

THE GREAT BASIN DESERT

The Great Basin Desert lies predominantly in the Intermountain West, a region bounded on the west by the Sierra Nevada–Cascade mountain axis and on the east by the Rocky Mountains. The mid-nineteenth century explorer Captain John C. Fremont perceived the landscape to be a gigantic enclosed basin; convinced by his 1843–44 explorations that the area lacked an outlet to the sea, he named it the Great Basin.

In fact, the name is somewhat misleading in that it suggests a single large basin. Actually, the Intermountain West is composed of 150 basins and approximately 160 discrete mountain ranges. This landscape of alternating mountain ranges and their adjacent basins is the physiographic zone known as the Basin and Range Province.

The Province has valley floors at high elevations, often more than 4000 feet. Protruding from the basins are mountain ranges, which were raised through the process of faulting. Most of the ranges have a north-south orientation, and many have peaks higher than 10,000 feet; several exceed 12,000 feet. This means that in some areas mountain peaks rise 5000 to 6000 feet above the surrounding basins.

The wearing away of the mountains by the inexorable forces of wind and water has filled many of the valleys with deep sediments, often forming broad plains. The low areas of these plains or valleys frequently contain ephemeral lakes, called playas, which seldom contain water except during years of unusually high precipitation.

During the late Pleistocene epoch, beginning about 75,000 years ago and ending 8000 to 12,000 years ago, many of the valleys contained somewhat more permanent lakes. Two of these ancient lakes are especially notable, because at one time or another they covered vast areas, and the sediments derived from them continue to affect the distribution of plants and animals even today. More important, there are existing lakes that originated from these bodies of water. One of the Pleistocene lakes, Lake Lahontan, existed in an area that today includes northwestern Nevada, southern Oregon, and northeastern California. Lake Lahontan once covered 8495 square miles and was 886 feet deep. Today it persists mainly in a few scattered remnants, including Pyramid and Walker lakes, in Nevada. Another lake, Lake Winnemucca, existed until 1938; however, a diversion dam built for irrigation caused Lake Winnemucca to go dry.

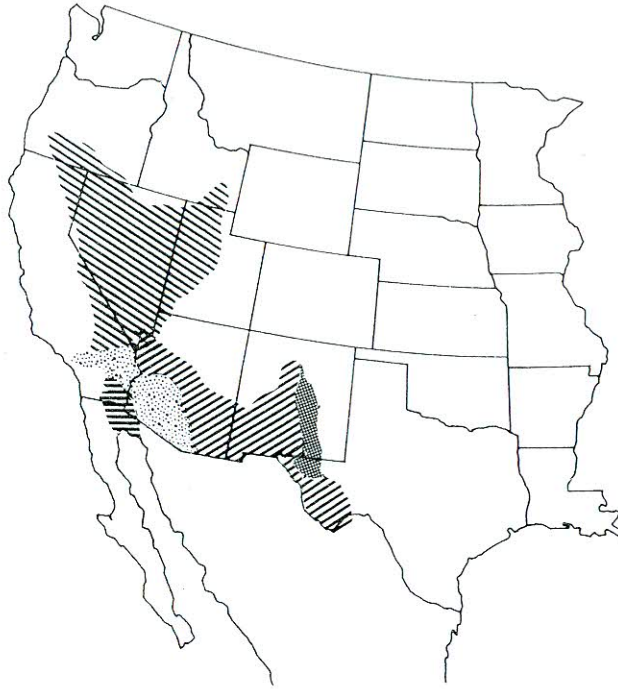
Pyramid Lake remains a viable, only slightly salty, lake covering an area approximately thirty miles long and seven miles wide. A form of trout, the Lahontan Cutthroat, occurs in the lake. This species is a relict from the time when it was the only predatory fish in Lake Lahontan. The Lahontan is the largest cutthroat known; a specimen taken in 1925 from Pyramid Lake weighed forty-one pounds. Other fish, native and introduced, occur in the lake and are the source of food for a large American White Pelican colony on Anaho Island, at the southeastern end of the lake.

