



Glen Canyon National Recreation Area

691 Scenic View Dr
P.O. Box 1507
Page AZ 86040-1507

Suggested Reading

Scenes of the Plateau Lands and How They Came To Be, William Lee Stokes

Rainbow of Rocks, Marjorie A. Chan & William T. Parry

Canyon Country Wildflowers, Damien Fagan

Scat & Tracks of the Desert Southwest, James C. Halfpenny, Ph.D.

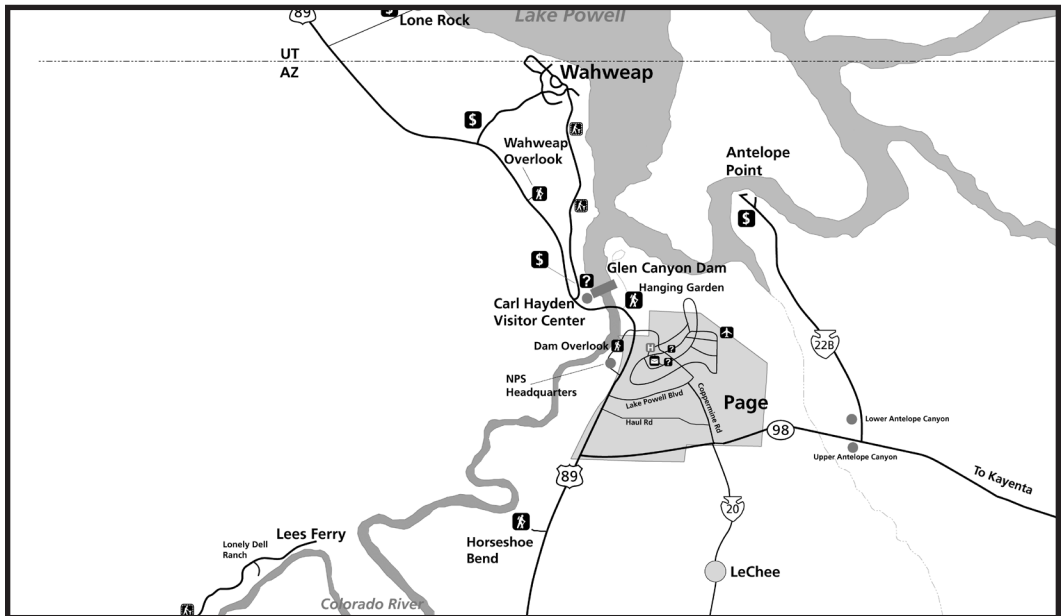
A Field Guide to Desert Holes, Pinau Merlin

National Audubon Society Field Guide to the Southwestern States, Peter Alden and Peter Friederici

Geology of Utah Parks and Monuments, Douglas A. Sprinkel et al.

Please contact the Glen Canyon Natural History Association for a list of helpful books and maps of the area.

Glen Canyon Natural History Association
P.O. Box 1835 691 Scenic View Drive Page, AZ 86040
928-608-6359 www.glencanyonnha.org



Map to Agua Tierra Loop Trail.





Agua Tierra Loop Trail Guide



The Agua Tierra Loop Trail leads through cultivated gardens and desert landscape. On this journey of discovery you will explore Agua -Tierra (Water - Earth). As you move through the 11 stops, consider the effects of water and erosion in sculpting landscape, habitat, and culture. Ponder our sense of place in an arid land.

Safety Comes First

Take plenty of water (at least two liters). Wear sunglasses, sunscreen, and a hat.

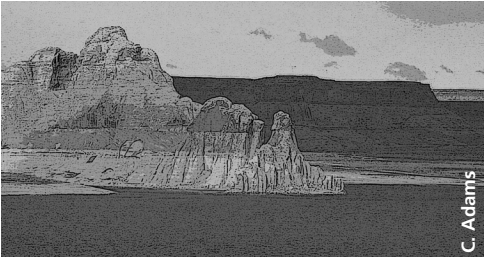
Leave No Trace

Pack garbage out. Don't disturb any plants or animals. Please keep your children with you and stay on the trail at all times. Dogs are allowed, as long as they wear a leash no longer than six feet. Clean up after your pet.

