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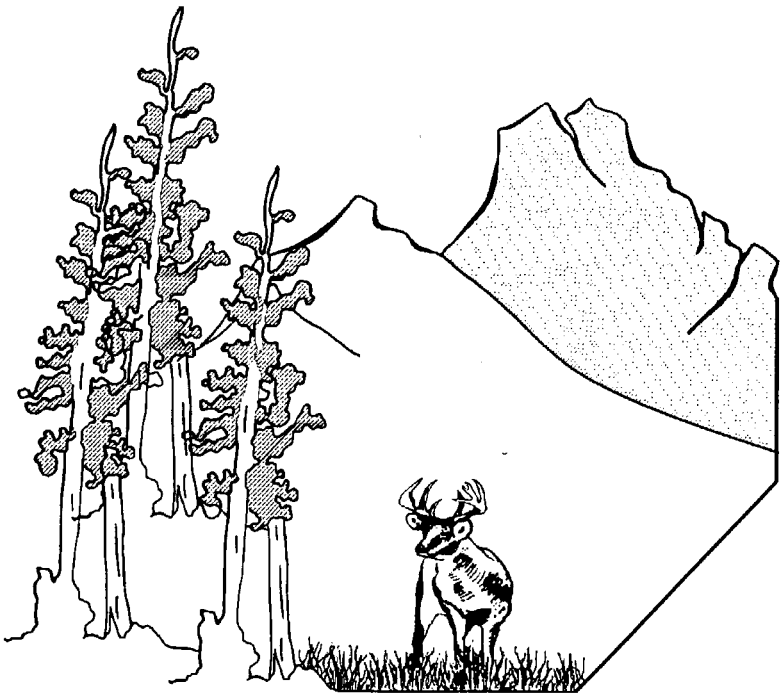
NATURAL HISTORY in the NATIONAL PARK SYSTEM and on the NATIONAL REGISTRY of NATURAL LANDMARKS

NATURAL RESOURCE REPORT
NPS/NR/NRTR-90/03



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NPS General

Natural History in the National Park System and on the National Registry of Natural Landmarks

Natural Resource Report
NPS NR NRTR-90 03

September 1990

National Park Service
USDI NPS
Washington, D.C.

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INTRODUCTION

This document has been prepared to identify what natural history themes are represented in units of the National Park System and in areas that have been designated National Natural Landmarks (NNLs). This publication updates "Part Two of the National Park System Plan - Natural History" published in 1972.

This update considers areas added to the National Park System since 1972 and includes a new section on NNLs organized by regions and themes to highlight representation of these resource types outside of the National Park System. This update is intended to be a companion to a similar publication addressing cultural resources entitled "History and Prehistory in the National Park System and the National Historic Landmarks Program."

The classification system for natural history used in this publication is essentially the same as the one used in 1972. Minor changes in theme subcategories were made to remain consistent with traditional ecological classification. The definition of themes is broad and allows only a general overview of natural feature representation within the parks and landmarks.

The information for this update was provided by the natural resources staffs in the National Park Service's (NPS) Washington Office, Regional Offices, and parks. As of September 1990, the National Park System included 356 units with more than 20 different designations such as national park, national monument, national recreation area, national battlefield, and national historic site. For this update, historic sites, battlefields, and similar areas less than 100 acres were generally excluded. However, in contrast to the 1972 publication, this update includes several parks that have important natural features regardless of size or "historic" designation.

This publication is not a strategy, plan, or proposal for expanding the National Park System. It provides a thematic framework for evaluating nominations for new parks and plans for managing parks already in the system. To be eligible for favorable consideration as an addition to the National Park System , a resource must meet established criteria for national significance, suitability, feasibility, and management alternatives. This publication is intended primarily to help answer the question of suitability by outlining what examples of a specific resource type are currently represented in the National Park System. This information also can help in planning for existing NPS units by identifying what other units have similar types of natural resources.

The NNLs program was established by the Secretary of the Interior to identify, recognize, and encourage the protection of sites containing the best remaining examples of ecological and geological components of the nation's natural heritage. Candidates for NNLs designation are identified primarily by natural history theme

studies conducted by qualified scientists. Landmarks are designated by the Secretary of the Interior based on nominations from the Director of the National Park Service.

The NNLs program relies on the voluntary cooperation of owners and managers of the sites listed on the National Registry of Natural Landmarks. These include resources on both public and private lands. In contrast to units of the National Park System that are established by Congress, status as an NNL does not change the ownership of a site, is not a land withdrawal, and does not authorize Federal acquisition or management of the site.

USING THIS PUBLICATION

This thematic framework is intended primarily to provide a basis for comparing potential new additions to the National Park System with other candidates and similar areas currently in the system. For example, if NPS were studying a site in northeast New Mexico, the following steps would be followed:

1. Check the map on page 5 to find what physiographic region the site falls within. For this sample, we will assume that the site lies within the Southern Rocky Mountains physiographic region.

2. Pages 47 and 48 list all of the natural history themes that characterize this region. The study of this site should identify which of those themes are present within the study area (some themes do not occur in every region).

3. For this sample, we also will assume that the site includes examples of a few themes under three major headings. Turning to page 47 of the thematic framework, we find the following park units listed under those themes:

SOUTHERN ROCKY MOUNTAINS

Landforms of the Present
Mountain Systems
Black Canyon of the Gunnison NM
Florissant Fossil Beds NM
Great Sand Dunes NM
Rocky Mountain National Park

*Works of Volcanism

Geologic History
Triassic-Cretaceous Periods
Curecanti NRA

Aquatic Ecosystems
Streams
Black Canyon of the Gunnison NM
Curecanti NRA
Great Sand Dunes NM
Rocky Mountain National Park

---

* Not represented

4. Turning to the section on the NNLs we find the following areas listed under the same themes on page 80.

SOUTHERN ROCKY MOUNTAINS

Landforms of the Present
*Mountain Systems

Works of Volcanism
Valles Caldera, NM

Geologic History
Triassic-Cretaceous Periods
Ghost Ranch, NM

Aquatic Ecosystems
* Streams

---

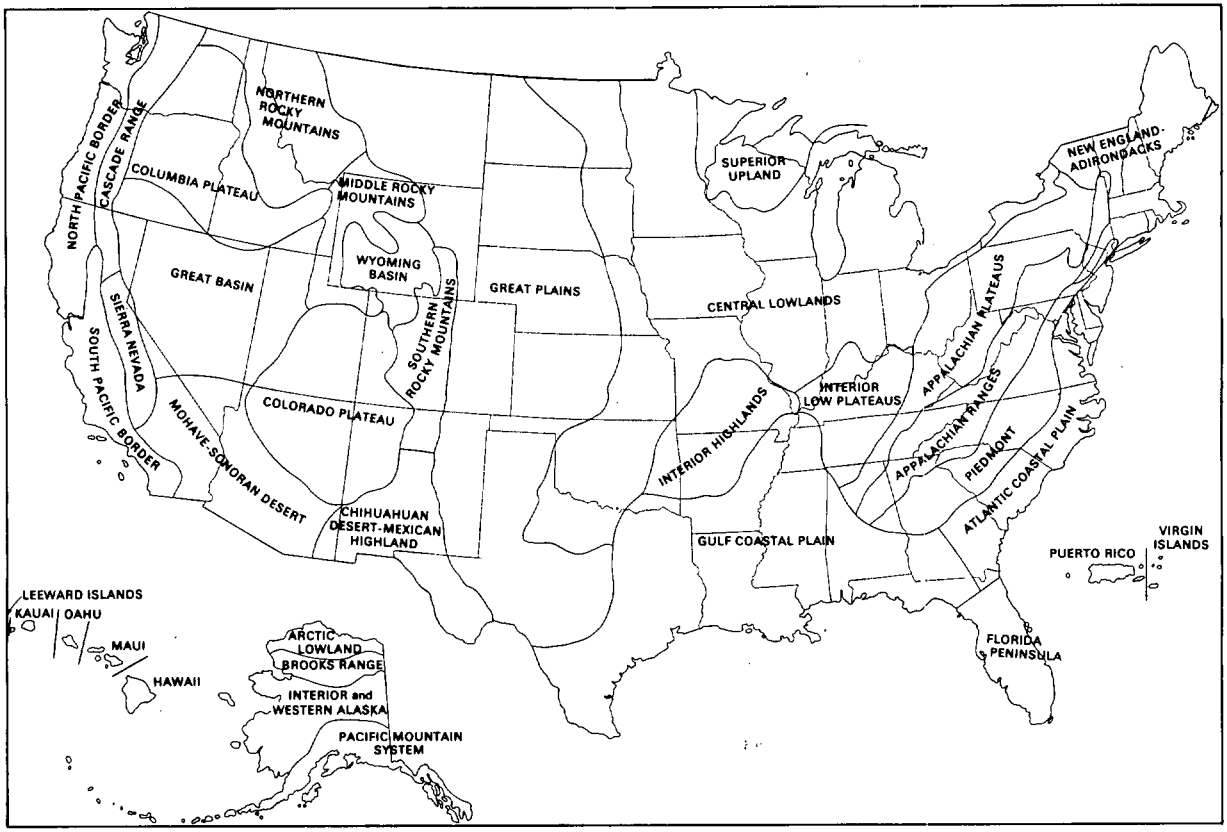
* Not represented

An analysis of the suitability of this area as a potential NPS unit would focus on the following questions:

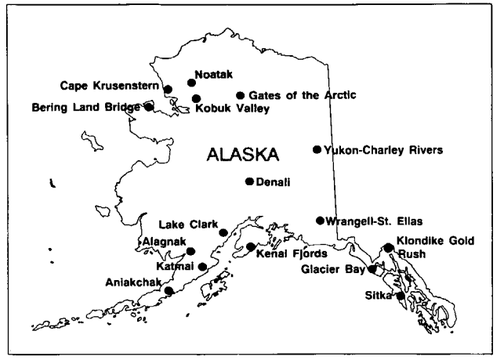
> Could the study area adequately represent the Works of Volcanism theme in this region since this is not currently represented in the National Park System?
>
> How does the study area compare with the one NNL designated under the Works of Volcanism theme in this region?
>
> How do the other themes represented in the study area compare to similar resources in the park units listed under each theme? For example, do the mountains and streams in the study area include some unusual biological or other features that are very different from resources found in the four park units listed under those headings? Do these four parks encompass an adequate example of these features?
>
> Are the parks listed as having an example of a theme managing their resources to focus on that theme? For example, although Curecanti NRA includes examples of Geologic History from the Triassic-Cretaceous period, protection and interpretation of this theme may not be a focus of attention in a unit managed primarily as a recreation area.

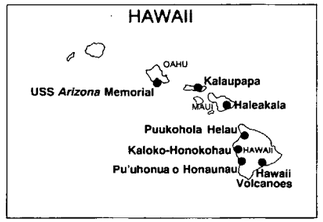
FIGURE 1. NATURAL REGIONS

*Based upon Fenneman's (1928) Physiographic Divisions of the United States.



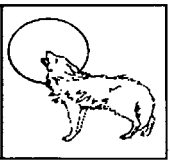
NATIONAL PARK SYSTEM





National Park of American Samoa is not shown on this map

NATURAL REGIONS DESCRIPTION



The following descriptions of natural regions are condensed from descriptions in "Part Two of the National Park System Plan: Natural History, 1972," with the exceptions of American Samoa and the Trust Territories, which are new. The Hawaiian Islands have been treated as one region, as have the Trust Territories.

Descriptions of natural history themes are those found in the above publication with the following few revisions. "Tundra" has been expanded to describe three subtypes. "Boreal forest" now includes subalpine forests of the Sierra-Cascade ranges. "Pacific forest" now excludes subalpine (boreal) forests of the Sierra-Cascade ranges, and "Deserts" now includes Great Basin Desert, to be consistent with traditional ecological classification and with regional discussion in the 1972 Plan.

North Pacific Border

This region includes the Olympic Mountains of Washington, the Coast Ranges of Oregon and northern California, and the Klamath Mountains of northern California and southern Oregon. Sand dunes border much of the coast in Oregon. Major rivers include the Columbia and large coastal streams. Lakes are a significant feature. Glacial sculpturing is particularly striking in the Olympic Mountains. Steep bluffs border most of the beaches. Luxuriant coniferous forest, including redwoods in southern Oregon and northern California, occupies the coastal region. Dry coniferous forest occurs at middle elevations in the Klamath Mountains and on the east slopes of the Coast Range in southern Oregon and northern California. Estuaries are extensive in this region. Offshore waters of the California Current are cold.

South Pacific Border

This region includes Coast Ranges, the Transverse Ranges, and the Peninsular Ranges of California. The Sacramento and San Joaquin rivers are the major surface water features. Steep cliffs and sandy beaches occur commonly along the coast. Dry coniferous forests on the mountains and chaparral, a product of the Mediterranean climate of coastal southern California, are the principal vegetation types. The cool California Current is warmer here than in Washington and Oregon.

Cascade Range

The Cascade Range, with its numerous volcanoes, extends from Washington to northern California. The Columbia River crosses the region from east to west. Lakes and streams are abundant in the heavily glaciated uplands. Boreal forest and some tundra cover the high elevations, with Pacific forest on the west slopes. Dry coniferous forests occur elsewhere at middle and lower elevations.

Sierra Nevada

The largely granitic Sierra Nevada stretches 400 miles south from the Cascade Range in central California. The steep east face of the range rises 11,000 feet above the Owens Valley. Mt. Whitney is the highest point at 14,495 feet. Glacial lakes, including Tahoe, are numerous. Alpine tundra, boreal forest, and dry coniferous forest are well represented. Pacific forest, with giant sequoia, occurs on the west slope, as does chaparral and oak woodland in the western foothills.

Columbia Plateau

The Columbia Plateau, consisting of broad lava plains and various mountain ranges, occupies eastern Washington, eastern Oregon, and southern Idaho. Deep gorges, such as those of the Snake River, have been cut into the plateau. Much of the region is arid and many lakes are saline. The Columbia, with its major tributary, the Snake, is the principal river system. Alpine tundra and boreal forest similar to that of the northern Rocky Mountains occur on the highest elevations. Dry coniferous forest is more extensive. Grassland, now greatly altered by cultivation and grazing, is the natural vegetation of most of eastern Washington, eastern Oregon and southern Idaho. Sagebrush desert occurs in much of eastern Washington, Oregon, and southern Idaho.

Great Basin

This region, which extends from parts of eastern California to eastern Utah, consists of numerous desert basins separated by mountain ranges. Many of these basins have an intermittent lakebed in its lowest portion. The Great Basin contains more than 160 isolated mountain ranges aligned roughly north-south. Permanent surface water is uncommon. Most of the permanent lakes are saline. At the lower elevations, low rainfall and cold winters have resulted in desert vegetation characterized by sagebrush and shadscale. Dry coniferous forest is extensive on lower slopes of mountains, and some boreal forest and isolated bits of tundra occur on the highest mountains.

Mohave-Sonoran Desert

The Mohave and Sonoran deserts occupy southeastern California, southernmost Nevada, and southern Arizona. Their physiographic features are roughly similar to those of the Great Basin. The major river system is the lower Colorado River. Both the Mohave and Sonoran deserts have hot summers and warm winters but their vegetation is different. The Mohave Desert of southern Nevada and southeastern California has simple plant communities dominated by creosotebush and bur-sage, with Joshua trees at 3000-4000 feet. The Sonoran Desert, mainly in Baja California and inland Mexico but extending into southern Arizona, has much more diverse vegetation characterized by columnar cacti.

Chihuahuan Desert - Mexican Highland

The main portion of this region is in Mexico but it extends into southern New Mexico and western Texas. The desert areas lie at 4000-6000 feet. Geologically diverse types of mountains rise above this base. Sand dunes are common. Surface water is uncommon. The Rio Grande is the major river. Ocotillo, creosotebush, mesquite, and numerous cactuses are among the most conspicuous plant species of the Chihuahuan Desert. Grassland and shrub savanna are widespread. On the mountains are chaparral at middle elevations and dry coniferous forest higher up. Isolated stands of boreal forest occur.

Colorado Plateau

This dry deeply-incised plateau covers parts of Utah, Arizona, New Mexico, and Colorado. Surface water is uncommon. The Colorado is the major river system. Rocks ranging in age from Precambrian through Eocene are exposed in the Plateau, most notably in the Grand Canyon. Much of the region is semi-arid to arid and has "cold desert" vegetation similar to that of the Great Basin. Grasslands once may have been common but most are now greatly disturbed and invaded by sagebrush. Dry coniferous forest is widespread, and boreal forest similar to that of the southern and middle Rocky Mountains occurs at higher elevations. Alpine tundra is found only on a few high mountains.

Northern Rocky Mountains

This section of the Rockies extends over western Montana, northeastern Idaho, and northeastern Washington. Some of its ranges exhibit spectacular glacial topography. Many of the headwaters of the Missouri and Columbia rivers rise here. Lakes and streams are abundant. Alpine tundra is fairly extensive because timberline is at 7000-8000 feet. Boreal forest, dominated by Engelmann spruce and subalpine fir, occurs at high altitudes. Dry coniferous forest occurs mainly in western Montana and much of Idaho. Pacific forest extends to northwestern Montana because of mild, moist Pacific air carried inland in a narrow corridor.