The second large Pleistocene lake occupied more than 20,000





Lahontan Cutthroat
Salmo clarki henshawi

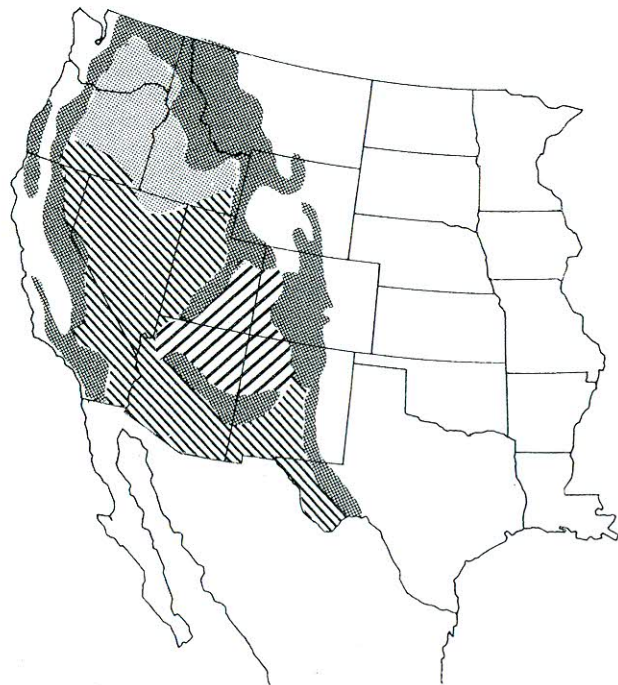
Physiographic Sections of the Basin and Range Province

-  Great Basin
-  Sonoran Desert
-  Salton Trough
-  Mexican Highland
-  Sacramento



Physiographic Provinces of Deserts and Surrounding Areas

-  Mountains
-  Columbia Plateau
-  Basin and Range
-  Colorado Plateau



Brine Shrimp
Artemia salina

square miles in Utah, Nevada, and Idaho. This body of water, Lake Bonneville, was approximately 1083 feet deep. The remainders of the shores of Lake Bonneville form a series of terraces at roughly 5150 feet in elevation, and can easily be seen today along the Wasatch Mountains of Utah. The remnants of Lake Bonneville include the Great Salt Lake and Utah Lake in northern Utah, and Sevier Lake, a large playa in west-central Utah.

The Great Salt Lake

Since 1851, the date from which accurate records have been maintained, the Great Salt Lake has experienced dramatic changes in water level. Until recently, the lake surface had fluctuated between a high elevation of about 4211 feet (in 1873) and a low of 4191 feet (in 1963). Currently the water level, although varying, stands at 4208 feet. When the water is at an elevation of 4200 feet the lake covers an area that is about eighty miles long and thirty miles wide, and has a maximum depth of slightly over thirty feet.

Although the Great Salt Lake is too salty for fish, a variety of other organisms occur and give it its characteristic colors. Until the summer of 1984, the northern and southern portions of the lake were separated by a railroad causeway. The northern portion was much more saline (about twenty-seven percent solids by weight) than the southern portion (about thirteen percent solids by weight), and its characteristic bacteria and algae gave the water a pinkish color that varied in hue. The southern portion of the lake was dominated by blue-green algae (*Dunelilla*), which imparted blue and green tints to the lake's waters. In 1984, the causeway was breached as a flood control measure. The long-range physical and biological changes that will be caused by the breaching are not yet known. Brine shrimp exist in great abundance in some parts of the lake. These small crustaceans are harvested and sold as fish food to the home aquarist. Of more commercial significance is the extraction of various chemicals from the saline waters. The sale of magnesium, chlorine, sodium chloride, potassium sulfate, as well as by-products resulting from the extraction of these chemicals, form a multimillion-dollar industry in Utah. Until the recent floods of 1983 and 1984, and the consequent rise in the lake's level, the north end of the lake was a birder's paradise. The area was dominated by vast freshwater marshlands, which had formed behind extensive dike systems holding out the salty water of the lake. Dozens of species of waterfowl and shorebirds nested in this area and congregated in enormous numbers. Because the extent of flood damage has not been entirely assessed, the ultimate fate of the area is unclear.

Plant Life

The Great Basin Desert contains fewer plant species and life forms than do other North American deserts. The plentiful native annual plants found in our hot deserts are lacking here. Also noticeably absent are the many forms of cacti, agaves, and yuccas. Additionally, watercourses are not lined with

native “desert-wash” trees and shrubs. The plants that do exist are generally small to medium-size shrubs. While a number of species can be found in any one area, by far the vast majority of plants are either sagebrushes (*Artemisia*) or saltbushes (*Atriplex*). In the northern portions of the Great Basin Desert, grasses become conspicuous, and their dominance in the cooler, moister areas northward into Idaho, Oregon, and Washington define the boundary between the arid deserts and a moister, more steppelike vegetation zone.