Trail Details

Proceed down the cobble path toward the last building. Marker 1 is located at the far end of the Wild Rose building. Happy Trails!

- Trail Distance: 0.6 mile (1km)
- Starts at the Lake Powell Resort Lodge and ends at the Wahweap Visitor Contact Station.
- Rating: Easy
- Time: 45-60 minutes



Independence Cove

Welcome to the Agua Tierra Loop Trail! Enjoy your hike, and take care of the land...

The language of Agua Tierra

Agua Tierra - Spanish
Kuuyi Tuuwaqatsi - Hopi
Tohó Kéyah - Navajo
Wasser Erde - German
Eau Terre - French
Nul Sae Song - Korean
Aqua Tierra - Italian
Water Earth - English

Take the Tread Lightly Pledge

Travel & recreate with minimum impact.

Respect the environment and the rights of others.

Educate yourself plan and prepare before you go.

Allow for future use of the outdoors by leaving it better than you found it.

Discover the rewards of responsible recreation.



Your destination, the Wahweap Ranger Station

The Desert Garden

Marker 10



Desert Plants

As the path transitions from the natural landscape into cultivated gardens notice the presence of both native and non-native plants. Many of these plants are arid land species with low water requirements. Notice the variety, texture, and character of these lovely desert dwellers as you meander down the path.

What are the natural and cultural benefits in landscaping with plants with low water requirements?

Our Sense of Place in an Arid Landscape

Marker 11

Agua (water) is the vital nectar that sustains us.

Tierra (earth) is the dwelling place of all living things.

On the Colorado Plateau, arid lands are a way of life. Though we may attempt to alter desert environments to our liking, we often experience a resistance to change. In this predictably unpredictable land of flood, drought and extremes, all living things must adapt in order to survive. Understanding the character and nature of the land in which we live enlightens us to its limitations. In the land of Agua Tierra we experience the stunning beauty of the Colorado Plateau and contemplate our sense of place in an arid land.



Cottontail rabbit

Have a safe trip back along the sidewalk to the trail head.

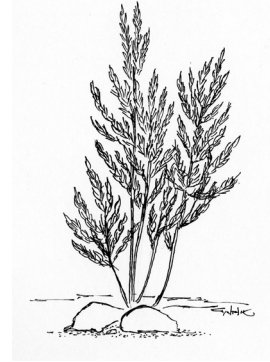
Marker 3

Arrowweed Lane



Arrowweed (*Pluchea sericea*) commonly grows in wet places, often forming dense thickets. This member of the sunflower family blooms in early spring with showy tufts of pink purple flowers.

Can you guess why it is called Arrowweed?



Human cultures throughout the ages have depended on nature to fulfill daily needs. The diversity of plants and wildlife around seeps, springs, and waterways offers many advantages. Water attracts wildlife to hunt, river cobbles are knapped into arrow points, and the long straight stems of Arrowweed supply the perfect arrow or spear shaft.

Marker 4

Black Brush Flats



Can you find the low growing woody plant with grey stems and small dark green leaves that covers much of this area? Blackbrush (*Coleogyne ramosissima*), a member of the rose family, covers more area of Glen Canyon National Recreation Area than any other species of plant. Stands of Blackbrush cast a dark, shadowy appearance across the landscape that blackens when wet, hence the name.

This common desert scrub habitat is home to a variety of different plants including Yucca, Prickly Pear Cactus, Joint Fir, Salt Bush, and Sand Sagebrush. The abundance of plant and animal life is directly influenced by precipitation and available water. Though it may appear less inviting, many species thrive in this scrubby shrub land.



How many different kinds of plants and animals can you find in Blackbrush Flats?



Sculptured Landscape

Water plays a major roll in sculpting Glen Canyon. Rivers and tributaries forcefully cut into 8000 feet of bedrock, revealing 300 million years of dynamic earth history. Like a window in time, geologic layers reveal worlds long gone.

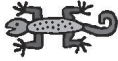
The Navajo and Entrada Sandstone reveal windblown and coastal sand dunes that once covered a vast area during the Jurassic. Beyond the slick rock domes of Entrada Sandstone on the far side of Wahweap Bay rest layers of Dakota, Tropic Shale, and Straight Cliffs Formations. Within the layers lies the fossil record of prehistoric life. During the Cretaceous, marine reptiles known as Plesiosaurs swam in a vast and shallow inland sea, and dinosaurs roamed the terrestrial environment beyond.