Middle Rocky Mountains

This region extends from southern Montana to northeastern Utah. Igneous activity in the region has been concentrated in the Yellowstone National park area, where the most outstanding hot water phenomena in the world occur. Spectacular canyons have been cut by the Green and Yampa Rivers. Most of the numerous lakes are of glacial origin. The Middle Rocky Mountains contain some of the prime areas of alpine vegetation in the United States. Boreal forest occupies the subalpine zone and dry coniferous forest the lower elevations.

Wyoming Basin

The topography of this region resembles that of the Great Plains. Dominated by large structural basins, the region also has several mountain ranges and much badland topography. The major streams and rivers typically rise in mountains adjacent to the Basin and flow more or less directly through it. The vegetation is a semidesert of sagebrush and grasses.

Southern Rocky Mountains

The Southern Rocky Mountains extend from southeastern Wyoming to north-central New Mexico, with most of the region in central Colorado. The headwaters of the Platte, Colorado, and Arkansas rivers are found here. Small alpine lakes, most of glacial origin, are scattered throughout the mountains. Alpine tundra covers large areas between 11,000 and 14,000 feet elevation. Boreal forest is extensive at high elevations and dry coniferous forest at low elevations.

Great Plains

Reaching from the Rio Grande of Texas north to Montana and North Dakota and to Great Bear Lake in Canada, the Great Plains region is largely plateau-like. The Black Hills rise 3000-4000 feet above the surrounding plains, and many other outlier mountain ranges occur in west-central Montana. The White River badlands of South Dakota and the Little Missouri badlands of North Dakota are outstanding examples of this topographic type. Large, low gradient rivers, fewer small permanent streams, and few lakes characterize this large area. Short-grass prairie is the most widespread vegetation type, with mixed-grass prairie in the eastern Great Plains. Boreal forest and dry coniferous forest occur in the Black Hills, juniper-oak savanna in central Texas.

Central Lowlands

This region covers a large part of the central United States, from north central Texas to eastern North Dakota and western Ohio. The extremely flat topography is largely the result of glacial drift which filled low places. Surface water ranges from intermittent small steams in prairie lands to the Great Lakes. Lakes occur mostly in the glaciated northern part of the region, and major rivers of the Mississippi system in the southern part. Various subdivisions of the eastern deciduous forest--beech-maple, maple-basswood, northern hardwoods, and oak-hickory--occupy much of the region, with tall-grass and mixed-grass prairies in the western portion.

Superior Upland

Repeatedly covered by advancing and retreating continental ice sheets during the Pleistocene epoch, this region is characterized by numerous lakes ranging in size from small ones to Lake Superior. It occupies northwestern Michigan, northern Wisconsin, and northeastern Minnesota. Precambrian rock of the Canadian shield underlies most of the region. Boreal forest and northern hardwoods are the principal vegetation types.

Interior Highlands

Stretching from southern Missouri to northwestern Arkansas and eastern Oklahoma, the Interior Highlands consist of the Ozark Plateau in the northern part and the Ouachita Mountains in the south, separated by the valley of the Arkansas River. Caverns and springs are abundant in the limestone plateaus of

southern Missouri. Oak-hickory forest is the dominant vegetation throughout this region.

Interior Low Plateaus

This region, mostly in western Kentucky and Tennessee, consists of a series of plateaus separated by prominent escarpments. The region is characterized by relatively large rivers and streams flowing generally northwest. Sinkholes and caverns are abundant in the extensive karst topography. The natural vegetation is western mesophytic forest, consisting of a mosaic ranging from mixed mesophytic forest to grassland.

Appalachian Plateaus

This long, narrow region between the Appalachian Ranges and the Interior Low Plateaus extends from New York to northern Alabama. The topography appears rolling, but major stream valleys are deeply incised. Lakes, including the Finger Lakes of New York, occur mainly in the glaciated northern part of this region. Rivers and streams are numerous and include headwaters of the Ohio, Delaware, and Susquehanna rivers. Mixed mesophytic forest, a very diverse subdivision of the eastern deciduous forest, occupies most of the region, with northern hardwoods in the northern section.

Appalachian Ranges

This region consists largely of the Blue Ridge Mountains and the ridge and valley physiographic province immediately to the west. The northernmost extension reaches into southern Vermont. Streams and rivers, usually small, are numerous. Lakes occur primarily in the glaciated northern portion. Caves are numerous, especially in the Great Valley of Virginia and the extreme southern part of the region. Boreal forest occurs at high elevations in West Virginia, Virginia, North Carolina, and Tennessee, and northern hardwoods in the northern end of the region. Oak forests are much more widespread.

Piedmont

The Piedmont region borders the Appalachian Ranges on the east, extending from southernmost Connecticut to south-central Alabama. This plateau is gently rolling with occasional monadnocks. The area is characterized by large, slow rivers and few natural lakes. Oak-pine forest, another subdivision of the eastern deciduous forest, occupies most of the Piedmont.

New England-Adirondacks

Four major mountain groups occur in this region: the Adirondacks, part of the Canadian Shield; and three groups that are part of the Appalachian chain--the Taconic Mountains, the Green Mountains; and the White Mountains. The entire region was glaciated and is well provided with lakes and streams. The coast is generally steep and rocky. The Continental Shelf north of Cape Cod is broad. The cold Labrador Current carries abundant nutrients. The estuaries of New England are narrow embayments with open access to the sea. Alpine tundra occurs on a few peaks of the Adirondacks, many in the White Mountains, and

on Maine's Mount Katahdin. Northern hardwoods are the dominant vegetation type, with boreal forest common at high elevations and in Maine. Oak forest dominates in southern New England.

Atlantic Coastal Plain

This region, averaging 75 to 100 miles in width, extends from Long Island to northernmost Florida. Topography is flat to rolling, with maximum elevations up to 800 feet at the western edge. The region is characterized by broad, slowly flowing rivers and streams. Large salt and fresh-water marshes adjoin the rivers. Swamps cover large areas. Beaches are characteristically broad and sandy. Long, narrow barrier islands are present off the coasts of North Carolina, Virginia, Maryland, New Jersey, and Long Island. The Sea Islands lie off the coast of Georgia and South Carolina. Offshore waters influenced by the Labrador Current are cool south to Cape Hatteras. South of Cape Hatteras, the warm subtropical waters of the Gulf Stream dominate. Mixed forests of oak, pine, beech, and other species dominate the uplands. Bald cypress, oak, and swamp black gum dominate swamps and river floodplains.

Gulf Coastal Plain

Wider than the Atlantic Coastal Plain, the Gulf Coastal Plain extends from northwestern Florida to southern Texas and up the Mississippi Valley to southeastern Missouri and adjacent Kentucky. The broad alluvial valley and delta of the Mississippi River are outstanding geological features. Many other large, low gradient rivers discharge into the Gulf of Mexico. Extensive marshes are present along the coastline of the whole region and inland in the Yazoo Basin. Broad, sandy beaches are characteristic of the Gulf Coast. Extensive barrier islands occur off the coast of Texas and the Florida Panhandle. Offshore waters are warm. Vegetation of the Gulf Coastal Plain varies with the geological substrate. Pine forests occupy large areas, and live oak forests are common near the coast. Various southern hardwood mixtures occur, with swamp forests of bald cypress and water tupelo along river floodplains, especially the Mississippi. Coastal prairie, similar to tall-grass prairie but more diverse, occupies much of coastal Texas and Louisiana.

Florida Peninsula

The Florida Peninsula is part of a platform of calcareous rocks which form the coastal plain and Continental Shelf at the southeastern corner of the United States. The emergent portion is a low plain. The southern tip is very low-lying and swampy. Water from Lake Okeechobee flows southward and westward for up to 100 miles before reaching the sea. Thousands of large and small solution-type lakes are found in north and central Florida. Swamps are extensive. Rivers and streams are of very low gradient. The beaches are sandy. Mangrove swamps, broad salt marshes, and coral reefs also occur along the coast. Karst features are prominent in north-central Florida. Southern mixed forest of beech, sweet gum, pine, and other species are dominant in northern Florida, with cypresses and hardwoods in swamps. Southern Florida is distinctly different, with subtropical pines, broadleaf evergreens, palms and

dry prairies on the drier sites. Sawgrass, wet prairie, freshwater swamp forest, mangroves, and salt marshes occur in wet areas. Offshore waters are warm.

Hawaiian Islands

The 1,600-mile-long Hawaiian Archipelago, of volcanic origin, consists of the islands of Hawaii, the Maui Island group, Oahu, Kauai and Niihau, and the Leeward Islands. In general, the volcanoes became extinct from northwest to southeast with the old and greatly eroded Leeward Islands the oldest, Mauna Loa and Kilauea the youngest, and the remaining volcanoes intermediate in age. Mauna Loa and Kilauea, on Hawaii, are still very active. Hawaii's Mauna Kea, 13,796 feet above sea level, is the highest peak in the Pacific. Spectacular deep gorges and sheer cliffs occur on several of the islands. Shorelines range from extensive sand beaches to sea cliffs. Coral reefs have developed along some shores, notably in the Leeward Islands and on the leeward side of East Molokai. Mountainous topography, varied substrates, and great elevational range combine to produce complex patterns of local climate and vegetation. Annual rainfall sometimes reaches 600 inches at high elevations on Kauai, whereas leeward sides of mountains may be quite dry. Temperatures range from near tropical at sea level to alpine above tree line. Although much of the original vegetation has been altered or destroyed, samples persist, including lowland rain forest, dryland sclerophyllous forest, montane rain forest, and high-altitude tussock grassland and microphyllous scrub. Endemism is very high though less among marine species than terrestrial species. On land there are great differences in biota from island to island.

Pacific Mountain System

This region consists mainly of a broad belt of ranges paralleling the southern coast of Alaska. These ranges include the coast range of southeast Alaska; the St. Elias Range, with elevations to 18,008 feet; the Chugach-Kenai Mountains; the Wrangell Range, with elevations to 16,523 feet; the Talkeetna Mountains; the Alaska Range, including 20,320-foot Denali, highest peak in North America; and the Aleutian Range, extending 1,600 miles from west of Anchorage to the western tip of the Aleutian Island chain. About 80 major volcanoes, many still active, are contained in the Aleutian Range. Nearly all the high ranges were covered and sculpted by glaciers during the Pleistocene Epoch, and 20,000 square miles of glaciers remain in Alaska. The Pacific Mountain System contains an enormous number of lakes and streams. The rugged coastline of Southeast Alaska is cut by channels, straits, and fjords; the Alexander Archipelago contains many islands of various sizes. The Kodiak Island-Gulf of Alaska area and the Aleutian Islands have a rocky, steep coastline. Treeless areas consist of glaciers, permanent snow fields, gravel and rock, barren volcanic peaks and recent lava flows, as well as dry and moist tundra. Boreal forest composed of white spruce and other species is generally restricted to the two plains regions--the Copper River plateau and Cook Inlet-Susitna lowlands--and along low-lying stream courses. Pacific forest, with sitka spruce, western hemlock, and other species, occurs along the coast to the Kenai Peninsula.

Interior and Western Alaska

This is a region of diverse topography drained primarily by the Yukon and Kuskokwin rivers, the largest in Alaska. An irregular assemblage of intricately dissected upland and broad alluvium-covered lowlands characterizes the topography. Discontinuous groups of mountains occur on the rolling upland. Water types range from large, clear, glacially formed lakes to brown sphagnum bog ponds, and from clear, torrential mountain streams to huge, slow-moving, silt-laden rivers. Surface water is a dominant feature in many portions of the region. Rainfall is low, but evaporation is also low and surface water does not percolate because of permafrost. Pleistocene glaciation was of quite limited extent, occurring locally over the highlands. Much of Alaska's west coast is bordered by coastal lowland, including the vast, marshy Yukon-Kuskokwim delta. Interior Alaska vegetation is a huge mosaic of forest, muskeg, and tundra. Small and large patches of dry and wet tundra occur. Boreal forest generally occupies the lower elevations up to 2,000-3000 feet in the interior, and 200-800 feet in western Alaska. White spruce is the dominant species on better drained sites, black spruce on poorly drained soils.

Brooks Range

The Brooks Range includes a group of mountain masses extending from the Canadian border across most of Alaska. Several large glacial lakes lie in mountain valleys formed by ancient glaciers and dammed by morainic debris. The Range separates waters flowing northward into the Arctic Ocean from those flowing southward into the Yukon River tributaries and westward into Kotzebue Sound. The Noatak River, the only major river lying entirely in the Brooks Range, bisects the range at the western end. There is considerable evidence of Pleistocene glaciation, though it was not as extensive as in the southern Alaska ranges. The vegetation is primarily dry tundra above 2,500 feet and moist tundra on poorly drained sites below 2,500 feet. Limited areas of boreal forest dominated by white spruce occur along river courses at low elevations on the southern slope of the Brooks Range.

Arctic Lowland

The Arctic Lowland, or Arctic Slope, 100-200 miles wide, stretches across northern Alaska. Two distinct parts are evident--the southern Foothills Belt and northern Coastal Plain. While the Foothills Belt has very irregular topography, the Coastal Plain is very flat and nearly half of it is covered with water. Northward flowing rivers originating in the Brooks Range or foothills meander over wide flood plains. The region is marked by thousands of lakes and low, wet areas. The arctic shoreline nearly everywhere has earth banks 3 to 30 feet high behind narrow pebble beaches. Underlain by permafrost, the Arctic Lowland is a vast treeless plain. Moist tundra predominates in the Foothills Belt and wet sedge tundra on the Coastal Plain.

Virgin Islands

The U.S. Virgin Islands, a part of the Lesser Antilles Leeward Islands, include 50 islands and cays of which St. Croix, St. Thomas, and St. John are of significant size. St. Thomas and St. John are generally mountainous and made up mostly of volcanic rocks, whereas St. Croix has three major landforms--the Northeast Range, the East Range, and an intervening coastal plain. Shorelines vary, including rocky, coral bank, coral beach, boulder or gravel beach, sand beach, and mangrove swamp. Considerable reef development has occurred around St. John, at the eastern end of St. Thomas, around the eastern two-thirds of St. Croix, and at Buck Island. The major vegetation types, now much disturbed, are moist forest, dry forest, dry forest with cactus, cactus woodland, wind-flattened scrub, mangrove, beach vegetation, and Croton-acacia scrub.

Puerto Rico

Puerto Rico, 110 miles long and 35 miles wide, is the smallest and most easterly of the Greater Antilles. Mountainous topography reaching elevations of 2,000 to 4,000 feet runs the length of the island. Foothills and coastal lowlands comprise the regions north and south of the mountains. Several continuously flowing streams drain the rainy windward portion of Puerto Rico. On the dry leeward slopes, intermittent steams predominate. Mountain streams are swift-flowing, lowland streams are slow moving and have broad flood plains. The east and west coasts are characterized by palm-fringed beaches strung between headlands and marine cliffs. Much of the north coast has 200-foot marine cliffs and protective beaches. Most of the south coast is gently sloping. Extensive karst topography occurs in the limestone regions. Vegetation zones include the littoral zone, lowland rain forest, seasonal evergreen forest, hill scrub, semi-deciduous forest, montane forest, montane scrub, and elfin forest. Along the coast, saltwater ponds, lagoons, and shallows support algal meadows and turtle grass beds. Reef complexes support marine algal crusts, kelp beds, and mangroves. Mangroves form a broken ring around the island.

Guam

The largest (212 square miles) and most southerly of the Mariana Islands, Guam lies in the western Pacific Ocean 1,200 miles east of the Philippines, well within the tropical zone. The northern half of Guam is a broad, gently tilting limestone plateau bordered by steep cliffs. The southern half is primarily a dissected volcanic upland. Permanent streams occur only in the southern half of Guam. The island has three basic types of shoreline: coral limestone, low swampy coast, and sandy beach. Significant vegetation types are forest of elevated hard limestones, ravine forest of southern Guam, marshes and swamps, strand vegetation, grassland or savanna vegetation, and vegetation of the argillaceous limestone area.

American Samoa

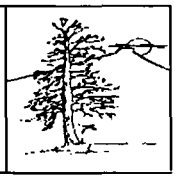
American Samoa, with a total land area of 76 square miles, includes the inhabited islands of Tutuila, Tau, Olosega, Ofu, and Aunuu and two uninhabited coral atolls named Rose Island. Swains Island, not a part of the Archipelago, is

also a part of American Samoa. Except for the coral atolls the islands are rocky and were formed by volcanic activity within the past 7 million years. Tutuila, the largest island, rises to an elevation of 2,142 feet. Rainfall is 100 to 300 inches; temperatures average 78-80°F for all months. Lowland and montane rain forest are the principal natural vegetation types.