The vast desert expanses of western Utah and Nevada appear to many travelers as a monotonous vista: miles of gray countryside where people are few and plants and animals are dull (plates 23 and 25). This impression is misleading. There are treasures here that, while harder to find than in the diverse Sonoran Desert, are no less interesting.

The relative proportions of the three plant types mentioned above—sagebrushes, saltbushes, and grasses—have been used to delimit three major Great Basin Desert vegetation types. In extreme northern and western Nevada and southern Idaho, there exists an area dominated by Big Sagebrush, which also includes a fair proportion of grasses. This vegetation type, Sagebrush Steppe, forms the northern portion of the Great Basin Desert (plate 27). The habitat extends well beyond the Great Basin physiographic Province northward into the Columbia Plateau Province and eastward into the Wyoming Basin Province.

Occurring in large patches across the rest of the Great Basin of Nevada and Utah is another sagebrush-dominated habitat, the Great Basin Sagebrush Zone (plate 24). These areas look very similar to the Sagebrush Steppe because Big Sagebrush is common to both zones, but the grass component, important in the Steppe, occurs less frequently in the Sagebrush Zone. Because of the dominance of Big Sagebrush, these two vegetation types are often lumped together. However, Dr. Neil West at Utah State University has argued that the more arid Great Basin Sagebrush Zone is less diverse in plant species, less productive in plant growth, and does not recover as quickly following a disturbance as does the moister Sagebrush Steppe. In line with his arguments, the two types are discussed separately here.

A third extensive vegetation type is Salt-Desert Shrub, which occurs at scattered localities throughout eight western states (plate 26). In the area under consideration in this book this type is usually, though not always, associated with saline soils. Thus, low-elevation sites where salts have accumulated and where soils composed of fine particles predominate usually contain this vegetation type.

These three main vegetation types cannot always be separated easily. Driving in a car down alluvial fans in Utah or Nevada, a careful observer can note a change from sagebrush-dominated sites on the upper slopes to virtually pure stands of various saltbushes in the valleys, even though only very short distances have been traversed. It is only at the extreme ends of this gradient that the vegetation types are absolutely different.

Big Sagebrush
Artemisia tridentata
353, 357

Sand Sagebrush
Artemisia filifolia

Black Sagebrush
Artemisia arbuscula

Sage Grouse
Centrocercus urophasianus
545

Mule Deer
Odocoileus hemionus
528

Pronghorn
Antilocapra americana
527

Cheatgrass Brome
Bromus tectorum

Similarly, along the border of Utah and Idaho or Nevada and Idaho, observers driving north or to higher elevations will see an increase in the amount of grass growing between Big Sagebrush plants, which reflects the transition from desertlike to moister, steppelike conditions.

Defining vegetation boundaries is difficult, even for ecologists. When interpreting landscapes, do not give up if a site does not exactly match the specific description of a particular community type. Many plant and animal species respond to almost imperceptible gradients of such environmental factors as rainfall, temperature, soil moisture, and salinity. The middle ranges of such gradients often contain confusing mixtures of the species that clearly dominate the extreme ends. Although two of the main Great Basin vegetation types are dominated by Big Sagebrush, other woody sagebrushes are important as well. Currently, in addition to Big Sagebrush, there are about eleven other woody sagebrush (*Artemisia*) species. More than a third of these are locally dominant in parts of the Great Basin Desert. For example, on sandy sites the beautiful Sand Sagebrush predominates, while on clay soils one finds the rather plain Black Sagebrush.

