
- Status/trajectory of different communities in the Park (e.g., grasslands, relic, aquatic)

### **CLIMATE CHANGE/PHENOLOGY**

- Effect of climate change on saguaros
- Effect of climate change on sensitive or exotic species
- Establishing protocols for monitoring global change in ecotones

### **ATMOSPHERIC**

- Air quality (e.g., ozone) effects on natural resources

### **NATURAL PROCESSES/FIRE**

- Effective post-fire restoration techniques at different elevations; in formerly weed dominated areas
- Buffelgrass fire behavior; fuel loads
- Impacts of fire on Sonoran desert plant and animal species

### **HYDROLOGY**

- Water sources (and their vulnerability) in the Rincon and Tucson Mountains
- Modeling (including predicting and preventing) large sedimentation events, especially post-fire
- Isotopic composition of surface waters in Saguaro National Park
- Development of a detailed water budget for the Rincon Creek watershed
- Subsurface geohydrology of Rincon and other creeks/drainages

### **AQUATIC RESOURCES**

- Exotic species inventory
- Aquatic resources management plan

### **TERRESTRIAL VERTEBRATES**

- Status/relationship of mule and white-tailed deer populations; javelina
- Status of large carnivore (mountain lion, black bear) populations
- Status of small mammals (e.g., bats, rodents)
- Inventory and monitoring of bats and known roosts
- Endemic fish and viability of fish reintroductions
- Population trends of T&E species (i.e., Mexican spotted owl, lesser long-nosed bat, yellow-billed cuckoo)

- Ecological studies of eastern cottontails, desert shrews, pocket gophers, badger, deer, and other species
- Relationship of lesser long-nosed bats and saguaros in Saguaro National Park
- Ecology of the mesquite mouse (and other *Peromyscus* spp.) in Saguaro NP

#### INVERTEBRATES

- Basic inventory (including aquatic invertebrates)
- Pests, specifically bark beetles

#### VEGETATION

- All things related to buffelgrass and other invasive species that have the potential to threaten saguaros or saguaro habitat, for example:
  - Effects of exotic grasses on saguaros
  - Buffelgrass and other invasive exotic species - spread models
  - Buffelgrass and other invasive species - fuel mapping
  - Buffelgrass and other invasive species - detection and monitoring methods
  - Buffelgrass and other invasive species - physiognomy and physiology in Sonoran desert vegetation communities
  - Buffelgrass and other invasive species - influence on small mammal, avian, and reptile diet and ecology
  - Influence of nitrogen deposition on native and non-native plants
  - Exotic plant inventories at upper elevations
  - Effects of urbanization/fragmentation on saguaros
  - Surface and sub-surface micro-organisms and role they play in a) native plant communities and b) invaded native plant communities
  - Landscape scale detection and distribution of saguaros and buffelgrass
  - Forest health/changes, including pests, disease

#### ARCHEOLOGICAL

- Inventories in mid- to upper elevations at RMD
- Analysis of prehistoric agriculture in the Rincon Valley
- Archeological survey of the high country of the Rincons

#### HISTORIC

- Cultural landscape inventory
- History of homesteading in the Rincons
- Grazing history of Saguaro National Park
- A comprehensive GIS based Research Atlas for Saguaro National Park (i.e., where are study plots for past studies located?)

#### SOCIAL SCIENCE/RECREATION/VISITOR USE

- Economic impacts of buffelgrass invasion
- Impacts of recreational activities on natural resources
- Outreach to underserved populations
- Mass transportation to/in natural preserves