The Trust Territories

This region consists of the Mariana, Marshall, and Caroline Islands, located in the southwest Pacific. These island groups consist of more than 2,000 islands, with a total land area of about 700 square miles. Three basic types of islands occur here: low coral atolls, high islands of volcanic origin, and islands that represent a combination of coral limestone and volcanic uplift. The highest elevation, 3,166 feet, occurs on Agrihan, in the northern Marianas. The climate is warm and humid, with temperatures usually ranging between 75°F and 85°F. Rainfall on larger volcanic islands may reach 300 to 400 inches a year, but on atolls in the northern Marshalls, annual rainfall may be as low as 20 to 30 inches, with prolonged periods of drought. Natural vegetation is limited on coral atolls, but dense rain forest grows in the interior of high volcanic islands. In the northern Marianas, areas resembling savanna, intermixed with dense forests, occur.

NATURAL HISTORY THEMES



In identifying themes, two major interrelated categories of natural phenomena must be recognized. One, the geological category, comprises phenomena that result from forces and processes acting through and upon the earth's inorganic substance to produce landforms and other evidences of nonliving entities. The biological world is here represented as fossilized records of organisms but the fossils and the processes through which they are preserved are geologic. Themes within the geological category must take into account the historical aspects of the development of the earth's surface and the evolution of life. In this respect, the geological time scale, recognized and generally accepted by geologists, provides a useful and workable tool. Individual themes must embrace segments of time of sufficient duration to include closely related events and associated land structures, environments, and stratigraphic formations, including fossiliferous deposits. Certain existing landforms and landscape features are of such prominence and importance as to require recognition and study under special themes outside of the historical context.

The second major category covers biological forms and processes. Since the foci of interest and importance lie in the interactions among the biological components and the abiotic environments, as well as in the individual life forms, this is more properly designated as the ecological category.

Within the ecological category, themes are based primarily on the ecosystem, which is defined as the natural community including its component organisms together with the abiotic environment, all forming an interacting system. As in the geological category, there are some biological phenomena that have intrinsic interest apart from the ecosystem in which they occur.

The basic philosophy of a system of themes has implications and connotations that require explanation. Natural history is complex. To individual scientists, as to individual laymen, it may have very different meanings. These differences arise from the consideration of these entities and processes from various points of view. Collectively among human minds, natural history, therefore, becomes polydimensional and difficult to resolve into a generally acceptable rational system of categories of a nature that would be useful for purposes of evaluation and selection of representative areas. The only apparently reasonable alternative is a system of themes such as outlined below. These themes involve not only entities and processes but also the aspects from which they are viewed. By their very nature, themes intersect and overlap. Because of this, no single area is characterized solely by a single theme, although a single theme may be of overwhelmingly dominant importance.

GROUP I. LANDFORMS OF THE PRESENT

Landforms of the present include the principal features of the existing natural landscapes. Each landform possesses certain distinguishing qualities and characteristics which set it apart from the others. Moreover, each is a manifestation of geologic events and processes that have determined its size, shape, composition, and structure. The qualities and characteristics of landforms, therefore, possess a dual significance. This theme describes the character of the landscape as a physical and scenic entity as it exists today, and present and past geologic events and processes.

Each of the themes embraces landforms with common major qualities and characteristics. The geologic events and processes which created the landforms within each theme are usually similar in some respects, but this is not always true. For example, plains are always level - or nearly level - areas of some considerable extent, but the underlying rocks may vary greatly in composition and structure.

Theme 1. Plains, plateaus, and mesas

Plains, plateaus, and mesas are characterized by their level, or nearly level, surface. Plateaus and mesas are essentially segments of plains standing at some considerable elevation above the surrounding country. Plateaus may vary from the norm, however, in that their surfaces may be highly dissected by erosion or form the bases of mountains rising to still higher elevations.

Theme 2. Cuestas and hogbacks

Cuestas are asymmetric ridges possessing a tilted dip-slope surface on one side, which is held up by a rock stratum relatively resistant to erosion, and possessing a steeper erosion scarp on the other side cut across the strata. Depending on the amount of cross drainage, their crest may be straight or scalloped. Cuestas are especially characteristic of the semi-arid West, and may form the foothills of higher mountains. Hogbacks are sharp-crested ridges formed on the more resistant rocks where the rock dips are steeper than those prevailing in cuestas.

Theme 3. Mountain systems

Although mountains may represent various types--folded, fault block, dome, or volcanic--all of them are eminences standing either alone or as part of a range or group. Mountains stand conspicuously above the surrounding country, as a rule, and are characterized by relatively small summit areas and frequently by a considerable extent of bare rock surface. Their form, composition, and structure are manifestations of a wide variety of geologic events and processes and constitute veritable record books of the Earth's history. Particularly worthy of attention are the folded structures visible in some areas of bare rock exposure.

Theme 4. Works of volcanism

All landforms of the present representing the works of volcanism have been created by the movement and the intrusion or the extrusion of molten masses of

rock called magma which subsequently cooled and solidified. Even today, in some places, this magma reaches the surface in a molten condition and is extruded explosively to leave a crater or as extensive lava flows prior to solidification. Cone volcanoes, lava flows, and ash necks become prominent land features chiefly where they remain as walls and pinnacles following erosion of the invaded country rock. The surfaces of lava flows in many places have assumed bizarre shapes owing to flowage of lava after the surface is partly cooled, and intricate caverns develop below the surface. Lava flows, sills, and dikes commonly break into hexagonal columns perpendicular to the cooling surface, and these columns may produce striking erosion features. Calderas are large circular basins associated with volcanic activity, and were produced either by erosion blowouts, or as subsidence basins.

Theme 5. Hot water phenomena

Hot water phenomena such as geysers, hot springs, fumaroles, bubbling paintpots, hydrothermally altered or colored terrain, and siliceous sinter terraces are closely related in that they require water and sources of heat. As a rule, such features are found in areas still subject to volcanism or where volcanism has occurred in the comparatively recent geologic past.

Theme 6. Sculpture of the land

This theme includes landforms produced by erosive action of water and wind, landslides, and other physical or chemical landshaping events or phenomena. Features resulting from the sculpture of the land by these processes commonly appear as "landforms superimposed upon landforms" such as occur when a stream valley or badlands topography is developed on a plateau or a mesa, or within a mountain system. Bare rock canyons, buttes, and rock needles are carved out of the bedrock. Pedestal or toadstool rocks usually have a hard cap rock which has protected weaker underlying strata from erosion.

Theme 7. Eolian landforms

Sand dunes oriented both perpendicular and parallel to directions of major wind movement are prominent topographic features in places. Their shapes are determined in part by the influence of vegetation. The composing material may be quartz, calcareous, or gypsum sand.

Theme 8. River systems and lakes

River systems and lakes are noteworthy features of the natural landscapes of which they are a part. Many rivers, not yet at grade, are characterized by waterfalls over the harder rock ledges. Others have reached grade and now meander in alluvial valleys. Some meandering rivers have been rejuvenated to produce incised meanders which may have vertical canyon walls.

Lakes bear a close relationship to the steams flowing into them which makes it practicable to include both rive systems and lakes within the same theme. River systems and lakes are usually within or superimposed upon other landforms as in Sequoia and Kings Canyon National Parks. Here the upper reaches of river

systems and a number of lakes lie within and upon the Sierra Nevada which is itself an outstanding example of a fault-block mountain system. The valley sides of both rivers and lakes commonly reveal evidences of earlier geologic history in the form of terraces.

Theme 9. Works of glaciers

The works of glaciers include landforms produced by both mountain and continental glaciers. Among these forms or features are cirques, aretes, tarns, hanging valleys, canyons with U-shaped transverse profiles, moraines, drumlins, eskers, and kames. The glaciers and their associated features on the Mount Rainier cone volcano are classic examples of this superimposed relationship. Glacial striae in thoroughly scoured areas are prominent features in many areas.

Theme 10. Seashores, lakeshores, and islands

Along seashores and lakeshores, landforms occur which are peculiar to these environments and which have been produced by natural processes at work within them. Eroded cliffs, stacks, beaches, dunes, barrier beaches, sandbars, hooks, and sandpits are examples of landforms in this category. Closely related features are the offshore islands of many regions; these show transitions to more remote islands of other regions. Other landforms, of themselves worthy of recognition, are normally superposed on islands.

Theme 11. Coral islands, reefs, and atolls

Coral islands, fringing reefs, barrier reefs, and atolls are landforms produced by the work of living organisms acting in concert with other processes. These landforms are always interesting and possess outstanding scientific value and beauty. The largest thing built by living organisms is not the Great Wall of China or the great power and irrigation projects of today, but, rather, the enormous barrier reef fringing Australia's northeastern coast constructed by corals and algae.

Theme 12. Caves and springs

Caves are subterranean features, most of which have been formed by solution of limestone or dolomite, though deposition of calcareous materials has alternated, in many instances with solution, and may have been the most recent event. Many caves are associated with underground streams. Locally, the rock cover over parts of such streams has been dissolved or otherwise eroded so that the stream is subaerial in parts of its course, underground in other parts. The open valley parts of such "blind rivers" or "lost rivers" are fascinating elements of the local landscape. In a more advanced stage of erosion, natural bridges may be formed. Many large steams that have flowed underground for considerable distances reappear at the surface as spectacular springs.

GROUP II. GEOLOGIC HISTORY

The records of the geologic history of the earth are found in the rocks. These records may be read from the composition, structure, and relationships of rocks and the fossils they contain. Earth history embraces a period of billions of years. The development of the themes involves the location, identification, and evaluation of the more significant geologic records in terms of their value, usefulness, and suitability in illustrating the history of the Earth and its life.

Theme 13. Precambrian era

This theme embraces the entire span of the Precambrian Era between about 3 billion and 600 million years ago. This time interval is characterized as The Morning of Life for within it the first life--- algae, fungi, and soft-bodied marine plants and animals--developed on the earth. The distribution of Precambrian rocks is worldwide, but in the United States rocks of this age are found in the Cordilleran region and the Appalachian Mountains. They also occur in the Lake Superior region and in a few localities of the southern midcontinent west of the Mississippi River.

Theme 14. Cambrian - Early Silurian periods

The Cambrian, Ordovician, and Early Silurian periods--a time span between about 600 and 420 million years ago--was the age of primitive invertebrates. Life forms were restricted to the water and were, in time, dominated by shellfish of a bewildering variety. Trilobites, brachiopods, sponges, and corals thrived, and jawless fish representing the first vertebrates made their appearance.

Theme 15. Late Silurian - Devonian periods

The Late Silurian and Devonian periods--a time span between about 420 and 350 million years ago--embraced the rise of vertebrates and the first forest. Life forms continued to exist primarily in the water, but terrestrial life began with the first land plants. During Devonian time, plant growth attained tree size; also primitive, land-living creatures became more firmly established and amphibians evolved.

Theme 16. Mississippian - Permian periods

The Mississippian, Pennsylvanian, and Permian periods include a span approximately between 350 and 220 million years ago. Crinoids attained their culmination; ammonoids and their successors, the ammonites, developed; the earliest reptiles appeared, and fish, including over 200 species of sharks, flourished. Trilobites became extinct but coal-swamp forests supporting a wide variety of insects prevailed.

Theme 17. Triassic - Cretaceous periods

Triassic, Jurassic, and Cretaceous periods, a time interval between some 220 and 70 million years ago, has been called the age of reptiles. This span embraces the dominance and extinction of dinosaurs and the flourishing of sea

going and flying reptiles. Modern plant types were on the rise during the latter part of this time interval.

Theme 18. Paleocene - Eocene epochs

The Paleocene and Eocene epochs-- between some 70 and 40 million years ago--embraced the time of the emerging dominance of mammals. Mammals, most of them different from those of today, filled niches which had been vacated by the extinct mammal-like reptiles, dinosaurs, and pterodactyls. Modern marine animals and fresh water fishes were on the rise.

Theme 19. Oligocene - Recent epochs

The Oligocene, Miocene, Pliocene, Pleistocene, and Recent epochs-- beginning about 40 million years ago and extending to the present time-- has been called the "Golden Age of Mammals". During this period modern life forms became well established. The age of prehistoric camels, horses, and dozens of other mammals, descendants of which are common today, are included. This is also the time (Pleistocene) of the remarkable large mammals of the ice age, and the development of humans and their civilizations, as well as all modern life forms.

GROUP III. LAND ECOSYSTEMS

There are literally thousands of kinds of land-dwelling plants and animals, and the number of associations among them are numerous. For purposes of a survey of natural areas, characteristic groupings of some of the more common and conspicuous forms are referred to as communities in the themes below.

Since the kind of community is intimately related to a kind of environment, it is necessary to look upon a group of organisms plus their environment as constituting a basic unit, and such a unit is commonly referred to by biologists as an ecosystem. The vegetative components of natural communities are generally more conspicuous than are the animal members and are more stable with respect to location and population density. Therefore, the name designations of land ecosystems stem from the types of vegetation which characterize them, but the animal populations and sometimes physical environmental features are often important elements in identifying and evaluating sites, as well as in shaping them.

Theme 20. Tundra

Tundra exists in a broad plain across the northernmost reaches of North America, with restricted occurrence on high mountains farther south. Tundra is a treeless area on which the principal vegetation consists of grasses, sedges, perennial herbs, and dwarf shrubs. Terrain is often poorly drained and climate alternates between a continuously cold, long harsh winter and a very short, cool to cold summer. Arctic tundra often is underlain by permanently frozen ground called permafrost. Associated with the permafrost are such tundra peculiarities as solifluction (a flowing of soil downslope), soil polygons, and frost boils. Alaskan tundra may be subdivided into three broad types: wet meadow tundra, shrub/tussock tundra, and alpine tundra. Wet meadow tundra, composed

largely of grasses, sedges, forbs, mosses, and lichens, occurs chiefly in wet areas of the coastal plains. Shrub/tussock tundra, characterized by tussock cotton-grass and ericaceous shrubs, occurs primarily in the piedmont and drier areas of the coastal plains. Alpine tundra, with a diversity of species and much bare ground, occurs at high elevations. Characteristic animals of Alaskan tundra are arctic fox, arctic hare, caribou, and lemming.

Alpine tundra also is found farther south in the Rocky Mountains, Sierra-Cascade ranges, and northern parts of the Appalachian chain. Here, many species of plants are closely related to the arctic tundra species but the mammals characteristic of arctic tundra are lacking. Among the common mammals are hoary marmot, bighorn sheep, and pika.

Theme 21. Boreal forest

Just south of the tundra is a belt of forest stretching from western Alaska eastward to the Atlantic coast in Labrador, Newfoundland, and Nova Scotia. Two principal trees characterize this forest: white spruce and paper birch. In the eastern half, balsam fir and jack pine are also characteristic. There is an extension of the northern forest southward along the Appalachian highlands to North Carolina and Tennessee. Here, white spruce is replaced by red spruce, paper birch is replaced by yellow birch and, in North Carolina and Tennessee, balsam fir is replaced by the closely related Fraser fir. White spruce and red spruce overlap in northern New England and the Maritime Provinces.

A corresponding southward extension along the Rockies is characterized by sub-alpine fir and Engelmann spruce, and another extension in the Cascades and Sierra Nevada is typified by red and silver fir.

The climate of the boreal forest is scarcely less severe than the tundra, but summers are longer, and precipitation somewhat greater. Paper birch, aspen, jack pine, lodgepole pine, red pine, and white pine are very common successional species in the boreal forest, and may last many years as distinct communities of utmost beauty and value. Among the animals, woodland caribou, moose, snowshoe hare, gray wolf, red fox, red squirrel, marten, wolverine, lynx, and several species of grouse and thrush are common.

Theme 22. Pacific forest

Bordering the Pacific Ocean from Alaska to northern California is a region of mild temperatures and moderate to heavy precipitation. The region extends from the coast inland to include (with the exception of the Central Valley and southern fifth of California) the seaward slopes of the Cascade and Sierra Nevada ranges. The essentially mountainous terrain of much of this region produces altitudinal zones that vary in climate and in the resulting plant and animal life. On the highest peaks there are perpetual fields of ice and snow; below the tundra are boreal forests of this theme, consisting of such species as white fir, giant sequoia, Douglas-fir, and sugar pine. The forests at low altitudes along the coast consist mainly of coniferous trees such as western arborvitae,

Douglas-fir, western hemlock, redwood, and Sitka spruce. Northward from the Olympic Peninsula, hemlock and Sitka spruce dominate. Southward from the Olympic Peninsula, Douglas-fir and redwood become increasingly dominant.

Animals common in this community include black bear, mule deer, coyote, cougar, raccoon, mountain beaver, golden-mantled ground squirrel, chickaree, and several species of chipmunks.

Theme 23. Dry coniferous forest

On the lower slopes of the Rocky Mountains and the eastern slopes of the Cascade-Sierra system there occur belts of coniferous forest and woodland dominated by Douglas-fir, ponderosa pine, and pinyon-juniper. The climate here is warmer but drier than that of the boreal (or subalpine) forest above, with drought setting the lower limits of elevation where these dry forests give way to steppe or chaparral. Deer, black bear, porcupine, coyote, chipmunks, magpie, Steller's jay, and pigmy nuthatch are common animals.