Local variations in soil chemistry and other habitat characteristics correlate to the occurrence of various sagebrush species; in addition, one species—Big Sagebrush—is so widespread and so well adapted to local conditions that botanists recognize at least four distinct forms of this species. These occur in different habitats and are as ecologically different from one another as are some of the separate species. Sagebrushes are not very tolerant of high salinity and they do not resprout after fires. Nor are they major food items for most grazing ruminant mammals, whether native or non-native. At least one bird, however, the Sage Grouse, may find over seventy percent of its diet in the form of sagebrush leaves and buds; browsing mammals such as Mule Deer and Pronghorns also eat sagebrush. In general, the presence of large grazing mammals increases the dominance of sagebrush, because the animals ignore it and feed on other species, especially grasses, thus eliminating some potential sagebrush competitors. Conversely, if an area has very saline soil or has recently been subject to fire, the importance of sagebrush will be decreased. Species that can resprout after fires, such as rabbitbrushes (*Chrysothamnus*), horsebrushes (*Tetradymia*), and snakeweeds (*Xanthocephalum*) will temporarily replace sagebrush. Therefore—as is the case with all vegetation types—the history of a particular plot of ground must be known if a proper interpretation of the relationships between plants and their environment is to be attempted.

An annual grass introduced in the 1870s, Cheatgrass Brome, also plays a role in determining the amount of sagebrush on a site. This species successfully competes with many native grasses; it also produces large quantities of stems and leaves that burn readily when dry and tend to increase the frequency and intensity of fires. This situation does not favor Big Sagebrush.

Littleleaf Horsebrush
Tetradymia glabrata
343

Mormon Tea
Ephedra spp.
364

Winter Fat
Ceratoides lanata
354

Shadscale
Atriplex confertifolia
346

Spiny Hopsage
Atriplex spinosa

Plains Pricklypear
Opuntia polyacantha
121

Bottlebrush Squirreltail
Sitanion hystrix

Indian Ricegrass
Oryzopsis hymenoides
362

Galleta
Hilaria jamesii

Bluebunch Wheatgrass
Agropyron spicatum
363

Wildrye
Elymus cinereus

Halogeton
Halogeton glomeratus

Tumble Weed
Salsola kali

Tansy Mustard
Descurainia pinnata

Clasping Pepperweed
Lepidium perfoliatum

Bur Buttercup
Ceratocephalus testiculatus

In addition to Big Sagebrush, several other shrubs occur in sagebrush-dominated areas. These include: Littleleaf Horsebrush, a species that, while attractive when covered with their yellow flowers, are toxic to cattle; Mormon teas (*Ephedra*); the highly palatable and thus prized Winter Fat; Shadscale; Spiny Hopsage; and others. The major cactus species is the very low and spreading Plains Pricklypear. Grasses vary greatly from place to place, but may include Bottlebrush Squirreltail, sacatons (*Sporobolus*), the subtly beautiful Indian Ricegrass, needle grasses (*Stipa*), Galleta, bluegrasses (*Poa*), the wheatgrasses (*Agropyron*)—especially Bluebunch Wheatgrass, as well as many wheatgrass species introduced from Eurasia—and Wildrye, a species that occurs in somewhat moist, slightly alkaline sites and may attain a height of six feet.

Forbs in the Great Basin Desert are extremely varied, but the more common include locoweeds (*Astragalus*), Sego lilies (*Calochortus*, the state flower of Utah), Indian paintbrushes (*Castilleja*), phloxes (*Phlox*), lupines (*Lupinus*), globemallows (*Sphaeralcea*), and a variety of asterlike members of the sunflower family.

There are many species of locoweeds and they are often difficult to identify. Most species are toxic, either because they accumulate selenium or because they contain a specific alkaloidlike compound (locine), or both. The Indian paintbrushes often appear to have showy red, orange, or yellow flowers. In fact these are not flowers but rather bractlike leaves.

While many of these plants may be found in either the Sagebrush Steppe or the Great Basin Sagebrush Zone, their relative proportions will differ. The Sagebrush Steppe will contain about twenty plant species in an area of approximately 1000 square feet. Shrubs range from twenty to forty inches in height and may cover from ten to eighty percent of the ground surface; forbs are about half as high as the shrubs, or even smaller. Few annual species can be found, except on disturbed sites. The Great Basin Sagebrush sites, on the other hand, rarely contain shrubs of forty inches in stature—there are also fewer individual shrub and plant species in a given area. Big Sagebrush often provides seventy percent of the plant cover and ninety percent of the biomass—the total accumulation of vegetation on the site, measured by cutting, drying, and weighing the plants.

Sites that have been disturbed often contain extensive stands of weedy annuals. Frequently these are species that are not native to North America. Among the more common “weeds” are Halogeton; Tumble Weed, a species that evokes the desolate character of the West; Tansy Mustard; Clasping Pepperweed; Bur Buttercup; and, of course, Cheatgrass Brome.

