Tumamoc Hill Steward Orientation

The Desert Laboratory on Tumamoc Hill
University of Arizona
Chemagagi Du’ag
(Tohono O’odham: Horned Lizard Mountain)
As a Tumamoc Steward, you will encounter differing and sometimes contradictory perspectives about Tumamoc Hill.

Different ways of understanding Tumamoc provide diverse ways of engaging the public.

In addition to the educational content you share, your behaviors and attitudes can model thoughtful and respectful relationships to this landscape.
Cultural Landscape

- Shaped by culture (humans) + time
  - Includes past and present interactions
- Evidence of interactions between humans and their environment may be visible, hard to see, or “invisible.”
- Understanding of the landscape varies according to one’s culture.
- Understanding a cultural landscape requires time, patience, and understanding multiple perspectives.
- The Tohono O’odham Nation and other Native nations have the longest continuous relationships with this landscape, and Tumamoc Hill is culturally significant to these nations.
Our origins are linked to our homeland, the Sonoran Desert. Thousands of years ago, our predecessors, the Hohokam, settled along the Salt, Gila, and Santa Cruz Rivers. The Hohokam were master dwellers of the desert, creating sophisticated canal systems to irrigate their crops of cotton, tobacco, corn, beans, and squash. They built vast ball courts and huge ceremonial mounds and left behind fine red-on-buff pottery and exquisite jewelry of stone, shell, and clay.
National Historic Landmark

- Building, district, object, site, or structure that is officially recognized by the United States government for its outstanding historical significance.
- Desert Laboratory
An Archaeological District

- Tumamoc Hill is an archaeological district.
- A place where evidence of human activity is preserved, and which has been investigated via archaeology.
- Artifacts, architecture, features, landscape modifications, and other forms of material culture.
- A timeline of human interactions with and residence in a particular place.
Middle Archaic*
5000–1700 BCE

Maize cultivation in the Tucson Basin ca. 4100 years ago

Santa Cruz River, 1904
*Archaeological timeline and phases from tumamoc.arizona.edu
Early Agricultural
2100 BCE–50 CE

• Construction of the *trincheras* on Tumamoc Hill
  - 2.3 km long
• A village site on top of Tumamoc Hill

Photo: Paul Mirocha
Tortolita Phase
400–500 CE

- Settlements shift from the floodplains to adjacent river terraces
- There is a large village on the top of Tumamoc Hill
- Only known Tortolita-phase hilltop settlement + only settlement surrounded by massive stone walls
Hohokam Culture 700–1450 CE

- Extensive agave (*Agave murpheyi*) farming at the base of Tumamoc Hill
- No settlements on the top of the Hill, closest was in the area of Saint Mary’s hospital
ANCIENT AGAVE PIT-ROASTING ON TUMAMOC HILL

Tumamoc Hill is one of the best-studied and intensely cultivated agave fields in the United States. It’s one of the few places where researchers have integrated botany, ecology, and archaeology of agaves to understand plant-people interactions through time.

ASADO ANTIGUO DEL MAGUEY EN EL CERRO DE TUMAMOC

El Cerro de Tumamoc es uno de los campos de maguey mejor estudiado e intensamente cultivado en los Estados Unidos. Es uno de los únicos lugares donde los investigadores han combinado las perspectivas de botánica, ecología y arqueología de los magueyes para comprender las interacciones planta-humana a través del tiempo.
Keeping visitors to Tumamoc Hill on the paved road and other designated areas protects the archaeology of Tumamoc Hill.

- Also protects the ecology of the Hill.

The top of Tumamoc Hill is dense in archaeological features and is culturally significant; pedestrians should not be beyond the gate at any time.

Any damage/vandalism to any aspect of the site should be taken seriously, per Federal and State laws.
Timeline of the Desert Laboratory
Frederick V. Coville

Andrew Carnegie

Theodore Roosevelt

Daniel T. MacDougal
Desert Botanical Laboratory

October 7, 1903

MacDougal 1903–1928
The library circa 1910
Carnegie and the Saguaro
(Carnegiea gigantea)
Greenhouse built in 1906
Greenhouse today
Forest Shreve (1878–1950) Joins Lab in 1908
260,000 km²
(100,000 mi²)

Lichens: 428+
Moss: 981+
Ferns: 142+
Plants: 3,659+
Fungi: 658+
Corals: ~4
Invertebrates: 2,000+
Marine Invertebrates: 4,916+ (7,189)
Native Fish: ~30 fresh water | ~911 marine
Amphibians: ~40
Reptiles: ~165
Birds: 350+
Mammals: 126+ terrestrial | 36 marine
1908: Volney Spalding
Saguaro Plots

1964: Ray Turner and J.R. Hastings re-establish Spalding's Saguaro study
1938: Carnegie funding is drastically cut. Shreve and a small staff remain at the Lab.

1940: Tumamoc sold to the US Forest Service for $1
U.S. Forest Service 1940–1960
University of Arizona (1956)

**1966:** The road is extended to the top for the Steward Observatory Astrograph, and Telescope – as well as the communications facilities

**2009:** Pima County purchases part of the land
DESERT LABORATORY
has been designated a
NATIONAL HISTORIC LANDMARK

This site possesses national significance
in commemorating the history of the
United States of America

1976
Fossil Packrat Middens
Neotropical Anachronisms: The Fruits the Gomphotheres Ate

Daniel H. Janzen and Paul S. Martin
Rancholabrean
240,000–11,000 ya
Research at the Desert Lab

Permanent plots on Tumamoc

I. Spalding-Shreve plots: established in 1906 (plots 1-19) and 1928 (Areas A, B) to study vegetation change in perennial vegetation

II. Saguaro plots: established in 1964 to study changes in saguaro populations by Rod Hastings and Ray Turner

III. Desert annual plots: established 1982 by Larry Venable to study population dynamics of desert annuals
Why are the permanent plots so important?