Theme 24. Eastern deciduous forest

From a central area in the southern Appalachian highlands, mainly winter-deciduous tree species spread in all directions--northward to the Great Lakes area, westward through the first tier of states west of the Mississippi River, southward to the Gulf of Mexico, and eastward to the Atlantic Coast. Oaks, hickories, maples, buckeye, basswood, tuliptree, hemlock, beech, and other hardwood species combine in various ways to form several distinctive groupings: oak forest, beech-maple forest, northern hardwoods, mixed mesophytic forest, and southern mixed forest. Extensive pine forests mark areas in the Southeast where frequent burning prevents the growth of broad-leaved trees and maintains more desirable timber, forage, and game.

Climate in this region is characterized by moderate-to-cold winters and hot summers. Precipitation varies from about 30 to over 50 inches annually. The most northern portions may have continuous snow cover throughout the winter, but snow is rare in the southern portion. White-tailed deer, raccoon, fox, thrushes, warblers, and the copperhead snake are common animals. Formerly, bison, cougar, and gray wolf ranged through much of the area.

Theme 25. Grassland (steppe)

Grassland is the most extensive formation in North America, extending westward from the edge of the eastern deciduous forests and covering the lowlands about the foothills of the Rocky Mountains to the Sierra-Cascades and from southern Saskatchewan and British Columbia to southern Texas. Throughout the formation, the rainfall is so low that the soil regularly dries out and the grasses become dormant each year. Total annual precipitation ranges from between 30 and 40 inches in the east to about 7 inches just east of the Cascades. In the north, winters are long and very cold but, in the south, winter temperatures seldom drop much below freezing.

Because there are large differences of climate within the grassland formation, there are corresponding differences in the vegetation. Along the eastern border of the formation, where precipitation is greatest, "tall-grass prairie" is the major vegetation type. Some of the dominant grasses are Stipa spartea, Bouteloua gracilis, B. curtipendula, Andropogon scoparius, A. gerardi, Panicum virgatum and Sorghastrum nutans. Composites and legumes are especially conspicuous among the broad-leaved herbs. Tall-grass prairie also dominates many sites formerly subject to regular burning in Illinois, Wisconsin, Minnesota, and Missouri, the combination of these sites often being referred to as the "prairie peninsula."

In the western portions of the central plains, where precipitation is lower, are the "short-grass plains." Bouteloua gracilis and Buchloe are the major dominants in this area of short grasses.

Between the Rockies and the Cascade-Sierra system, rainfall is mainly restricted to winter, rather than being concentrated in summer, as east of the Rockies, and the character of the steppe is correspondingly different. Characteristic grasses are Agropyron spicatum, Festuca idahoensis, and Oryzopsis hymenoides, and over most of the area there is a conspicuous overstory of shrubs, especially sagebrush or shadscale. Much of the interior valley of California originally supported grassland in which Stipa pulchra was the leading dominant.

Bison, pronghorn, elk, coyote, wolf, jackrabbit, kit fox, badger, ground squirrels, prairie dog, pocket gopher, prairie chicken, sage hen, and black-footed ferret are characteristic of grassland, but bison and elk are essentially restricted to the area of summer rainfall.

Theme 26. Chaparral

The dominant plants of chaparral are broad-leafed, mainly evergreen, species of shrubs or low trees, occurring as a dense scrub or woodland or in scattered arrangement with grass interspersed.

Two subdivisions may be made:
(1) Woodland---evergreen forest trees including several oaks, tanbark-oak, California-bay, madrone, chinquapin, and wax-myrtle. (2) Scrub---shrubs of many genera and species, the most important of which are manzanita, chamise, buckbrush, scrub oak, and mountain-mahogany.

Theme 27. Deserts

Deserts range from areas with no vegetation to areas with sparse, shrubby vegetation. Throughout the deserts, variations in soil texture, drainage, and salinity produce distinctive variations in vegetation.

The North American desert is traditionally divided into four geographic sub-regions: Great Basin Desert, Mohave Desert, Sonoran Desert, and Chihuahuan

Desert. Sagebrush characterizes the Great Basin Desert, which has cold winters and warm summers. One common, simple community-type consisting mainly of an open stand of creosotebush occurs throughout the other three deserts, which have warm winters and hot summers.

The Great Basin Desert occurs in much of the lower elevations between the Rocky Mountains and the Sierra Nevada-Cascade ranges. Perennial grasses are an important component in the northern part of this desert.

The Mohave Desert occupies much of inland southern California and adjacent Nevada and northwestern Arizona. Joshua-tree is the outstanding characteristic plant.

The Sonoran Desert extends from southeastern California to the western edge of New Mexico. The species that characterize the Sonoran Desert are ocotillo and the cactuses, especially the saguaro, organpipe, and other conspicuous columnar species.

The Chihuahuan Desert of eastern New Mexico and southwestern Texas is characterized by mesquite, ocotillo, yucca, agave, sotol, and nolina.

Typical animals of the North American deserts include coyote, javelina, bobcat, bighorn, jackrabbit, pocket gopher, kangaroo rat, packrat, antelope ground squirrel, ring-tailed cat, rattlesnake, road-runner, raven, and numerous lizards.

Theme 28. Tropical ecosystems

Tropical areas are limited in the United States and possessions to Hawaii, American Samoa, and other Pacific islands; Puerto Rico and the U.S. Virgin Islands; and the southern tip of Florida, including the Florida Keys. Astronomically speaking, the "tropics" occur in that area bounded by the Tropics of Cancer and Capricorn; but oceanic influences on southern Florida result in a vegetation that is outstandingly tropical in its character despite its extra-tropical position. Due to the geographic dispersion of tropical lands belonging to the United States, the vegetation is highly differentiated, so this theme is complex in its constituent parts.

Seasonal variation in the tropics is minimized by the fact that day length varies but little from 12 hours during all seasons, eliminating the long-winter-night, long-summer-day regime of temperate areas. On the other hand, wind patterns, continental position, and mountain ranges giving rise to rain-shadow phenomena do create seasonally wet-and-dry areas in the tropics as well as in temperate regions. Altitudinal variations also create vast differences in climate, vegetation, and attendant animal life.

Tropical formations of major importance are:

A. Lowland rain forest--temperature more or less constant and warm with any tendency toward drought offset by a coincident season of lower temperature.

B. Summer-deciduous forest--a forest with wet and dry periods alternating each year, and the trees, or many of them, leafless during the dry season.

C. Woodland and scrub formation--found in areas of still more pronounced drought, with small-leaved shrubs and low trees among which legumes are conspicuous.

D. Swamp and mangrove formations--forest or scrub growing where saline or fresh water covers the soil during at least part of the year.

E. Savanna--grassland, usually with scattered trees, related to abnormal soil conditions or recurrent burning of summer-deciduous forest.

F. Montane rain forest--evergreen forest of the cool, misty upper slopes of mountains, extending to upper tree line.

G. Alpine vegetation--nonforest vegetation of areas on mountains where there is insufficient heat for forest growth, as on Hawaii.

GROUP IV. AQUATIC ECOSYSTEMS

Collectively, aquatic plants and animals are at least as diverse as terrestrial forms. Although the concept of the ecosystem is equally applicable in the realm of aquatic biology, there are some difficulties in devising a classification of ecosystems that can be employed effectively in the survey and evaluation of natural areas. In part, these are the consequence of the philosophic problem of categorizing a very large number of essentially discontinuous fresh-water ecosystems. Further, although by no means unique to aquatic ecosystems, there is the practical problem of delineation of the ecosystem in terms of the area under consideration. For example, a lake as an ecosystem, in reality, should include the entire watershed and the plants and animals therein. The boundaries of a marine littoral ecosystem are even more difficult to delineate. Despite this type of difficulty, the concept of the ecosystem must nevertheless be applied vigorously in the evaluation of aquatic natural areas. A lake with an altered watershed is no longer natural, nor is a lagoon into which flows a polluted stream.

The system of themes used here for aquatic ecosystems is based extensively, although not completely, on geomorphological and other physical aspects of the environments of the aquatic ecosystems. Such a classification has obvious internal inconsistencies including many partially overlapping themes. Bearing in mind,

however, that the function of the entire scheme is to provide the basis for the inclusion of adequate and representative samples from the entire spectrum of natural history, such overlapping, rather than being a matter of concern, is one of insurance with respect to attaining the objectives of the system. It is only to be recognized that the system of themes for aquatic ecosystems has a structure that differs philosophically from that of the themes from terrestrial ecosystems.

Theme 29. Marine environments

Among the purely marine environments that can be included in protected areas, it is, of course, extremely difficult to divorce geological from biological influences. This theme is based on important changes in the biological community associated with relatively minor changes in substrate or exposure to wave action. Most conceivable marine sites will fit within the following divisions of this theme:

Exposed coastline and rocky substrate. A complex ecosystem characterized by maximum development of sessile animals and benthic algae (especially Postelsia). Wave action is severe; a splash zone is prominent; zonation is generally an obvious environmental feature. Examples: Cape Arego, Oregon; and possibly Point Loma at the entrance to San Diego Harbor, California.

Exposed coastline with unconsolidated sediment. The animal community is simple, composed of organisms characterized by ability to burrow rapidly. Wave action, surf, tidal rips, and other water movements are severe. A plant community, at least in the ordinary sense, is nonexistent; the substrate consists of shifting sand or small pebbles.

Coral reefs. Examples may be found in the U.S. Virgin Islands, Florida, Hawaii, American Samoa, and Guam. Exposure varies (i.e., windward and leeward sides). Reefs may be classified further into fringing, barrier, and atoll reefs. The biotic community is among the most complex known but also one of the best integrated (See also Group 1, theme 11.)

Protected coastline with rocky substrate. Wave action is reduced in intensity. Zonation is often not very apparent. The splash zone may be reduced or absent. Examples: San Juan Island; many areas near Santa Barbara, California, including the Channel Islands.

Protected coastline with unconsolidated sediment. Included here are areas of extensive sand flats characterized by soft-bodied burrowing animals. This theme may be difficult to separate from lagoons (below) except on the basis of currents and general degree of protection. Examples: Discovery Bay, Washington; Quincy Bay, Massachusetts.

Lagoons. These are often extensive bodies of water completely protected from wave or current action. Organisms usually include eelgrass, Zostera, growing in

extensive submersed meadows, and also characteristic animals. Examples: Mission, California; Sarasota Bay, Florida.

Tidal salt marshes. This is a type of community which has little diversity among plants and animals. Tidal salt marshes are often underlain by extensive salt-marsh peat; they are frequently characterized by endemic or specific mammal or bird populations. Examples: Spartina marshes, Sapelo Island, Georgia, Salicornia - Distichlis marshes, almost any bay in California.

Mangrove swamps. To a great extent these are the tropical replacements of the salt marshes. They are dominated by woody plants usually with stilt roots or pneumatophores. They occur in quiet tidal waters. Examples: Everglades National Park; all high Caroline Islands (Trust Territories).

Areas with extensive kelp beds. These are submarine forests with enormous brown algae in whose holdfasts live complex animal communities. Examples: much of the Pacific coast.

Theme 30. Estuaries

Estuarine ecosystems occupy the portion of rivers and/or arms of the sea between the head of tidal fluctuation and the open sea. They are characterized by marked gradients in salinity. The gradient in salinity and the tidal movements provide a series of habitats containing plants and animals that exemplify the transition from marine to fresh-water forms and from aquatic to terrestrial. Succession and the consequences of siltation are well illustrated. Relict forms may find in estuaries refuge from the forces of extinction. Isolation and partial isolation with their evolutionary consequences may be observed. In some cases, at least, this theme overlaps with, or is closely related to, lagoons, tidal salt marshes, and mangrove swamps in Theme 29, or deltas in Theme 33.

Theme 31. Underground systems

Caves and underground streams and lakes are the most common underground ecosystems. Unusual, endemic or rare species often occur here. Beetles, crayfish, millipedes, and amphipods are some examples of such fauna. Limited gene pools within a cave system has sometimes resulted in different rates of evolution. Thus, underground ecosystems can be important "evolutionary laboratories". Examples: Mammoth Cave National Park.

Theme 32. Lakes and ponds

A single lake may present many characteristics and may typify different kinds of biological and geological interaction. The following divisions are based extensively on the ways in which biological characteristics of a lake are influenced by a variety of physical factors in the environment, including geologic origin, location, climate, size (area and depth), and the chemical content of the water.

Large deep lakes. Large deep lakes are of interest and importance because of peculiar features with respect to stratification and restricted circulation, and because a relatively large fraction of the water mass is below the photosyntheic zone. Example: Lake Tahoe, Nevada.

Large shallow lakes. In contrast to large deep lakes, these lakes tend to circulate more freely. Much more of the water is within the photosynthetic zone. Other factors being similar, such lakes are more productive. They are often major breeding sites for aquatic birds. Plant communities of the more eutrophic large lakes are characterized by an abundance and diversity of forms. Examples: Mille Lacs and the Red Lakes, Minnesota; Salton Sea, California. (Obviously there is a continuous spectrum between shallow and deep lakes.)

Lakes of complex shape. A lake with complex shape, but with essentially uniform type of water, frequently presents excellent opportunities for observations of the effects on diverstiy and productivity, such as basin morphology, type of shore, and type of bottom. Included are lakes with multiple basins and systems of interconnected lakes.

Crater lakes. Because of their origin, the morphology of their basins and the physical and chemical properties of their waters, many of these lakes tend to be extremely oligotrophic. They are usually isolated and have extremely small watersheds. Example: Crater Lake, Oregon.

Kettle lakes and potholes. Such lakes vary considerably in trophic state. Frequently they support a varied and abundant aquatic vegetation and are attractive to species of birds that require isolated aquatic or semiaquatic breeding territories.

Oxbow lakes. Attention should be given to the degree of trophic development and the rate of replacement by terrestrial communities. The more eutrophic oxbow lakes may be important breeding sites for waterfowl.

Dune lakes. Again attention should be given to the rate of replacement by terrestrial communities. The interpretive value of such lakes is obvious.

Sphagnum-bog lakes. Careful selection can give important illustrations about the evolution from aquatic communities to fens to bogs.

Saline lakes. Saline lakes frequently contain unique communities of great interest and scientific value. They illustrate well the concept that the watershed is a part of the lake ecosystem.

Lakes fed by thermal steams. See Thermal waters, Theme 33.

Tundra lakes and ponds. These are, in reality, a part of the tundra ecosystem (Group III, Theme 20). It includes a large fraction of the breeding North

American geese and some other waterfowl. Low density is compensated by large total area. From the aspect of aquatic biology, the shallow nature of these bodies and the long winter freeze exert distinctive and interesting effects on the communities therein.

Swamps and marshy areas. Properly selected examples will provide excellent illustrations of the evolution of aquatic communities. These areas support an abundance and diversity of animal life, including many interesting species of birds and other animals. (They may be permeated by streams, ponds, and puddles.)

Sinkhole lakes. These are of importance and interest because of their origin from collapsed caves and because of previous or continuing association with underground stream systems.

Unusually productive lakes. See Large shallow lakes, kettle lakes and pot-holes, and oxbow lakes. Example: Upper Klamath Lake, Oregon.

Lakes of low productivity and high clarity. See large deep lakes and crater lakes. Examples: Crater Lake, Oregon; many montane lakes in Colorado.

Theme 33. Streams

Flowing waters are powerful molders of the Earth's crust and diverse habitats for life. As in the case of lakes and ponds, the biologic characteristics of streams are determined extensively by the physical properties of the stream-bed and by the nature of the watershed. Streams are characterized within the following divisions of this theme:

Rapidly flowing steams. These are of varying size and may have both gravel and rock bottoms. Such streams contain distinctive, specialized forms.

Slow meandering steams. These also include streams of varying sizes. Obviously, there is a spectrum of types between slow and rapid streams.

Deltas (both at seashore and at lakeshore). Deltas are often of major importance as breeding areas for waterfowl and shore birds. (See also estuaries.)

Springs. Especially important are springs in the desert or steppe, and those whose outflow disappears into the Earth without connection to other bodies of water.

Thermal waters. These ecosystems contain organisms with unusual and biologically important thermal adaptations. Examples: springs and warm streams in Yellowstone and Mount Rainier National Parks.