The Salt-Desert Shrub vegetation is dominated by members of the plant family Chenopodiaceae. This family contains a variety of plants, including many species tolerant of high concentrations of salt. While a number of chenopods have some economic importance, sugar beet and spinach are two

that have worldwide agricultural significance, since they are inexpensive yet nutritious dietary staples.

The various Salt-Desert Shrub species differ in their tolerance to moisture, each thriving where the water table is an optimum distance from the surface of the ground. Some species, such as greasewoods (*Sarcobatus*), can occur in lowlands where the water table is within three feet of the surface and where standing water often occurs. The areas formerly covered by Lake Lahontan harbor Little Greasewood, a species that some biologists believe to be different from the much more widely distributed Greasewood.

Other species that grow in such relatively moist areas and that can also often tolerate higher salinities than Greasewood include Iodinebush, glassworts or pickleweeds (*Salicornia*), seepweeds (*Suaeda*), and saltgrasses (*Distichlis*). On sites with deeper water tables, which seldom have surface standing water, a variety of saltbush (*Atriplex*) species predominate, as do other chenopods, such as Winter Fat and the mollies (*Kochia*).

The most characteristic shrub of the Salt-Desert area is Shadscale. This species can be found mixed in with Big Sagebrush on many sites; its greater tolerance to salinity, however, allows it to be the dominant species over vast areas of the moderately saline soils found in valley bottoms. Shadscale is an important browse plant for livestock, especially when it bears succulent young stems and leaves.

Throughout the Salt-Desert zone there exists an unusual and interesting mosaic of vegetation. Gray-green patches composed completely of Shadscale will surround white-gray patches composed entirely of Winter Fat. On some sites, several other species combine to create a striking pattern. Originally it was thought that this phenomenon was due to local soil differences; however, the situation now seems to be more complex. On the most saline sites in the Great Basin, virtually no true shrubs persist. In such areas, Iodinebush and saltgrass (*Distichlis*) predominate. Sometimes these two plants are mixed with rushes, Alkali Sacaton, and one or more species of pickleweed (*Salicornia*). This type of mixture is not confined to the desert areas of North America; plants in these genera occur together wherever highly saline soils exist.

To the north, the Great Basin Desert grades into the more grassy steppe vegetation of Oregon and Washington. Wherever elevations increase, the desert species give way to tree-dominated vegetation. Often in the Great Basin the transition is to a Pinyon Pine-Juniper community. To the south, the transition from the Great Basin Desert to the Mojave Desert is marked by a fourth vegetation type, the Blackbrush community.

A small, round, dark shrub, Blackbrush grows in a narrow band from California—along the edges of the Mojave Desert—across southern Nevada, and straddles the Utah-Arizona border. Often nearly pure stands of Blackbrush dominate mesas between 3000 and 5000 feet in elevation. In these areas, rainfall is low and the shallow soils are usually underlain

Little Greasewood
Sarcobatus baileyi

Greasewood
Sarcobatus vermiculatus
345

Iodinebush
Allenrolfea occidentalis

Rushes
Juncus balticus

Alkali Sacaton
Sporobolus airoides

Blackbrush
Coleogyne ramosissima
348

Turpentine Broom
Thamnosma montana
366

Desert Peach
Prunus fasciculata

Common Raven
Corvus corax
582

Golden Eagle
Aquila chrysaetos
540

Red-tailed Hawk
Buteo jamaicensis
536, 537

American Kestrel
Falco sparverius
542

Horned Lark
Eremophila alpestris
576

Black-tailed Jack Rabbit
Lepus californicus
509

Coyote
Canis latrans
523, 524

Pallid-winged
Grasshopper
Trimerotropis pallidipennis
369

Speckled Rangeland
Grasshopper
Arphia conspersa

Red-winged Grasshopper
Arphia pseudomietana

Sagebrush Defoliator
Moth
Aroga websteri

Western Widow
Latrodectus hesperus

by a calcium layer. Visitors to the Grand Canyon who peer into the abyss are often looking down upon stands of Blackbrush.

Although Blackbrush is usually highly dominant where it occurs, other shrubs do exist alongside it, including the extremely, almost nauseatingly pungent Turpentine Broom, Desert Peach, the ever-present Big Sagebrush, and, in some areas, other species of *Artemisia*, *Ephedra*, or *Atriplex*.