Entrada Sandstone at the Wahweap Windows

Wahweap Windows

Search across Wahweap Bay in the Entrada Sandstone for two distinct arch windows. You may need to use binoculars to see through them. The Wahweap Windows are sculpted by natural erosive forces. Alcoves often form between two joints in a sandstone fin. A small window develops as the alcove wears all the way through the fin. The window enlarges through the erosive forces of wind, weather, water, and ice wedging. Ice wedging occurs when water seeps into cracks, freezes, and thaws - eventually forcing slabs of rock to break away from the canyon walls. Gravity pulls at these conchoidal (round or arch-shaped) fractures until the rocks crumble to the ground below, leaving arches standing in the cliff or fin. The erosive forces of nature are still at work sculpting the Glen Canyon landscape.



A desert, by definition, receives less than ten inches of annual precipitation. Glen Canyon typically receives much less. Summer monsoons deliver a majority of Glen Canyon's scant precipitation, supplemented by winter rain and an occasional dusting of snow. Water runs off rocks and down washes descending toward the canyons. Along the way, arroyos are gouged, rocks and boulders are dislodged, and sediment is picked up and re-deposited elsewhere. The process of sculpting a landscape flows on.



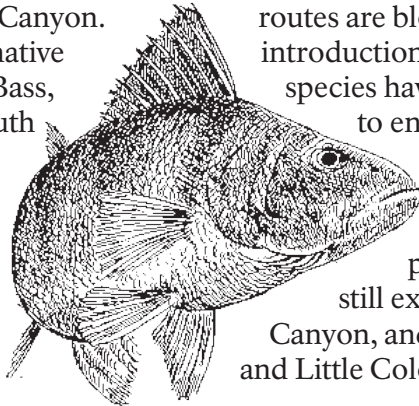
Does Something Smell Fishy?

To the west, beyond the salt bushes you will discover the Wahweap Fish Cleaning Station; perhaps someone is cleaning their catch. Sport fishing is a popular activity at Glen Canyon. Lake Powell supports non-native fish populations of Striped Bass, Largemouth Bass, Smallmouth Bass, Crappie, Walleye, Catfish, Green Sunfish, and Carp.

Colorado Pikeminnow, Humpback Chub, Bonytail Chub, and Razorback Sucker once thrived in the warm turbid waters of the Colorado River but, for all intents and purposes, have disappeared from

Why should we save endangered plant and animal species?

Glen Canyon. Dams control the flow of the river, and alter native fish habitat. The waters below the dam are now clear and cool, migration routes are blocked, and the introduction of non-native species have contributed



to environmental stress on native fish. It is hoped that some populations still exist in Cataract Canyon, and the San Juan and Little Colorado Rivers.

Adaptive management plans, designed to improve native fish habitats by increasing the river temperatures, are currently underway.



Explore along the trail for evidence of desert inhabitants. Scat and tracks in the soft, red sand give clues to animal activity. Can you guess what kind of animals live here by inspecting their tracks and scat?

Coyotes, kangaroo rats, pack rats, cottontail rabbits, jackrabbits, lizards, ravens, and other mammals, reptiles, birds, and bugs live in this desert habitat.



The ability to escape, evade, and endure environmental extremes is a required arid-land survival skill.



Animals have the gift of mobility. Many desert animals are active during the cool morning and evening hours (crepuscular), or at night (nocturnal). A land seemingly absent of life during the day may erupt with abundant activity in the twilight. To beat the daytime heat, animals escape into the cool refuge of burrows, bushes, trees, and rock crevices.

Desert plants and animals survive on scant moisture.

Kangaroo rats drink no water. Their kidneys and metabolism take all the water they need from the dry seeds they eat. Jackrabbits crouch in a hollow, using their long ears to radiate heat from their bodies on hot days.