THEMATIC REPRESENTATION: NATIONAL PARK SYSTEM

NORTH PACIFIC BORDER

Landforms of the Present

Mountain Systems
- *Muir Woods NM*
- *Olympic National Park*
- *Oregon Caves NM*
- *Redwood National Park*

Works of Volcanism
- *Olympic National Park*
- *Point Reyes NS*

Sculpture of the Land
- *Golden Gate NRA*
- *Olympic National Park*
- *Point Reyes NS*
- *Redwood National Park*

Eolian Landforms
- *Point Reyes NS*

River Systems and Lakes
- *Golden Gate NRA*
- *Olympic National Park*
- *Point Reyes NS*
- *Redwood National Park*

Works of Glaciers
- *Olympic National Park*

Seashores, Lakeshores, and Islands
- *Golden Gate NRA*
- *Olympic National Park*
- *Point Reyes NS*
- *Redwood National Park*

Caves and Springs
- *Golden Gate NRA*
- *Muir Woods NM*
- *Oregon Caves NM*

Geologic History

Triassic-Cretaceous Periods
- *Redwood National Park*

Paleocene-Eocene Epochs
- *Olympic National Park*

Oligocene-Recent Epochs
- *Olympic National Park*
- *Redwood National Park*

Land Ecosystems

Tundra
- *Olympic National Park*

Boreal Forest
- *Olympic National Park*

Pacific Forest
- *Golden Gate NRA*
- *Muir Woods NM*
- *Olympic National Park*
- *Oregon Caves NM*
- *Point Reyes NS*
- *Redwood National Park*
- *San Juan Island NHP*

NHP = National Historical Park
NHS = National Historic Site
NMP = National Military Park
NRA = National Recreation Area
NSR = National Scenic Riverway(s)

* Not Represented
NL = National Lakeshore
NM = National Monument
NS = National Seashore
MP = Memorial Parkway

Dry Coniferous Forest
Golden Gate NRA
Point Reyes NS
Redwood National Park
San Juan Island NHP

Grassland
Golden Gate NRA
Redwood National Park

*Chaparral

Aquatic Ecosystems
Marine Environments
Golden Gate NRA
Olympic National Park
Point Reyes NS
Redwood National Park

Estuaries
Golden Gate NRA
Point Reyes NS
Redwood National Park

Underground Systems
Oregon Caves NM

Lakes and Ponds
Golden Gate NRA
Olympic National Park
Point Reyes NS
Redwood National Park

Streams
Golden Gate NRA
Muir Woods NM
Olympic National Park
Oregon Caves NM
Point Reyes NS
Redwood National Park

SOUTH PACIFIC BORDER

Landforms of the Present
Cuestas and Hogbacks
Santa Monica Mountains NRA

Mountain Systems
Channel Islands National Park
Pinnacles NM
Santa Monica Mountains NRA
Whiskeytown-Shasta-TrinityNRA

Works of Volcanism
Cabrillo NM
Channel Islands National Park
Pinnacles NM

Sculpture of the Land
Channel Islands National Park
Golden Gate NRA
Pinnacles NM
Santa Monica Mountains NRA

Eolian Landforms
Channel Islands National Park

River Systems and Lakes
Channel Islands National Park
Golden Gate NRA
Santa Monica Mountains NRA
Whiskeytown-Shasta-TrinityNRA

Seashores, Lakeshores, and Islands
Cabrillo NM
Channel Islands National Park
Golden Gate NRA
Santa Monica Mountains NRA
Whiskeytown-Shasta-TrinityNRA

Caves and Springs
Channel Islands National Park
Golden Gate NRA
Pinnacles NM
Santa Monica Mountains NRA

Geologic History
*Triassic-Cretaceous Periods

*Oligocene-Recent Epochs

Land Ecosystems
Pacific Forest
Golden Gate NRA

Dry Coniferous Forest
Channel Islands National Park
Golden Gate NRA
Pinnacles NM
Santa Monica Mountains NRA
Whiskeytown-Shasta-TrinityNRA

Grassland
Cabrillo NM
Channel Islands National Park
Golden Gate NRA
Pinnacles NM

Chaparral
Pinnacles NM
Santa Monica Mountains NRA
Whiskeytown-Shasta-TrinityNRA

Aquatic Ecosystems
Marine Environments
Cabrillo NM
Channel Islands National Park
Golden Gate NRA
Santa Monica Mountains NRA

Estuaries
Channel Islands National Park
Golden Gate NRA
Santa Monica Mountains NRA

Underground Systems
Pinnacles NM

Lakes and Ponds
Golden Gate NRA
Pinnacles NM
Whiskeytown-Shasta-TrinityNRA

Streams
Channel Islands National Park
Golden Gate NRA
Pinnacles NM
Santa Monica Mountains NRA
Whiskeytown-Shasta-TrinityNRA

CASCADE RANGE

Landforms of the Present
Mountain Systems
Crater Lake National Park
Lassen Volcanic National Park
Mount Rainier National Park
North Cascades National Park

Works of Volcanism
Crater Lake National Park
Lassen Volcanic National Park
Mount Rainier National Park

Hot Water Phenomena
Crater Lake National Park
Lassen Volcanic National Park
Mount Rainier National Park

Sculpture of the Land
Crater Lake National Park
Lassen Volcanic National Park
Mount Rainier National Park
North Cascade NPS Service Complex

River Systems and Lakes
Crater Lake National Park
Lassen Volcanic National Park
Mount Rainier National Park
North Cascades National Park

Works of Glaciers
Crater Lake National Park
Mount Rainier National Park
North Cascades National Park

Seashores, Lakeshores, and Islands
Crater Lake National Park
Lassen Volcanic National Park

Caves and Springs
Crater Lake National Park
Mount Rainier National Park
North Cascades National Park

Geologic History
Paleocene-Eocene Epochs
Mount Rainier National Park
North Cascades National Park

Oligocene-Recent Epochs
Crater Lake National Park
Mount Rainier National Park
North Cascades National Park

Land Ecosystems
Tundra
Mount Rainier National Park
North Cascades National Park

Boreal Forest
Crater Lake National Park
Mount Rainier National Park
North Cascades National Park
Lassen Volcanic National Park

Pacific Forest
Crater Lake National Park
Lassen Volcanic National Park
Mount Rainier National Park
North Cascades National Park

Grassland
North Cascades National Park

Aquatic Ecosystems
Lakes and Ponds
Crater Lake National Park
Lassen Volcanic National Park
Mount Rainier National Park
North Cascades National Park

Streams
Crater Lake National Park
Lassen Volcanic National Park
Mount Rainier National Park
North Cascades National Park

SIERRA NEVADA

Landforms of the Present
Mountain Systems
Devils Postpile NM
Kings Canyon National Park
Sequoia National Park
Yosemite National Park

Works of Volcanism
Devils Postpile NM

Hot Water Phenomena
Kings Canyon National Park

Sculpture of the Land
Devils Postpile NM
Kings Canyon National Park
Sequoia National Park
Yosemite National Park

River Systems and Lakes
Devils Postpile NM
Kings Canyon National Park
Sequoia National Park
Yosemite National Park

Works of Glaciers
Kings Canyon National Park
Sequoia National Park
Yosemite National Park

Seashores, Lakeshores, and Islands
Kings Canyon National Park
Sequoia National Park
Yosemite National Park

Caves and Springs
Devils Postpile NM
Kings Canyon National Park
Sequoia National Park

Geologic History
Triassic-Cretaceous Periods
Kings Canyon National Park

Oligocene-Recent Epochs
Kings Canyon National Park

Land Ecosystems
Tundra
Devils Postpile NM
Kings Canyon National Park
Sequoia National Park
Yosemite National Park

Boreal Forest
Devils Postpile NM
Kings Canyon National Park
Sequoia National Park
Yosemite National Park

Pacific Forest
Kings Canyon National Park
Sequoia National Park
Yosemite National Park

Dry Coniferous Forest
Kings Canyon National Park
Sequoia National Park
Yosemite National Park

Chaparral
Kings Canyon National Park
Sequoia National Park

Aquatic Ecosystems
Underground Systems
Kings Canyon National Park
Sequoia National Park

Lakes and Ponds
Kings Canyon National Park
Sequoia National Park
Yosemite National Park

Streams
Devils Postpile NM
Kings Canyon National Park
Sequoia National Park
Yosemite National Park

COLUMBIA PLATEAU

Landforms of the Present
Plains, Plateaus, and Mesas
John Day Fossil Beds NM

Works of Volcanism
Craters of the Moon NM
John Day Fossil Beds NM

Sculpture of the Land
John Day Fossil Beds NM

River Systems and Lakes
John Day Fossil Beds NM

*Works of Glaciers

Caves and Springs
Craters of the Moon NM

Geologic History
Triassic-Cretaceous Periods
John Day Fossil Beds NM

Paleocene-Eocene
John Day Fossil Beds NM

Oligocene - Recent Epochs
Craters of the Moon NM
Hagerman Fossil Beds NM
John Day Fossil Beds NM

Land Ecosystems
*Tundra

*Boreal Forest

Dry Coniferous Forest
John Day Fossil Beds NM

Grassland
John Day Fossil Beds NM

Deserts
Craters of the Moon NM
John Day Fossil Beds NM

Aquatic Ecosystems
*Lakes and Ponds

Streams
John Day Fossil Beds NM

GREAT BASIN

Landforms of the Present
Plains, Plateaus, and Mesas
Golden Spike NHS

Mountain Systems
Death Valley NM
Great Basin National Park
Lava Beds NM

Works of Volcanism
Death Valley NM
Lava Beds NM

Hot Water Phenomena
Death Valley NM

Sculpture of the Land
Death Valley NM
Lava Beds NM
Great Basin National Park

Eolian Landforms
Death Valley NM

River Systems and Lakes
Great Basin National Park

Works of Glaciers
Great Basin National Park

Seashores, Lakeshores, and Islands
Great Basin National Park

Caves and Springs
Death Valley NM
Great Basin National Park
Lava Beds NM

Geologic History
Cambrian-Early Silurian Periods
Death Valley NM
Great Basin National Park

Late Silurian-Devonian Periods
Death Valley NM

Mississippian-Permian Periods
Death Valley NM
Great Basin National Park
Lava Beds NM

Triassic-Cretaceous Periods
Death Valley NM
Lava Beds NM

Paleocene-Eocene Epochs
Death Valley NM
Lava Beds NM

Oligocene - Recent Epochs
Death Valley NM
Great Basin National Park
Lava Beds NM

Land Ecosystems
Tundra
Death Valley NM
Great Basin National Park

Boreal Forest
Death Valley NM
Great Basin National Park

Dry Coniferous Forest
Death Valley NM
Great Basin National Park
Lava Beds NM

Deserts
Death Valley NM
Great Basin National Park
Lava Beds NM

Aquatic Ecosystems
Underground Systems
Great Basin National Park
Lava Beds NM

Lakes and Ponds
Death Valley NM
Great Basin National Park

Streams
Death Valley NM
Great Basin National Park
Lava Beds NM

MOHAVE-SONORAN DESERT

Landforms of the Present
Plains, Plateaus, and Mesas
Casa Grande NM
Hohokam Pima NM
Joshua Tree NM
Lake Mead NRA
Montezuma Castle NM
Tumacacori NM

Cuestas and Hogbacks
Joshua Tree NM
Lake Mead NRA

Mountain Systems
Death Valley NM
Joshua Tree NM
Lake Mead NRA
Organ Pipe Cactus NM
Saguaro NM
Tonto NM

Works of Volcanism
Death Valley NM
Joshua Tree NM
Lake Mead NRA
Tonto NM

Hot Water Phenomena
Death Valley NM
Lake Mead NRA

Sculpture of the Land
Death Valley NM
Joshua Tree NM
Lake Mead NRA
Montezuma Castle NM
Organ Pipe Cactus NM
Saguaro NM
Tonto NM

Eolian Landforms
Death Valley NM
Joshua Tree NM

River Systems and Lakes
Lake Mead NRA
Montezuma Castle NM
Tuzigoot NM

Seashores, Lakeshores, and Islands
Lake Mead NRA

Caves and Springs
Death Valley NM
Joshua Tree NM
Lake Mead NRA
Montezuma Castle NM
Organ Pipe Cactus NM
Saguaro NM
Tonto NM

Geologic History
Cambrian-Early Silurian Periods
Death Valley NM

Late Silurian-Devonian Periods
Death Valley NM

Mississippian-Permian Periods
Death Valley NM

Triassic-Cretaceous Periods
Death Valley NM
Joshua Tree NM

Paleocene-Eocene Epochs
Death Valley NM

Joshua Tree NM
Lake Mead NRA

Oligocene-Recent Epochs
Death Valley NM
Joshua Tree NM
Lake Mead NRA

Land Ecosystems
Tundra
Death Valley NM

Boreal Forest
Death Valley NM

Dry Coniferous Forest
Death Valley NM
Montezuma Castle NM
Saguaro NM

Grassland
Joshua Tree NM
Lake Mead NRA

Chaparral
Joshua Tree NM
Saguaro NM

Deserts
Casa Grande NM
Death Valley NM
Hohokam Pima NM
Joshua Tree NM
Lake Mead NRA
Organ Pipe Cactus NM
Saguaro NM
Tonto NM
Tumacacori NM
Tuzigoot NM

Aquatic Ecosystems
Lakes and Ponds
Death Valley NM
Joshua Tree NM
Lake Mead NRA
Montezuma Castle NM
Organ Pipe Cactus NM

Streams
Death Valley NM
Lake Mead NRA
Montezuma Castle NM
Organ Pipe Cactus NM
Saguaro NM
Tonto NM
Tuzigoot NM

CHIHUAHUAN DESERT-MEXICAN HIGHLAND

Landforms of the Present
Plains, Plateaus, and Mesas
Big Bend National Park
Rio Grande Wild and Scenic River
Salinas Pueblo Missions NM

Cuestas and Hogbacks
Big Bend National Park
Gila Cliff Dwellings NM

Mountain Systems
Big Bend National Park
Chiricahua NM
Coronado National Memorial
Fort Bowie NHS
Gila Cliff Dwellings NM
Guadalupe Mountains National Park

Works of Volcanism
Big Bend National Park
Chiricahua NM
Rio Grande Wild and Scenic River

Hot Water Phenomena
Big Bend National Park
Rio Grande Wild and Scenic River

Sculpture of the Land
Big Bend National Park
Chamizal National Memorial
Chiricahua NM
Fort Davis NHS
Gila Cliff Dwellings NM
Guadalupe Mountains National Park
Rio Grande Wild and Scenic River

Salinas Pueblo Mission NM
White Sands NM

Eolian Landforms
Big Bend National Park
Chamizal NM
White Sands NM

River Systems and Lakes
Big Bend National Park
Chamizal National Memorial
Fort Davis NHS
Gila Cliff Dwellings NM
Guadalupe Mountains National Park
Rio Grande Wild and Scenic River
Salinas Pueblo Mission NM
White Sands NM

Caves and Springs
Big Bend National Park
Chiricahua NM
Coronado National Memorial
Fort Bowie NHS
Fort Davis NHS
Guadalupe Mountains National Park
Rio Grande Wild and Scenic River
White Sands NM

Geologic History
Mississippian-Permian Periods
Guadalupe Mountains National Park

Triassic-Cretaceous Periods
Big Bend National Park
Fort Davis NHS
Rio Grande Wild and Scenic River

Paleocene-Eocene Epochs
Gila Cliff Dwellings NM
Salinas Pueblo Mission NM

Oligocene-Recent Epochs
Chamizal National Memorial
White Sands NM

Land Ecosystems
*Boreal Forest

Dry Coniferous Forest
Big Bend National Park
Chiricahua NM
Coronado National Memorial
Fort Bowie NHS
Fort Davis NHS
Gila Cliff Dwellings NM
Guadalupe Mountains National Park
Salinas Pueblo Mission NM

Grassland
Chiricahua NM
Coronado National Memorial
Fort Bowie NHS
Guadalupe Mountains National Park
White Sands NM

Deserts
Big Bend National Park
Chiricahua NM
Coronado National Memorial
Fort Bowie NHS
Rio Grande Wild and Scenic River

Aquatic Ecosystems
Underground Systems
Big Bend National Park
Coronado National Memorial
Guadalupe Mountains National Park

Lakes and Ponds
Guadalupe Mountains National Park
White Sands NM

Streams
Big Bend National Park
Chamizal National Memorial
Chiricahua NM
Coronado National Memorial
Fort Davis NHS
Fort Davis NHS
Gila Cliff Dwellings NM
Guadalupe Mountains National Park
Rio Grande Wild and Scenic River

Salinas Pueblo Mission NM
White Sands NM

COLORADO PLATEAU

Landforms of the Present

Plains, Plateaus, and Mesas
Arches National Park
Black Canyon of the Gunnison NM
Bryce Canyon National Park
Canyon de Chelly NM
Canyonlands National Park
Capitol Reef National Park
Cedar Breaks NM
Chaco Culture NHP
Colorado NM
El Morro NM
Glen Canyon NRA
Grand Canyon National Park
Hovenweep NM
Mesa Verde National Park
Natural Bridges NM
Navajo NM
Petrified Forest National Park
Walnut Canyon NM
Wupatki NM
Yucca House NM
Zion National Park

Cuestas and Hogbacks
Arches National Park
Capitol Reef National Park
Canyon de Chelly NM
Navajo NM

Mountain Systems
Arches National Park
Black Canyon of the Gunnison NM
Canyon de Chelly NM
Colorado NM
Grand Canyon National Park
Sunset Crater NM

Works of Volcanism
Grand Canyon National Park
Sunset Crater NM
Walnut Canyon NM
Wupatki NM
Zion National Park