Animal Life

The rather stark structural nature of the Great Basin Desert is reflected in the paucity of animal species you may see when you travel there. If you are near water, there may be large numbers of birds. In the open drylands, however, there are very few species conspicuously present other than the Common Raven, Golden Eagle, Red-tailed Hawk, American Kestrel (which can be abundant), and flocks of Horned Larks. The Black-tailed Jack Rabbit, the Pronghorn, and—if you are lucky—the Coyote may also be seen.

Invertebrates

Invertebrates are not as obvious in the Great Basin as in other places. Of course there is the usual smattering of insects on shrubs, but because there are few succulent forbs, there are simply fewer insects than on more moist sites, or than on drier sites with more forbs. Grasshoppers of the band-winged group are conspicuous because of their colored wings and often noisy flight. Several species may be observed from early spring until the frosts. The most often encountered species is the Pallid-winged Grasshopper, a species that, like many other band-wings, has yellow hind wings with a prominent black band. Several red-winged species might catch your attention. In the spring and early summer, the Speckled Rangeland Grasshopper is abundant. In summer and fall it is replaced by the Red-winged Grasshopper. Ground-dwelling beetles may number more than one hundred species in some localities.

Members of the families Tenebrionidae and Carabidae are especially common, but they are primarily nocturnal. Butterflies and moths are not especially abundant, but some species, such as the Sagebrush Defoliator Moth, can significantly influence the plant community. Robber flies (family Asilidae) are often easily seen as they hunt other insects. The dislike mounds of harvester ants (*Pogonomyrmex*) dot the landscape, and in some places, such as northern Utah, up to fifteen percent of the land surface may be covered by their mounds and the surrounding areas, which the ants keep stripped of plants.

Most Great Basin desert-shrub sites contain twenty to forty species of spiders. In the shrubs themselves, crab spiders, jumping spiders, and typical orb-web builders dominate, while on the ground the usual funnel-web weavers and some wolf spiders are present. The only potentially dangerous arachnid is the Western Widow, a species that is abundant in disturbed areas, even around houses in new developments. Fortunately, it is not likely to bite unless it is handled.

Mormon Cricket
Anabrus simplex
374

Great Basin Spadefoot
Scaphiopus intermontanus
277

Tiger Salamander
Ambystoma tigrinum
289, 290, 291

Western Whiptail
Cnemidophorus tigris
206

Side-blotched Lizard
Uta stansburiana
202

Sagebrush Lizard
Sceloporus graciosus
212

Striped Whipsnake
Masticophis taeniatus
221

Western Yellowbelly
Racer
Coluber constrictor mormon
232

Great Basin Gopher
Snake
Pituophis melanoleucus deserticola
263

Great Basin Rattlesnake
Crotalus viridis lutosus
258, 260

Perhaps the most famous Great Basin invertebrate is the Mormon Cricket. It is this species that is the "grasshopper" noted in Mormon diaries. At one point, a Mormon wrote, it "... was near turning the 'Garden of the Mountains' into a desert." From 1848 to 1850, this species reached high densities, which—according to legend—were contained by hordes of gulls. In fact, on the Mormon Temple grounds in Salt Lake City, Utah, there is a monument erected to honor the seagulls. Mormon Crickets occur in a variety of habitats, especially those with grasses, from extreme western Minnesota to the east side of the Sierra Nevada and Cascades, north to southern Canada, and south to the boundary of the Great Basin in the West and northern New Mexico farther eastward. Periodic outbreaks were common in the past. In 1938, nineteen million acres were infested in eleven western states.

Amphibians and Reptiles

Amphibians are few, but temporary bodies of water support breeding colonies of the desert-adapted Great Basin Spadefoot, a frog whose plaintive call carries for great distances in the desert night. In limited areas of the eastern Great Basin, you may occasionally be surprised to find the Tiger Salamander or its larvae in unlikely places, even in what appear to be stark desert landscapes.