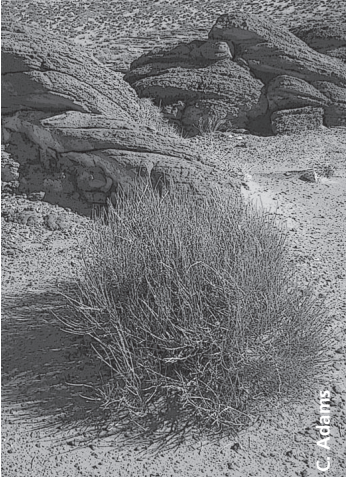
Some plants have small leaves to limit moisture loss, while others have no leaves at all. Fuzzy and spiny leaf surfaces reflect intense sunlight. Succulent stems and feeder roots enable cacti to soak up and store precious moisture. Spines protect succulent parts from predators eager for a juicy bite.



How do you beat the heat?

Marker 8

A Desert Pharmacy



Desert plants served many needs for early cultures. Contemporary tribes continue to use native plants for food, medicine, and spiritual ceremonies. Joint Fir is one such plant with a long history of use. A non-caffeinated tea made from steeping the green branches was commonly used to treat congestion and colds. It is also known as Mormon Tea due to extensive regional use by Mormon Pioneers.

Plants provide shelter, food, clothing, furniture, and medicine - and enhance the quality of human life. Plants are an important element in the survival of other living creatures as well. Imagine a world without plant life.

Could we survive without plants? How might the absence of plant life affect other living things?

Marker 9

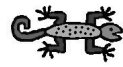
Cottonwood Grove

The amount of available water often determines the kind of plants and animals that live within a given habitat. A consistent supply of water affords the opportunity for groves of broadleaf trees, such as Cottonwood, to thrive even in a desert environment. Prior to the building of Glen Canyon Dam that created Lake Powell, tributary side canyons supported lush groves of cottonwood trees. To this day, many side canyons are still able to sustain Cottonwood habitats.



Alcove seep springs represent another type of desert oasis habitat supporting a diverse array of water-loving plants. Seep-walls blanketed with maiden hair fern, orchids, cardinal monkey flowers, and columbine are a delightful surprise in contrast to the dry perimeter of slick rock and sand. Shady grottoes provide a cool respite on a hot summer day.

Do you prefer to bask in the warmth of the sun, or shelter in the shade of a tree?



Marker 1

Canyon Panorama

As we glance across the Glen Canyon landscape, water and earth are the most prominent and notable features. Earth is the foundation of our existence and the dwelling place for all living things. Water is the nectar of the land; the vital source that makes life possible. In an arid land, the abundance or absence of water determines and affects the sustainability of life, not only for plants and animals, but for humans as well.



Castle Rock

C. Adams

The Colorado Plateau is a land of diverse character and climate. It is predictably unpredictable with fluctuating periods of flood, drought, and extremes in temperature. Due to their ability to adapt...or not, plants and animals survive, die, or thrive. Humans are no exception. Our technological ingenuity enables us to inhabit a landscape that might otherwise be inhospitable. Yet, in spite of, or perhaps even because of our ambitious endeavors, we often forget our sense of place in an arid land.



Marker 2

Plants out of Place

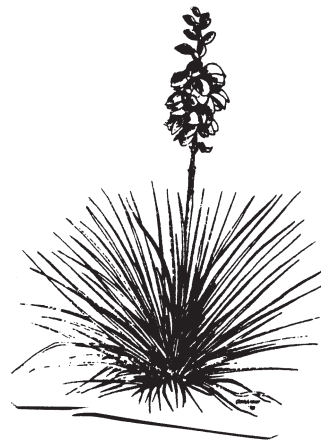
Some plants belong here; some do not.

Apache Plume grows at a higher elevation and is cultivated here as a low water landscape plant.

Arrowweed typically grows on benches adjacent to the Colorado River, but naturalized into this habitat.

The *Tamarisk* is non-native and originates from the Mediterranean Region. It was brought to California for erosion control and is now considered a thirsty invasive weed throughout the West.

The *Narrow Leaf Yucca* (shown here) is native to this habitat and has a long history of use by native cultures for weaving baskets and other useful items.



Conditions resulting from human influence create an atypical habitat where four unlikely plants become neighbors. *What human caused conditions might have encouraged these plants to grow together in this location?*