Sculpture of the Land
Arches National Park
Black Canyon of the Gunnison NM
Bryce Canyon National Park
Canyon de Chelly NM
Canyonlands National Park
Capitol Reef National Park
Cedar Breaks NM
Chaco Culture NHP
Colorado NM
El Morro NM
Glen Canyon NRA
Grand Canyon National Park
Mesa Verde National Park
Natural Bridges NM
Navajo NM
Petrified Forest National Park
Rainbow Bridge NM
Sunset Crater NM
Walnut Canyon NM
Wupatki NM
Zion National Park

Eolian Landforms
Arches National Park
Canyon de Chelly NM
Chaco Culture NHP
Wupatki NM

River Systems and Lakes
Arches National Park
Aztec Ruins NM
Black Canyon of the Gunnison NM
Bryce Canyon National Park
Canyon de Chelly NM
Canyonlands National Park
Capitol Reef National Park
Chaco Culture NHP
Glen Canyon NRA
Grand Canyon National Park
Hubbell Trading Post NHS
Rainbow Bridge NM
Walnut Canyon NM

Wupatki NM
Zion National Park

Seashores, Lakeshores, and Islands
Glen Canyon NRA
Rainbow Bridge NM

Geologic History
Precambrian Era
Black Canyon of the Gunnison NM
Grand Canyon National Park

Cambrian-Early Silurian Periods
Grand Canyon National Park

Late Silurian-Devonian Periods
Grand Canyon National Park
Natural Bridges NM
Pipe Spring NM

Mississippian-Permian Periods
Canyon de Chelly NM
Capitol Reef National Park
Grand Canyon National Park
Mesa Verde National Park
Navajo NM
Rainbow Bridge NM
Zion National Park

Triassic-Cretaceous Periods
Arches National Park
Bryce Canyon National Park
Canyonlands National Park
Capitol Reef National Park
Colorado NM
El Morro NM
Glen Canyon NRA
Hovenweep NM
Petrified Forest National Park
Rainbow Bridge NM
Yucca House NM
Zion National Park

Paleocene-Eocene Epochs
Arches National Park
Bryce Canyon National Park
Canyonlands National Park
Cedar Breaks NM
Chaco Culture NHP
Grand Canyon National Park
Petrified Forest National Park
Wupatki NM

Oligocene - Recent Epochs
Aztec Ruins NM
Bryce Canyon National Park
Canyonlands National Park
Cedar Breaks NM
Glen Canyon NRA
Grand Canyon National Park
Hubbell Trading Post NHS
Natural Bridges NM
Petrified Forest National Park
Rainbow Bridge NM
Sunset Crater NM
Wupatki NM
Zion National Park

Land Ecosystems
*Tundra

Boreal Forest
Black Canyon of the Gunnison NM
Grand Canyon National Park

Dry Coniferous Forest
Arches National Park
Aztec Ruins NM
Black Canyon of the Gunnison NM
Bryce Canyon National Park
Canyon de Chelly NM
Canyonlands National Park
Capitol Reef National Park
Cedar Breaks NM
Chaco Culture NHP
Colorado NM
El Morro NM
Glen Canyon NRA
Grand Canyon National Park
Hovenweep NM
Hubbell Trading Post NHS
Mesa Verde National Park
Natural Bridges NM
Navajo NM

Petrified Forest National Park
Sunset Crater NM
Walnut Canyon NM
Wupatki NM
Zion National Park

Grassland
Black Canyon of the Gunnison NM
Grand Canyon National Park
Sunset Crater NM
Walnut Canyon NM

Deserts
Arches National Park
Black Canyon of the Gunnison NM
Bryce Canyon National Park
Canyon de Chelly NM
Canyonlands National Park
Capitol Reef National Park
Colorado NM
El Morro NM
Glen Canyon NRA
Grand Canyon National Park
Hovenweep NM
Hubbell Trading Post NHS
Mesa Verde National Park
Natural Bridges NM
Navajo NM
Sunset Crater NM
Walnut Canyon NM
Wupatki NM
Zion National Park

Aquatic Ecosystems
Underground Systems
Grand Canyon National Park
Sunset Crater NM
Wupatki NM

Lakes and Ponds
Aztec Ruins NM
Glen Canyon NRA
Rainbow Bridge NM

Streams
Arches National Park
Aztec Ruins NM
Black Canyon of the Gunnison NM
Bryce Canyon National Park
Canyon de Chelly NM
Canyonlands National Park
Capitol Reef National Park
Cedar Breaks NM
Chaco Culture NHP
El Morro NM
Glen Canyon NRA
Grand Canyon National Park
Hubbell Trading Post NHS
Navajo NM
Petrified Forest National Park
Rainbow Bridge NM
Walnut Canyon NM
Wupatki NM
Zion National Park

NORTHERN ROCKY MOUNTAINS

Landforms of the Present
Plains, Plateaus, and Mesas
Grant-Kohrs Ranch NHS

Mountain Systems
Glacier National Park

Sculpture of the Land
Big Hole National Battlefield
Glacier National Park

River Systems and Lakes
Big Hole National Battlefield
Glacier National Park

Works of Glaciers
Big Hole National Battlefield
Glacier National Park

Caves and Springs
Big Hole National Battlefield
Glacier National Park

Geologic History

*Precambrian Era

Land Ecosystems
Tundra
Big Hole National Battlefield
Glacier National Park

Boreal Forest
Glacier National Park
Grant-Kohrs Ranch NHS

Pacific Forest
Glacier National Park

Grassland
Grant-Kohrs Ranch NHS

Aquatic Ecosystems
Lakes and Ponds
Glacier National Park

Streams
Glacier National Park
Grant-Kohrs Ranch NHS

MIDDLE ROCKY MOUNTAINS

Landforms of the Present
Plains, Plateaus, and Mesas
Bighorn Canyon NRA
Dinosaur NM

Cuestas and Hogbacks
Dinosaur NM

Mountain Systems
Bighorn Canyon NRA
Dinosaur NM
Grand Teton National Park
John D. Rockefeller Jr. MP
Yellowstone National Park

Works of Volcanism
Yellowstone National Park

Hot Water Phenomena
Grand Teton National Park
John D. Rockefeller Jr. MP
Yellowstone National Park

Sculpture of the Land
Bighorn Canyon NRA
Dinosaur NM
Fossil Butte NM
Grand Teton National Park
Yellowstone National Park

River Systems and Lakes
Bighorn Canyon NRA
Dinosaur NM
Grand Teton National Park
John D. Rockefeller, Jr. MP
Yellowstone National Park

Works of Glaciers
Grand Teton National Park
Yellowstone National Park

Seashores, Lakeshores, and Islands
Bighorn Canyon NRA
Grand Teton National Park
Yellowstone National Park

Caves and Springs
Bighorn Canyon NRA
Dinosaur NM
Fossil Butte NM
Grand Teton National Park
John D. Rockefeller Jr. MP
Timpanogos Cave NM
Yellowstone National Park

Geologic History
Precambrian Era
Dinosaur NM
Grand Teton National Park
Yellowstone National Park

Cambrian-Early Silurian Periods
Dinosaur NM

Mississippian-Permian Periods
Dinosaur NM
Timpanogos Cave NM
Yellowstone National Park

Triassic-Cretaceous Periods
Dinosaur NM
Yellowstone National Park

Paleocene-Eocene Epochs
Fossil Butte NM
Grand Teton National Park
Yellowstone National Park

Oligocene-Recent Epochs
Dinosaur NM
Fossil Butte NM
Grand Teton National Park
Yellowstone National Park

Land Ecosystems
Tundra
Grand Teton National Park
Yellowstone National Park

Boreal Forest
Grand Teton National Park
John D. Rockefeller Jr. MP
Yellowstone National Park

Dry Coniferous Forest
Bighorn Canyon NRA
Dinosaur NM
Grand Teton National Park
John D. Rockefeller Jr. MP

Grassland
Bighorn Canyon NRA

Deserts
Dinosaur NM
Fossil Butte NM
Timpanogos Cave NM

Aquatic Ecosystems
Underground Systems
Bighorn Canyon NRA
Timpanogos Cave NM

Lakes and Ponds
Bighorn Canyon NRA
Grand Teton National Park
John D. Rockefeller Jr. MP
Yellowstone National Park

Streams
Bighorn Canyon NRA
Dinosaur NM
Fossil Butte NM
Grand Teton National Park
John D. Rockefeller Jr. MP
Timpanogos Cave NM
Yellowstone National Park

WYOMING BASIN

Landforms of the Present
Plains, Plateaus, and Mesas
Dinosaur NM

Cuestas and Hogbacks
Dinosaur NM

Mountain Systems
Dinosaur NM

Sculpture of the Land
Dinosaur NM

River Systems and Lakes
Dinosaur NM

Caves and Springs
Dinosaur NM

Geologic History
Precambrian Era
Dinosaur NM

Cambrian-Early Silurian Periods
Dinosaur NM

Mississippian-Permian Periods
Dinosaur NM

Triassic-Cretaceous Periods
Dinosaur NM

*Paleocene-Eocene Epochs

Oligocene-Recent Epochs
Dinosaur NM

Land Ecosystems
Dry Coniferous Forest
Dinosaur NM

*Grassland

Deserts
Dinosaur NM

Aquatic Ecosystems
*Lakes and Ponds

Streams
Dinosaur NM

SOUTHERN ROCKY MOUNTAINS

Landforms of the Present
Plains, Plateaus, and Mesas
Black Canyon of the Gunnison NM
Curecanti NRA

Mountain Systems
Black Canyon of the Gunnison NM
Florissant Fossil Beds NM
Great Sand Dunes NM
Rocky Mountain National Park

*Works of Volcanism

Sculpture of the Land
Black Canyon of the Gunnison NM
Curecanti NRA
Rocky Mountain National Park

Eolian Landforms
Great Sand Dunes NM

River Systems and Lakes
Black Canyon of the Gunnison NM
Curecanti NRA
Florissant Fossil Beds NM
Rocky Mountain National Park

Works of Glaciers
Rocky Mountain National Park

Seashores, Lakeshores, and Islands
Curecanti NRA

Caves and Springs
Curecanti NRA
Florissant Fossil Beds NM
Rocky Mountain National Park

Geologic History
Precambrian Era
Black Canyon of the Gunnison NM
Curecanti NRA
Rocky Mountain National Park

Triassic-Cretaceous Periods
Curecanti NRA

Oligocene-Recent Epochs
Florissant Fossil Beds NM
Great Sand Dunes NM
Rocky Mountain National Park

Land Ecosystems
Tundra
Rocky Mountain National Park

Boreal Forest
Black Canyon of the Gunnison NM
Curecanti NRA
Rocky Mountain National Park

Dry Coniferous Forest
Black Canyon of the Gunnison NM
Great Sand Dunes NM
Rocky Mountain National Park

Grassland
Black Canyon of the Gunnison NM
Florissant Fossil Beds NM
Great Sand Dunes NM

Deserts
Black Canyon of the Gunnison NM
Curecanti NRA

Aquatic Ecosystems

Underground Systems
Rocky Mountain National Park

Lakes and Ponds
Curecanti NRA
Rocky Mountain National Park

Streams
Black Canyon of the Gunnison NM
Curecanti NRA
Great Sand Dunes NM
Rocky Mountain National Park

GREAT PLAINS

Landforms of the Present

Plains, Plateaus, and Mesas
Agate Fossil Beds NM
Amistad Recreation Area
Badlands National Park
Bent's Old Fort NHS
Bighorn Canyon NRA
Custer Battlefield NM
Devils Tower NM
Fort Union NM
Fort Laramie NHS
Fort Union Trading Post NHS
Fort Larned NHS
Knife River Indian Villages NHS
Lake Meredith Recreation Area
Theodore Roosevelt National Park
Wind Cave National Park

*Cuestas and Hogbacks

Mountain Systems
Bighorn Canyon NRA
Capulin Volcano NM
Mount Rushmore National Memorial

Works of Volcanism
Capulin Volcano NM
Devils Tower NM

Sculpture of the Land
Alibates Flint Quarries NM
Amistad Recreation Area
Badlands National Park
Bighorn Canyon NRA
Capulin Volcano NM
Carlsbad Caverns National Park
Devils Tower NM
Fort Union NM
Lake Meredith Recreation Area
Lyndon B. Johnson NHP
Scotts Bluff NM
Theodore Roosevelt National Park

Eolian Landforms
Amistad Recreation Area
Fort Union NM

River Systems and Lakes
Amistad Recreation Area
Badlands National Park
Bent's Old Fort NHS
Bighorn Canyon NRA
Devils Tower NM
Fort Union NM
Fort Union NM
Fort Union Trading Post NHS
Fort Union Trading Post NHS
Fort Laramie NHS
Lake Meredith Recreation Area
Lyndon B. Johnson NHP
Scotts Bluff NM
Theodore Roosevelt National Park

Seashores, Lakeshores, and Islands
Bighorn Canyon NRA
Lake Meredith Recreation Area

Caves and Springs
Badlands National Park
Bighorn Canyon NRA
Capulin Volcano NM
Carlsbad Caverns National Park
Devils Tower NM
Fort Union NM
Jewel Cave NM
Wind Cave National Park

Geologic History

Mississippian-Permian Periods

Alibates Flint Quarries NM
Amistad Recreation Area
Carlsbad Caverns National Park
Jewel Cave NM
Lake Meredith Recreation Area
Mount Rushmore National Memorial
Wind Cave National Park

Triassic-Cretaceous Periods

Custer Battlefield NM

Paleocene-Eocene Epochs

Devils Tower NM
Capulin Volcano NM
Fort Union NM
Lyndon B. Johnson NHP

Oligocene-Recent Epochs

Agate Fossil Beds NM
Badlands National Park
Scotts Bluff NM
Theodore Roosevelt National Park

Land Ecosystems

*Boreal Forest

Dry Coniferous Forest

Bighorn Canyon NRA
Capulin Volcano NM
Devils Tower NM
Fort Union NM
Jewel Cave NM
Lyndon B. Johnson NHP
Mount Rushmore National Memorial
Scotts Bluff NM
Wind Cave National Park

Eastern Deciduous Forest

Fort Larned NHS
Lake Meredith Recreation Area

Grassland

Agate Fossil Beds NM
Badlands National Park
Bighorn Canyon NRA
Capulin Volcano NM
Custer Battlefield NM
Devils Tower NM
Fort Union NM
Fort Union Trading Post NHS
Fort Larned NHS
Jewel Cave NM
Lyndon B. Johnson NHP
Mount Rushmore National Memorial
Theodore Roosevelt National Park
Wind Cave National Park

Aquatic Ecosystems

Underground Systems

Bighorn Canyon NRA
Carlsbad Caverns National Park
Jewel Cave NM
Wind Cave National Park

Lakes and Ponds

Amistad Recreation Area
Fort Union Trading Post NHS
Lake Meredith Recreation Area

Streams

Agate Fossil Beds NM
Amistad Recreation Area
Badlands National Park
Bent's Old Fort NHS
Bighorn Canyon NRA
Carlsbad Caverns National Park
Devils Tower NM
Fort Laramie NHS
Fort Union NM
Fort Union Trading Post NHS
Knife River Indian Villages NHS
Lake Meredith Recreation Area
Lyndon B. Johnson NHP
Mount Rushmore National Memorial
Scotts Bluff NM
Theodore Roosevelt National Park
Wind Cave National Park

CENTRAL LOWLANDS

Landforms of the Present

Plains, Plateaus, and Mesas
- *Fort Scott NHS*
- *Homestead NM of America*
- *Lincoln Home NHS*
- *Pipestone NM*

*Cuestas and Hogbacks

Sculpture of the Land
- *Chickasaw NRA*
- *Pictured Rocks NL*

Eolian Landforms
- *Indiana Dunes NL*
- *Pictured Rocks NL*
- *Sleeping Bear Dunes NL*

River Systems and Lakes
- *Chickasaw NRA*
- *Ice Age National Scientific Reserve*
- *Indiana Dunes NL*

Works of Glaciers
- *Ice Age National Scientific Reserve*
- *Indiana Dunes NL*
- *Sleeping Bear Dunes NL*

Seashores, Lakeshores, and Islands
- *Chickasaw NRA*
- *Indiana Dunes NL*
- *Pictured Rocks NL*
- *Sleeping Bear Dunes NL*

Caves and Springs
- *Chickasaw NRA*

Geologic History

Precambrian Era
- *Pictured Rocks NL*
- *Pipestone NM*

Cambrian-Early Silurian Periods
- *Effigy Mounds NM*

*Late Silurian-Devonian Periods

Triassic-Cretaceous Periods
- *Chickasaw NRA*

Oligocene-Recent Epochs
- *Homestead NM of America*
- *Indiana Dunes NL*
- *Pictured Rocks NL*
- *Pipestone NM*
- *Sleeping Bear Dunes NL*

Land Ecosystems

Boreal Forest
- *Pictured Rocks NL*

Eastern Deciduous Forest
- *Chickasaw NRA*
- *Effigy Mounds NM*
- *Indiana Dunes NL*
- *Lincoln Home NHS*
- *Pictured Rocks NL*
- *Sleeping Bear Dunes NL*