Reptiles, while not as numerous here as in other deserts, can be locally abundant. The speedy Western Whiptail, an alert diurnal species, occurs commonly throughout the Great Basin Desert. Even more abundant, however, is the Side-blotched Lizard. The Sagebrush Lizard is frequently seen running into the cover of a Big Sagebrush shrub. In summer, a mid-morning walk in their habitat could reveal dozens of these lizards. Snakes are not often seen by the casual visitor to the Great Basin. A careful observer, however, might find the handsome Striped Whipsnake or the agile Western Yellowbelly Racer, a rather common snake that is frequently seen, especially during the warm portion of the morning. The serpent most likely to be encountered is the Great Basin Gopher Snake, which makes its presence known by hissing loudly and vibrating its tail at intruders. This distressing habit causes many Great Basin residents to call it the "Blow Snake" and to consider this harmless species—a great consumer of rodents—venomous. The only venomous snake in the area is the Great Basin Rattlesnake, a potentially dangerous species but one that has been responsible for very few bite cases, except while it was being handled. This rattlesnake occurs from the driest deserts to elevations of more than 8000 feet and usually betrays its presence by rattling.

Birds

An early morning bird walk in the Great Basin can be somewhat disappointing. While raptors are numerous in terms of both individuals and species, other types of birds are not common in the desert scrub. In part this is caused by the low-lying vegetation, but it is also partly due to the limited supply of consumable seeds. Short walks up into the Pinon-

Sage Thrasher
Oreoscoptes montanus
591

Sage Sparrow
Amphispiza belli
611

Green-tailed Towhee
Pipilo chlorurus
605

Mountain Cottontail
Sylvilagus nuttalli

Pygmy Rabbit
Brachylagus idahoensis

Desert Cottontail
Sylvilagus audubonii
508

Least Chipmunk
Eutamias minimus
497

Townsend's Ground
Squirrel
Spermophilus townsendii
501

Ord's Kangaroo Rat
Dipodomys ordii
480

Chisel-toothed Kangaroo
Rat
Dipodomys microps
481

Deer Mouse
Peromyscus maniculatus
489

Great Basin Pocket
Mouse
Perognathus parvus
474

Kit Fox
Vulpes macrotis
521

Bobcat
Felis rufus
517, 520

Juniper area, or into higher montane sites, are usually more rewarding.

There are a few birds that tend to favor stands dominated by Big Sagebrush. These include the Sage Thrasher, Sage Sparrow, and the Sage Grouse. Unfortunately none are very easy to observe. They fly quickly to the cover of shrubs and are not very strikingly marked. Another bird of secretive habits, one not as closely associated with sagebrush, is the Green-tailed Towhee. During the breeding season in early spring, groups of Sage Grouse going through their courtship routine of athletic dances and booming sounds rival almost any sight in nature for sheer excitement. Local breeding sites are generally well known and easy for a visitor to find, although they may be off the beaten track.

Mammals

Most desert mammals are nocturnal and therefore difficult to observe. A conspicuous exception is the Badger, a species encountered when least expected, often with unnerving consequences because Badgers can be aggressive. The Black-tailed Jack Rabbit can usually be seen easily in most areas. In the northern Great Basin, however, the species experiences population cycles, and, as a result, the jack rabbits reach high densities every nine to eleven years. In different areas, the peaks may occur in different years. In response to the growth in the rabbit population, Coyotes, major predators of the rabbits, expand their populations; their peak population lags behind that of the rabbits. When the rabbit population is low, Coyotes feed instead on rodents.

The Pronghorn is locally abundant in the Great Basin Desert and can be a pest to agricultural crops. This animal forms small groups composed of a buck, several does, and young. The males are quite territorial and mark their boundaries in a number of ways, including the use of scent glands, with each individual producing a distinctive scent.

In addition to Pronghorns and jack rabbits, one of three small rabbits is usually visible: the Mountain Cottontail, a generally montane species that occurs in sagebrush stands in the northern part of the Great Basin Desert; the Pygmy Rabbit, usually seen in sagebrush clumps; and, in the southern Great Basin, the Desert Cottontail. Two rodents, the Least Chipmunk and Townsend's Ground Squirrel, are active during the day and are abundant.

A night foray with flashlight in hand, especially in sand-dune areas, may reveal a greater abundance of mammals. Various kangaroo rats, especially Ord's Kangaroo Rat or the rarer Chisel-toothed Kangaroo Rat, are easily found during such searches. Invariably, you will see the ubiquitous Deer Mouse and the Great Basin Pocket Mouse. If you are particularly lucky you may even see one of the two North American species of kangaroo mice (*Microdipodops*), both of which are confined to the Great Basin. And a fleeting glimpse of a Kit Fox or a Bobcat in the edge of your light is always possible.