Document changes in vegetation (composition, structure) over time so we can relate to environmental change.

Follow fate of individual plants: survival, growth, and recruitment (demography) so we can develop models of population dynamics and project future changes.

The Spalding plots are the oldest plots in the world where individual plants are mapped.
1906: Volney Spalding established 19 permanent plots, 10m x 10m, as a “debt to the future” (same year as entire area fenced)

1928: Forest Shreve established two additional plots, areas A and B. Area A was for counts only

1957: Ray Turner (UA, USGS) took over responsibility for plots
Spalding-Shreve plot map years

And all mapped again in 2010 and/or 2012

Bowers 2005

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Plots mapped: 10, 2, 1, 4, 17
THIRTY YEARS OF CHANGE IN DESERT VEGETATION

Forrest Shreve and Arthur L. Hinsley

Desert Laboratory of the Carnegie Institution of Washington

ECOLOGY

Vol. 18 October, 1937 No. 4

106 years of change in a Sonoran Desert plant community: impact of climate anomalies and 5 trends in species sensitivities


Ecology: in press
VIP: Vertically Integrated Project
Undergraduate research team

- CURE (Course-based Undergraduate Research Experience)
- We started fall 2021
- 15 students involved to date
- 38 species with data on at least one trait
VIP (Vertically Integrated Projects) Program
II. Saguaro plots

1908: Spalding mapped ALL saguaros on Tumamoc and Sentinel Hill
1964: Rod Hastings and Ray Turner established four plots overlain on the Spalding map.

Numbered, marked and measured all individuals in plots.


Peter Breslin, Postdoctoral Fellow, Tumamoc Hill, 2022-4.
Some other current Tumamoc research projects

Conducting any research, education, or other activities on Tumamoc outside of building areas requires a permit to ensure that no damage is done to the cultural or natural systems on the Hill.

No ground disturbance of any kind is allowed.
Some other current Tumamoc research projects

- Using pollinator DNA left on flowers to survey saguaro pollinator communities (Johnson)
- Resurveying saguaro permanent plots (Breslin)
- Monitoring Tumamoc globeberry, a formerly (and currently?) endangered plant (Reichenbacher)
- Testing novel imaging techniques (Wiley/Driggers)
- Monitoring buffelgrass demography across environments to build population dynamics models (Hovanes)
- The role of the gut microbiome in native bee health (Buchmann)
- Exploring variability in saguaro genotypes and collecting seeds as part of larger study of ecotypic variation in saguaros across its range (Copetti)
- Engaging with art installations on Tumamoc and how it influences community thinking about the ecology of Tumamoc Hill and its climate future
Tumamoc context and policies
Tumamoc Hill Ownership Boundaries

- National Historic Landmark
- Archaeological district of Arizona
- Natural Environmental Study Area
Walking Community

- On average Tumamoc Hill has 1,000 walkers per day
- The hike is a 1.5 mile walk from base to the top of the hill
- 3 mile round trip
- There is an approximate 700ft rise in elevation from the bottom to the top
- The grade is gentler on the bottom road, steeper on the upper road
Rules and Regulations

- Hours are 4am-10pm daily.
- Firearms are prohibited on all University of Arizona facilities.
- Do not bring pets on to the preserve.
- Stay on the paved road and please do not wander into the ecology reserve—this includes the top of the Hill.
- Do not go beyond the fence or cables—this is a sensitive archaeological and cultural area.
- Please step to the side when vehicles approach.
- Please bring a refillable water bottle—a refill station has been provided for your use.
Please use the garbage and recycling containers at the midpoint of the Hill to dispose of any unwanted items. Please help us maintain the health of the Hill by picking up other people’s garbage.

Smoking is strictly prohibited. Please extinguish cigarettes or any other burning object prior to entering the site.

For the consideration of others and the wildlife, please do not listen to amplified music or sound.

Bicycles and skateboards are not permitted on the Hill. For the safety and pleasure of everyone using the hill, secure your bicycle at the bicycle rack at the entrance and please leave skateboards and all skates at home.

Please help protect the plants and animals of the hill by not handling, harming, or removing them from their natural setting.

Do not bring any plant material or animals on to the hill.
Community Outreach and Engagement
Community Outreach and Engagement

Venomous Reptiles of Tumamoc Hill

How to avoid conflict with various species

Pop-up engagement at the entrance to the Tumamoc Hill Boathouse

For more information visit: https://tumamoc.arizona.edu/calendar

Walk with a Naturalist

Join Desert Laboratory Community Outreach Assistant Robert Viti on a walk from the entrance to Tumamoc Hill to the Desert Laboratory parking lot. Along the way he will talk about some of the plants, animals, and natural history of Tumamoc Hill, as well as do his best to answer your questions.

Meeting point: Entrance to Tumamoc Hill

Robert is a native Tucsonan and Sonoran Desert naturalist who has worked on a variety of projects in our backyards, and the areas of Sonora since 2004. He is president of Tucson Herpetological Society (an active and reptilian), a board member of the Tucson Cactus and Succulent Society, and conducts on a variety of projects and topics.
Community Outreach and Engagement

- Past Steward field trips to:
  - Arizona State Museum
  - Mission Garden
  - UA Campus Arboretum
Your role as a Tumamoc Steward

- Commit to 2 hours, 2x/month of being a presence on the Hill
- Being a physical presence on the Hill representing the Desert Lab
- Sharing information as needed about respecting the rules and policies of the Hill
- Attend monthly Tumamoc Stewards In-Service Workshops
- Become a Friend of Tumamoc
  - $25/yr donation to the Desert Laboratory to support our programming
Questions?