Grassland
- *Fort Scott NHS*
- *Herbert Hoover NHS*
- *Homestead NM of America*
- *Indiana Dunes NL*
- *Pipestone NM*

Aquatic Ecosystems

Lakes and Ponds
- *Chickasaw NRA*
- *Indiana Dunes NL*
- *Pictured Rocks NL*
- *Sleeping Bear Dunes NL*

Streams
- *Lincoln Home NHS*
- *Pictured Rocks NL*
- *Pipestone NM*
- *Sleeping Bear Dunes NL*

SUPERIOR UPLANDS

Landforms of The Present

River Systems and Lakes
- *Grand Portage NM*
- *Isle Royale National Park*
- *Lower Saint Croix NSR*
- *Saint Croix NSR*
- *Voyageurs National Park*

Works of Glaciers
- *Apostle Islands NL*
- *Grand Portage NM*
- *Isle Royale National Park*
- *Lower Saint Croix NSR*
- *Saint Croix NSR*
- *Voyageurs National Park*

Seashores, Lakeshores, and Islands
- *Apostle Islands NL*
- *Grand Portage NM*
- *Isle Royale National Park*
- *Voyageurs National Park*

Geologic History

Precambrian Era
- *Apostle Islands NL*
- *Grand Portage NM*
- *Isle Royale National Park*
- *Saint Croix NSR*
- *Voyageurs National Park*

Cambrian-Early Silurian Periods
- *Lower Saint Croix NSR*
- *Saint Croix NSR*

Oligocene-Recent Epochs
- *Apostle Islands NL*
- *Grand Portage NM*
- *Isle Royale National Park*
- *Saint Croix NSR*
- *Voyageurs National Park*

Land Ecosystems

Boreal Forest
- *Apostle Islands NL*
- *Grand Portage NM*
- *Isle Royale National Park*
- *Voyageurs National park*

Eastern Deciduous Forest
- *Apostle Islands NL*
- *Isle Royale National Park*
- *Lower Saint Croix NSR*
- *Saint Croix NSR*

Grassland
- *Lower Saint Croix NSR*
- *Saint Croix NSR*

Aquatic Ecosystems

Lakes and Ponds
- *Apostle Islands NL*
- *Grand Portage NM*
- *Isle Royale National Park*
- *Voyageurs National Park*

Streams
- *Apostle Islands NL*
- *Grand Portage NM*
- *Isle Royale National Park*
- *Lower Saint Croix NSR*
- *Saint Croix NSR*
- *Voyageurs National Park*

INTERIOR HIGHLANDS

Landforms of the Present

Plains, Plateaus, and Mesas
- *George Washington Carver NM*
- *Ozark NSRs*
- *Wilson's Creek National Battlefield*
- *Pea Ridge NMP*

Mountain Systems
- *Buffalo National River*

Hot Water Phenomena
- *Hot Springs National Park*

Sculpture of the Land
- *Buffalo National River*
- *Hot Springs National Park*
- *Pea Ridge NMP*

River Systems and Lakes
Buffalo National River
Fort Smith NHS
Ozark NSRs

Caves and Springs
Buffalo National River
Hot Springs National Park
Ozark NSRs
Pea Ridge NMP

Geologic History
*Cambrian-Early Silurian Periods

Mississippian-Permian Periods
Hot Springs National Park

Triassic-Cretaceous Periods
Buffalo National River
Pea Ridge NMP

Paleocene-Eocene Epochs
Fort Smith NHS

Land Ecosystems
Eastern Deciduous Forest
Buffalo National River
George Washington Carver NM
Hot Springs National Park
Ozark NSRs
Pea Ridge NMP
Wilson's Creek National Battlefield

Grassland
George Washington Carver NM
Wilson's Creek National Battlefield

Aquatic Ecosystems
Underground Systems
Buffalo National River
Ozark NSRs

Lakes and Ponds
Ozark NSRs

Streams
Buffalo National River
Fort Smith NHS
Hot Springs National Park
Ozark NSRs
Pea Ridge NMP
Wilson's Creek National Battlefield

INTERIOR LOW PLATEAUS

Landforms of the Present
Plains, Plateaus, and Mesas
Fort Donelson National Battlefield
Natchez Trace Parkway
Stones River National Battlefield

*River Systems and Lakes

Caves and Springs
Mammoth Cave National Park

Geologic History
*Cambrian-Early Silurian Periods

*Mississippian-Permian Periods

Land Ecosystems
Eastern Deciduous Forest
Abraham Lincoln Birthplace NHS
Fort Donelson National Battlefield
Mammoth Cave National Park
Natchez Trace Parkway
Stones River National Battlefield

Aquatic Ecosystems
Underground Systems
Mammoth Cave National Park

Streams
Fort Donelson National Battlefield
Mammoth Cave National Park
Natchez Trace Parkway
Stones River National Battlefield

APPALACHIAN PLATEAUS

Landforms of the Present
Plains, Plateaus, and Mesas
Delaware Water Gap NRA

Fort Necessity National Battlefield
Obed Wild and Scenic River
Russell Cave NM
Upper Delaware Scenic and Recreational River

Cuestas and Hogbacks
Delaware Water Gap NRA

Mountain Systems
Big South Fork National River and Recreation Area
Cumberland Gap NHP
Delaware Water Gap NRA
New River Gorge National River
Obed Wild and Scenic River
Upper Delaware Scenic and Recreational River

Sculpture of the Land
Big South Fork National River and Recreation Area
Cumberland Gap NHP
Delaware Water Gap NRA
New River Gorge National River
Upper Delaware Scenic and Recreational River

River Systems and Lakes
Big South Fork National River and Recreation Area
Cuyahoga Valley NRA
Delaware Water Gap NRA
Johnstown Flood National Memorial
New River Gorge National River
Obed Wild and Scenic River
Upper Delaware Scenic and Recreational River

Works of Glaciers
Delaware Water Gap NRA

Seashores, Lakeshores, and Islands
Delaware Water Gap NRA
Upper Delaware Scenic and Recreational River

Caves and Springs
Big South Fork National River and Recreation Area
Chesapeake and Ohio Canal NHP
Delaware Water Gap NRA
New River Gorge National River
Russell Cave NM
Upper Delaware Scenic and Recreational River

Geologic History
Cambrian-Early Silurian Periods
Delaware Water Gap NRA

Late Silurian-Devonian Periods
Cuyahoga Valley NRA
Cuyahoga Valley NRA
Delaware Water Gap NRA
Upper Delaware Scenic and Recreational River

Mississippian-Permian Periods
Big South Fork National River and Recreation Area
Cuyahoga Valley NRA
Fort Necessity National Battlefield
Friendship Hill NHS
New River Gorge National River

Oligocene-Recent Epochs
Delaware Water Gap NRA
Friendship Hill NHS
Upper Delaware Scenic and Recreational River

Land Ecosystems
Eastern Deciduous Forest
Big South Fork National River and Recreation Area
Cumberland Gap NHP
Cuyahoga Valley NRA
Delaware Water Gap NRA
Fort Necessity National Battlefield
Friendship Hill NHS
Johnstown Flood National Memorial
New River Gorge National River
Obed Wild and Scenic River

Russell Cave NM
Upper Delaware Scenic and Recreational River

Aquatic Ecosystems
Underground Systems
Russell Cave NM

Lakes and Ponds
Delaware Water Gap NRA
Upper Delaware Scenic and Recreational River

Streams
Big South Fork National River and Recreation Area
Cumberland Gap NHP
Cuyahoga Valley NRA
Delaware Water Gap NRA
Fort Necessity National Battlefield
Johnstown Flood National Memorial
New River Gorge National River
Obed Wild and Scenic River
Russell Cave NM

APPALACHIAN RANGES

Landforms of the Present
Mountain Systems
Blue Ridge Parkway
Carl Sandburg Home NHS
Catoctin Mountain Park
Catoctin Mountain Park
Chesapeake and Ohio Canal NHP
Chickamauga and Chattanooga NMP
Cumberland Gap NHP
Delaware Water Gap NRA
Great Smoky Mountains National Park
Harpers Ferry NHP
Obed Wild and Scenic river
Shenandoah National Park
Upper Delaware Scenic and Recreational River

Sculpture of the Land
Catoctin Mountain Park
Chesapeake and Ohio Canal NHP
Cumberland Gap NHP
Cumberland Gap NHP
Delaware Water Gap NRA
Upper Delaware Scenic and Recreational River

Eolian Landforms
Saratoga NHP

River Systems and Lakes
Antietam National Battlefield
Catoctin Mountain Park
Chesapeake and Ohio Canal NHP
Delaware Water Gap NRA
Eleanor Roosevelt NHS
Great Smoky Mountains National Park
Harpers Ferry NHP
Home of Franklin D. Roosevelt NHS
Obed Wild and Scenic River
Upper Delaware Scenic and Recreational River

Works of Glaciers
Delaware Water Gap NRA

Seashores, Lakeshores, and Islands
Delaware Water Gap NRA
Upper Delaware Scenic and Recreational River

Caves and Springs
Antietam National Battlefield
Catoctin Mountain park
Chesapeake and Ohio Canal NHP
Delaware Water Gap NRA
Great Smoky Mountains National Park
Harpers Ferry NHP
Shenandoah National Park
Upper Delaware Scenic and Recreational River

Geologic History
Precambrian Era
Catoctin Mountain Park
Hopewell Furnace NHS
Shenandoah National Park

Cambrian-Early Silurian Periods
Antietam National Battlefield
Catoctin Mountain Park
Chesapeake and Ohio Canal NHP
Delaware Water Gap NRA
Harpers Ferry NHP
Hopewell Furnace NHS
Shenandoah National Park

Late Silurian-Devonian Periods
Chesapeake and Ohio Canal NHP
Delaware Water Gap NRA
Shenandoah National Park
Upper Delaware Scenic and Recreational River

Mississippian - Permian Periods
Shenandoah National Park

Triassic-Cretaceous Periods
Hopewell Furnace NHS

Paleocene-Eocene Epochs
Eleanor Roosevelt NHS
Home of Franklin D. Roosevelt NHS
Saratoga NHP

Oligocene-Recent Epochs
Chesapeake and Ohio Canal NHP
Delaware Water Gap NRA
Upper Delaware Scenic and Recreational River

Land Ecosystems
Boreal Forest
Great Smoky Mountains National Park

Eastern Deciduous Forest
Antietam National Battlefield
Blue Ridge Parkway
Carl Sandburg Home NHS
Catoctin Mountain Park
Chesapeake and Ohio Canal NHP
Chickamauga and Chattanooga NMP
Cumberland Gap NHP
Delaware Water Gap NRA
Eleanor Roosevelt NHS
Harpers Ferry NHP
Home of Franklin D. Roosevelt NHS
Hopewell Furnace NHS
Obed Wild and Scenic River
Saratoga NHP
Shenandoah National Park
Vanderbilt Mansion NHS
Upper Delaware Scenic and Recreational River

Aquatic Ecosystems
Underground Systems
Vanderbilt Mansion NHS

Lakes and Ponds
Catoctin Mountain Park
Delaware Water Gap NRA
Home of Franklin D. Roosevelt NHS
Saratoga NHP
Shenandoah National Park
Upper Delaware Scenic and Recreational River

Streams
Antietam National Battlefield
Blue Ridge Parkway
Carl Sandburg Home NHS
Catoctin Mountain Park
Chesapeake and Ohio Canal NHP
Chickamauga and Chattanooga NMP
Cumberland Gap NHP
Delaware Water Gap NRA
Eleanor Roosevelt NHS
Great Smoky Mountains National Park
Harpers Ferry NHP
Home of Franklin D. Roosevelt NHS
Hopewell Furnace NHS
Obed Wild and Scenic River
Saratoga NHP
Shenandoah National Park
Upper Delaware Scenic and Recreational River

PIEDMONT

Landforms of the Present

Plains, Plateaus, and Mesas
- *Chattahoochee River NRA*
- *Cowpens National Battlefield*
- *Guilford Courthouse NMP*
- *Horseshoe Bend NMP*
- *Kings Mountain NMP*
- *Ninety-Six NHS*
- *Ocmulgee NM*

Works of Volcanism
- *George Washington MP*
- *Prince William Forest Park*
- *Rock Creek Park*
- *Theodore Roosevelt Island*
- *National Capital Parks*

Sculpture of the Land
- *Chesapeake and Ohio Canal NHP*
- *George Washington MP*
- *National Capital Parks*
- *Prince William Forest Park*
- *Rock Creek Park*

River Systems and Lakes
- *Chattahoochee River NRA*
- *Chesapeake and Ohio Canal NHP*
- *George Washington MP*
- *National Capital Parks*
- *Manassas National Battlefield Park*
- *Monocacy National Battlefield*
- *Prince William Forest Park*
- *Rock Creek Park*
- *Wolf Trap Farm Park for the Performing Arts*

Seashores, Lakeshores, and Islands
- *Chesapeake and Ohio Canal NHP*
- *George Washington MP*

Caves and Springs
- *National Capital Parks*
- *Chesapeake and Ohio Canal NHP*
- *George Washington MP*
- *National Capital Parks*
- *Manassas National Battlefield Park*
- *National Capital Parks*
- *Prince William Forest Park*
- *Rock Creek Park*
- *Valley Forge NHP*
- *National Capital Parks*
- *Wolf Trap Farm Park for the Performing Arts*

Geologic History

Precambrian Era
- *Chesapeake and Ohio Canal NHP*
- *George Washington MP*
- *National Capital Parks*
- *Hopewell Furnace NHS*
- *Prince William Forest Park*
- *Rock Creek Park*
- *Theodore Roosevelt Island*
- *National Capital Parks*

Cambrian-Early Silurian Periods
- *Chesapeake and Ohio Canal NHP*
- *Hopewell Furnace NHS*
- *Monocacy National Battlefield*
- *Prince William Forest Park*
- *Rock Creek Park*
- *Valley Forge NHP*
- *Wolf Trap Farm Park for the Performing Arts*

Late Silurian-Devonian Periods
- *Chesapeake and Ohio Canal NHP*
- *George Washington MP*
- *Rock Creek Park*

Triassic-Cretaceous Periods
- *Chesapeake and Ohio Canal NHP*
- *George Washington MP*
- *Gettysburg NMP*
- *Hopewell Furnace NHS*
- *Manassas National Battlefield Park*
- *Valley Forge NHP*

Paleocene-Eocene Epochs
- *Prince William Forest Park*

Oligocene-Recent Epochs
AppomattoxCourt House NHP
Chesapeake and Ohio Canal NHP
George Washington MP
National Capital Parks
Prince William Forest Park
Rock Creek Park
Wolf Trap Farm Park for the Performing Arts

Land Ecosystems
Eastern Deciduous Forest
Booker T. Washington NM
Chattahoochee River NRA
Chesapeake and Ohio Canal NHP
Cowpens National Battlefield
Eisenhower NHS
Fredericksburg and Spotsylvania County Battlefields Memorial NMP
George Washington MP
Gettysburg NMP
National Capital Parks
Guilford Courthouse NMP
Hopewell Furnace NHS
Horseshoe Bend NMP
Kennesaw Mountain National Battlefield Park
Kings Mountain NMP
Manassas National Battlefield Park
Monocacy National Battlefield
Ninety-Six NHS
Ocmulgee NM
Prince William Forest Park
Rock Creek Park
Theodore Roosevelt Island
Valley Forge NHP
National Capital Parks
Wolf Trap Farm Park for the Performing Arts

Aquatic Ecosystems
Estuaries
George Washington MP

Lakes and Ponds
Chesapeake and Ohio Canal NHP
George Washington MP
Gettysburg NMP
Prince William Forest Park
Rock Creek Park
Wolf Trap Farm Park for the Performing Arts

Streams
Booker T. Washington NM
Chattahoochee River NRA
Chesapeake and Ohio Canal NHP
Cowpens National Battlefield
Eisenhower NHS
Fredericksburg and Spotsylvania County Battlefields Memorial NMP
George Washington MP
Gettysburg NMP
National Capital Parks
Guilford Courthouse NMP
Hopewell Furnace NHS
Horseshoe Bend NMP
Kennesaw Mountain National Battlefield Park
Kings Mountain NMP
Manassas National Battlefield Park
Monocacy National Battlefield
Ninety-Six NHS
Ocmulgee NM
Prince William Forest Park
Rock Creek Park
Valley Forge NHP
National Capital Parks
Wolf Trap Farm Park for the Performing Arts

NEW ENGLAND - ADIRONDACKS

Landforms of the Present
Mountain Systems
Acadia National Park

Sculpture of the Land
Acadia National Park

Eolian Landforms
Minute Man NHP

River Systems and Lakes
Acadia National Park
Eleanor Roosevelt NHS
Minute Man NHP
Saint-Gaudens NHS

Works of Glaciers
Acadia National Park

Seashores, Lakeshores, and Islands
Acadia National Park

Caves and Springs
Acadia National park

Geologic History
*Precambrian Era

*Triassic-Cretaceous Periods

*Paleocene-Eocene Epochs
Acadia National Park
Eleanor Roosevelt NHS
Minute Man NHS
Morristown NHP
Saint-Gaudens NHS
Saratoga NHP