THE GREAT BASIN DESERT: PLANTS AND ANIMALS

Wildflowers

Arrowleaf Balsam Root 30
Balloon Flower 44
Birdcage Evening
Primrose 93
Clammyweed 81
Claret Cup Cactus 42
Cushion Cactus 40
Desert Candle 164
Desert Dandelion 125
Desert Four O'Clock 52
Desert Paintbrush 159
Desert Trumpet 108
Esteve's Pincushion 84
Filaree 57
Five-Needle Fetid
Marigold 134
Freckled Milkvetch 163
Golden Prince's Plume 109
Jones' Penstemon 68
Long-Leaved Phlox 58
Nuttall's Larkspur 63
Plains Pricklypear 121
Poison Milkweed 80
Puncture Vine 143
Rattlesnake Weed 102
Sego Lily 99
Simpson's Hedgehog
Cactus 38
Skyrocket 161
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Spreading Fleabane 89
Sulphur Flower 112
Sunray 132
Tahoka Daisy 62
Tansy-leaved Evening
Primrose 139
Threadleaf Groundsel 129
Western Peppergrass 78
Winged Dock 46
Yellow Bee Plant 111
Yellow Spiny Daisy 131

Mushrooms

Buried-Stalk Puffball 168
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Reptiles

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233
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231
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Sagebrush Lizard 212
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Great Basin Spadefoot 277
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Trees, Shrubs, Cacti, and Grasses

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Bluebunch Wheatgrass 333
Four-wing Saltbush 322
Greasewood 315
Indian Ricegrass 332
Littleleaf Horsebrush 313
Mormon Tea 334
Rabbit Brush 310
Shadscale 316
Snakeweed 311
Tamarisk 304, 324
Winter Fat 324

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THE COLORADO PLATEAU SEMIDESERT

The arid portions of the Colorado Plateau physiographic province defy easy categorization. Their enigmatic nature can be understood, in part, by examining the maps found on page 25. These maps offer two interpretations of North American deserts. On one, the Colorado Plateau is included as a part of the Great Basin Desert; on the other, it is excluded. In fact, this confusion results because the area's vegetation is a composite of mid-elevation woodland species, those found in grasslands, and some that occur in the Great Basin Desert. Since some landscapes in the Plateau superficially resemble deserts and may contain some Great Basin plants and animals—and, additionally, because some of our most spectacular National Parks and Monuments occur in this area—a brief discussion of the Plateau is included here.

The Plateau area itself includes the southeastern quarter of Utah, east of the Wasatch Mountains and south of the Uinta Mountains; the northeastern quarter of Arizona and a bit of southwestern Colorado, west of Durango; and northwestern New Mexico, north of Gallup. The region has variously been referred to as the Painted Desert, the Navahoan Desert, the Great Basin Desert, and the Colorado Plateau Semidesert. The Colorado Plateau physiographic province covers 130,000 square miles of land, most of which is higher than 5000 feet. About a quarter of the area receives less than ten inches of precipitation per year, and this occurs predominantly as snow. The geological structure consists of stacked plates of starkly beautiful layers of sedimentary rocks, which, although frequently altered by uplifting, are generally flat, dipping only slightly northward. These soft substrates have been deeply incised by streams and rivers, resulting in canyons and rock structures of awesome beauty and magnitude. In this region, this process is most often associated with the splendor of the Grand Canyon in Arizona, yet its results are also obvious in the equally beautiful, but less visited, Canyonlands, Arches, and Capitol Reef national parks in Utah. In addition to the sedimentary rocks, many areas are marked by cones and flows of dark lava. Members of the extensive Colorado River complex are located in the Province, including the spectacular Green River, which flows through Utah.

The Plateau's arid-adapted vegetation is a mixture of the salt-desert shrubland, Blackbrush, and Great Basin sagebrush floras that were discussed in the section on Great Basin Desert. In many places, the combination of trees—such as junipers (*Juniperus*) and pinyon pines (*Pinus*)—and a great variety of grasses suggests the unique character and mixed origins of the Plateau's flora. In other places, especially in saline areas, communities virtually typical of the Great Basin Desert exist. The biota of the Plateau is isolated because the area is surrounded by mountains, save in two low areas. This isolation has permitted the evolution of a large number of endemic plant species. Many of the endemics are locoweeds (*Astragalus*), cryptanthas (*Cryptantha*), or buckwheats (*Eriogonum*), but at least ten other genera are represented by endemic species in the region.