Land Ecosystems
Boreal Forest
Acadia National Park

Eastern Deciduous Forest
Acadia National Park
Eleanor Roosevelt NHS
Minute Man NHP
Morristown NHP
Saint-Gaudens NHS

Aquatic Ecosystems
Marine Environments
Acadia National Park

Estuaries
Acadia National Park

Lakes and Ponds
Acadia National Park
Eleanor Roosevelt NHS
Minute Man NHP
Morristown NHP
Saint-Gaudens NHS

Streams
Acadia National Park
Eleanor Roosevelt NHS
Minute Man NHP
Morristown NHP
Saint-Gaudens NHS

ATLANTIC COASTAL PLAIN

Landforms of the Present
Plains, Plateaus, and Mesas
Congaree Swamp NM

Sculpture of the Land
Cape Cod NS
Chesapeake and Ohio Canal NHP
Fire Island NS
Fort Washington Park
Gateway NRA
George Washington MP
National Capital Parks
Piscataway Park
Prince William Forest Park
Rock Creek Park

Eolian Landforms
Assateague Island NS
Cape Hatteras NS
Cape Cod NS
Cumberland Island NS
Fire Island NS
Fort Frederica NM
Fort Pulaski NM
Gateway NRA
Wright Brothers National Memorial

River Systems and Lakes
National Capital Parks
Cape Cod NS
Chesapeake and Ohio Canal NHP

Colonial NHP
Congaree Swamp NM
Fort Washington Park
Fort Sumter NM
Fredericksburg and Spotsylvania County Battlefields Memorial NMP
George Washington MP
George Washington Birthplace NM
Greenbelt Park
National Capital Parks
Piscataway Park
Prince William Forest Park
Richmond National Battlefield Park
Rock Creek Park
Theodore Roosevelt Island
Thomas Stone NHS

Works of Glaciers
Fire Island NS

Seashores, Lakeshores, and Islands
Assateague Island NS
Cape Lookout NS
Cape Hatteras NS
Cape Cod NS
Cumberland Island NS
Fire Island NS
Fort Pulaski NM
Fort Raleigh NHS
Fort Frederica NM
Fort Caroline National Memorial
Gateway NRA
Theodore Roosevelt Island

Caves and Springs
Chesapeake and Ohio Canal NHP
Fort Washington Park
George Washington MP
Greenbelt Park
National Capital Parks
Prince William Forest Park
Theodore Roosevelt Island

Geologic History
Precambrian Era
Petersburg National Battlefield
Prince William Forest Park
Theodore Roosevelt Island

Cambrian-Early Silurian Periods
Prince William Forest Park

*Late Silurian-Devonian Periods

Triassic-Cretaceous Periods
National Capital Parks
Fort Washington Park
George Washington MP
Greenbelt Park
National Capital Parks
Petersburg National Battlefield
Prince William Forest Park

Paleocene-Eocene Epochs
Cape Cod NS
Fort Washington Park
Petersburg National Battlefield
Piscataway Park

Oligocene-Recent Epochs
National Capital Parks
Cape Lookout NS
Cape Cod NS
Chesapeake and Ohio Canal NHP
Colonial NHP
Cumberland Island NS
Fire Island NS
Fort Caroline National Memorial
Fort Pulaski NM
Fort Washington Park
Fort Frederica NM
Fort Raleigh NHS
Gateway NRA
George Washington Birthplace NM
George Washington MP
Greenbelt Park
Piscataway Park
Prince William Forest Park
Rock Creek Park
Theodore Roosevelt Island
Theodore Roosevelt Island
Wright Brothers National Memorial

Land Ecosystems

Eastern Deciduous Forest

Assateague Island NS
National Capital Parks
Cape Lookout NS
Cape Hatteras NS
Cape Cod NS
Chesapeake and Ohio Canal NHP
Colonial NHP
Congaree Swamp NM
Cumberland Island NS
Fire Island NS
Fort Frederica NM
Fort Pulaski NM
Fort Caroline National Memorial
Fort Raleigh NHS
Fort Washington Park
Fredericksburg and Spotsylvania County Battlefields Memorial NMP
Gateway NRA
George Washington Birthplace NM
George Washington MP
Greenbelt Park
Greenbelt Park
National Capital Parks
Petersburg National Battlefield
Piscataway Park
Prince William Forest Park
Richmond National Battlefield Park
Rock Creek Park
Theodore Roosevelt Island
Thomas Stone NHS
Wright Brothers National Memorial

Aquatic Ecosystems

Marine Environments

Assateague Island NS
Cape Lookout NS
Cape Hatteras NS
Cape Cod NS
Cumberland Island NS
Fire Island NS
Fort Pulaski NM
Fort Raleigh NHS
Fort Frederica NM
Gateway NRA

Estuaries

Assateague Island NS
Cape Hatteras NS
Cape Lookout NS
Cape Cod NS
Colonial NHP
Cumberland Island NS
Fire Island NS
Fort Caroline National Memorial
Fort Frederica NM
Fort Pulaski NM
Fort Sumter NM
Fort Washington Park
Fort Raleigh NHS
Gateway NRA
George Washington Birthplace NM
George Washington MP
Piscataway Park
Theodore Roosevelt Island
Thomas Stone NHS

Lakes and Ponds

National Capital Parks
Cape Lookout NS
Cape Hatteras NS
Cape Cod NS
Congaree Swamp NM
Fire Island NS
Fort Raleigh NHS
Fort Frederica NM
Fort Pulaski NM
Fort Sumter NM
Gateway NRA
George Washington MP
Greenbelt Park
National Capital Parks
Piscataway Park
Prince William Forest Park
Theodore Roosevelt Island

Streams

National Capital Parks
Cape Cod NS
Chesapeake and Ohio Canal NHP
Colonial NHP
Congaree Swamp NM
Cumberland Island NS

Fire Island NS
Fort Caroline National Memorial
Fort Pulaski NM
Fort Frederica NM
Fort Washington Park
Fredericksburg and Spotsylvania County Battlefields Memorial NMP
George Washington MP
George Washington Birthplace NM
Greenbelt Park
National Capital Parks
Petersburg National Battlefield
Piscataway Park
Piscataway Park
Prince William Forest Park
Richmond National Battlefield Park
Theodore Roosevelt Island

GULF COASTAL PLAIN

Landforms of the Present
Plains, Plateaus, and Mesas
Natchez Trace Parkway
San Antonio Missions NHP
Shiloh NMP

*Cuestas and Hogbacks

Eolian Landforms
Gulf Islands NS
Padre Island NS

River Systems and Lakes
Arkansas Post National Memorial
Big Thicket National Preserve
Jean Lafitte NHP and Preserve
San Antonio Missions NHP
Vicksburg NMP

Seashores, Lakeshores, and Islands
Arkansas Post National Memorial
Big Thicket National Preserve
Gulf Islands NS
Jean Lafitte NHP and Preserve
Padre Island NS

Caves and Springs
Arkansas Post National Memorial
Big Thicket National Preserve
Padre Island NS

Geologic History
*Triassic-Cretaceous Periods

Paleocene-Eocene Epochs
Arkansas Post National Memorial
San Antonio Missions NHP

Oligocene-Recent Epochs
Big Thicket National Preserve
Gulf Islands NS
Jean Lafitte NHP and Preserve
Padre Island NS

Land Ecosystems
Eastern Deciduous Forest
Arkansas Post National Memorial
Big Thicket National Preserve
Gulf Islands NS
Jean Lafitte NHP and Preserve
Natchez Trace Parkway
Padre Island NS
Shiloh NMP
Vicksburg NMP

Grassland
San Antonio Missions NHP

Aquatic Ecosystems
Marine Environments
Gulf Islands NS
Jean Lafitte NHP and Preserve
Padre Island NS

Estuaries
Big Thicket National Preserve
Gulf Islands NS
Jean Lafitte NHP and Preserve

Lakes and Ponds
Arkansas Post National Memorial
Big Thicket National Preserve
Gulf Islands NS

Jean Lafitte NHP and Preserve
Padre Island NS

Streams
Arkansas Post National Memorial
Big Thicket National Preserve
Jean Lafitte NHP and Preserve
Natchez Trace Parkway
Padre Island NS
San Antonio Missions NHP
Shiloh NMP
Vicksburg NMP

FLORIDA PENINSULA

Landforms of the Present
Plains, Plateaus, and Mesas
Everglades National Park

Eolian Landforms
Canaveral NS
Fort Matanzas NM

River Systems and Lakes
Big Cypress National Preserve
Everglades National Park

Seashores, Lakeshores, and Islands
Biscayne National Park
Canaveral NS
Everglades National Park
Fort Jefferson NM
Fort Matanzas NM

Coral Islands, Reefs, and Atolls
Biscayne National park
Fort Jefferson NM

*Caves and Springs

Geologic History
Oligocene-Recent Epochs
Canaveral NS
Fort Jefferson NM
Fort Matanzas NM

Land Ecosystems
Eastern Deciduous Forest
Canaveral NS
Fort Matanzas NM

Tropical Ecosystems
Big Cypress National Preserve
Biscayne National Park
Everglades National Park

Aquatic Ecosystems
Marine Environments
Biscayne National Park
Canaveral NS
Everglades National Park
Fort Jefferson NM
Fort Matanzas NM

Estuaries
Big Cypress National Preserve
Biscayne National Park
Canaveral NS
Everglades National Park
Fort Jefferson NM
Fort Matanzas NM

Lakes and Ponds
Big Cypress National Preserve
Canaveral NS
Everglades National Park
Fort Matanzas NM

Streams
Big Cypress National Preserve
Biscayne National Park
Everglades National Park
Fort Matanzas NM

HAWAIIAN ISLANDS

Landforms of the Present
Mountain Systems
Haleakala National Park
Hawaii Volcanoes National Park
Kalaupapa NHP

Works of Volcanism
Haleakala National Park

Kalaupapa NHP
Kaloko-Honokohau NHP
Pu'uhonua o Honaunau NHP

Hot Water Phenomena
Hawaii Volcanoes National Park

Sculpture of the Land
Haleakala National Park
Hawaii Volcanoes National Park
Kalaupapa NHP

Eolian Landforms
Haleakala National Park
Hawaii Volcanoes National Park
Kalaupapa NHP
Kaloko-Honokohau NHP

River Systems and Lakes
Haleakala National Park
Kalaupapa NHP

*Works of Glaciers

Seashores, Lakeshores, and Islands
Haleakala National Park
Hawaii Volcanoes National Park
Kalaupapa NHP
Kaloko-Honokohau NHP
Pu'uhonua o Honaunau NHP

Coral Islands, Reefs, and Atolls
Kalaupapa NHP
Kaloko-Honokohau NHP

Caves and Springs
Haleakala National Park
Hawaii Volcanoes National Park
Kalaupapa NHP
Kaloko-Honokohau NHP
Pu'uhonua o Honaunau NHP

Geologic History
Oligocene-Recent Epochs
Haleakala National Park
Hawaii Volcanoes National Park
Kalaupapa NHP
Kaloko-Honokohau NHP
Pu'uhonua o Honaunau NHP

Land Ecosystems
Tropical Ecosystems
Haleakala National Park
Hawaii Volcanoes National Park
Kalaupapa NHP
Kaloko-Honokohau NHP
Pu'uhonua o Honaunau NHP

Aquatic Ecosystems
Marine Environments
Haleakala National Park
Hawaii Volcanoes National Park
Kalaupapa NHP
Kaloko-Honokohau NHP
Pu'uhonua o Honaunau NHP

*Estuaries

Lakes and Ponds
Haleakala National Park
Kalaupapa NHP
Kaloko-Honokohau NHP

Streams
Haleakala National Park
Hawaii Volcanoes National Park
Kalaupapa NHP

PACIFIC MOUNTAIN SYSTEM

Landforms of the Present
*Plains, Plateaus, and Mesas

Mountain Systems
Aniakchak NM and Preserve
Denali National Park and Preserve
Glacier Bay National Park and Preserve
Katmai National Park and Preserve
Kenai Fjords National Park
Klondike Gold Rush NHP
Lake Clark National Park and Preserve
Wrangell-St. Elias National Park and Preserve

Works of Volcanism
Aniakchak NM and Preserve
Denali National Park and Preserve
Katmai National Park and Preserve
Lake Clark National Park and Preserve
Wrangell-St. Elias National Park and Preserve

Hot Water Phenomena
Aniakchak NM and Preserve
Katmai National Park and Preserve
Wrangell-St. Elias National Park and Preserve

Sculpture of the Land
Aniakchak NM and Preserve
Denali National Park and Preserve
Glacier Bay National Park and Preserve
Katmai National Park and Preserve
Kenai Fjords National Park
Klondike Gold Rush NHP
Lake Clark National Park and Preserve
Wrangell-St. Elias National Park and Preserve

Eolian Landforms
Wrangell-St. Elias National Park and Preserve

River Systems and Lakes
Aniakchak NM and Preserve
Denali National Park and Preserve
Glacier Bay National Park and Preserve
Katmai National Park and Preserve
Kenai Fjords National Park
Klondike Gold Rush NHP
Lake Clark National Park and Preserve
Sitka NHP
Wrangell-St. Elias National Park and Preserve

Works of Glaciers
Aniakchak NM and Preserve
Denali National Park and Preserve
Glacier Bay National Park and Preserve
Katmai National Park and Preserve
Kenai Fjords National Park
Klondike Gold Rush NHP
Lake Clark National Park and Preserve
Wrangell-St. Elias National Park and Preserve

Seashores, Lakeshores, and Islands
Aniakchak NM and Preserve
Denali National Park and Preserve
Glacier Bay National Park and Preserve
Katmai National Park and Preserve
Kenai Fjords National Park
Lake Clark National Park and Preserve
Sitka NHP
Wrangell-St. Elias National Park and Preserve

Caves and Springs
Aniakchak NM and Preserve
Katmai National Park and Preserve
Wrangell-St. Elias National Park and Preserve

Geologic History
Precambrian Era
Denali National Park and Preserve

Cambrian-Early Silurian Periods
Denali National Park and Preserve
Glacier Bay National Park and Preserve
Wrangell-St. Elias National Park and Preserve

Late Silurian-Devonian Periods
Denali National Park and Preserve
Glacier Bay National Park and Preserve
Wrangell-St. Elias National Park and Preserve

Mississippian-Permian Periods
Denali National Park and Preserve

Glacier Bay National Park and Preserve
Wrangell-St. Elias National Park and Preserve

Triassic-Cretaceous Periods
Aniakchak NM and Preserve
Denali National Park and Preserve
Glacier Bay National Park and Preserve
Katmai National Park and Preserve
Kenai Fjords National Park
Klondike Gold Rush NHP
Lake Clark National Park and Preserve
Sitka NHP
Wrangell-St. Elias National Park and Preserve

Paleocene-Eocene Epochs
Aniakchak NM and Preserve
Denali National Park and Preserve
Glacier Bay National Park and Preserve
Katmai National Park and Preserve
Kenai Fjords National Park
Klondike Gold Rush NHP
Lake Clark National Park and Preserve
Sitka NHP
Wrangell-St. Elias National Park and Preserve

Oligocene-Recent Epochs
Aniakchak NM and Preserve
Denali National Park and Preserve
Glacier Bay National Park and Preserve
Katmai National Park and Preserve
Kenai Fjords National Park
Klondike Gold Rush NHP
Lake Clark National Park and Preserve
Sitka NHP
Wrangell-St. Elias National Park and Preserve

Land Ecosystems
Tundra
Aniakchak NM and Preserve
Denali National Park and Preserve
Glacier Bay National Park and Preserve
Katmai National Park and Preserve
Kenai Fjords National Park
Klondike Gold Rush NHP
Lake Clark National Park and Preserve
Wrangell-St. Elias National Park and Preserve

Boreal Forest
Denali National Park and Preserve
Katmai National Park and Preserve
Kenai Fjords National Park
Lake Clark National Park and Preserve
Wrangell-St. Elias National Park and Preserve

Pacific Forest
Glacier Bay National Park and Preserve
Katmai National Park and Preserve
Kenai Fjords National Park
Klondike Gold Rush NHP
Lake Clark National Park and Preserve
Sitka NHP
Wrangell-St. Elias National Park and Preserve

Aquatic Ecosystems
Marine Environments
Aniakchak NM and Preserve
Glacier Bay National Park and Preserve
Katmai National Park and Preserve
Kenai Fjords National Park
Klondike Gold Rush NHP
Lake Clark National Park and Preserve
Sitka NHP
Wrangell-St. Elias National Park and Preserve

Estuaries
Aniakchak NM and Preserve
Glacier Bay National Park and Preserve
Katmai National Park and Preserve

Kenai Fjords National Park
Lake Clark National Park and Preserve
Sitka NHP
Wrangell-St. Elias National Park and Preserve

Underground Systems
Wrangell-St. Elias National Park and Preserve

Lakes and Ponds
Aniakchak NM and Preserve
Denali National Park and Preserve
Glacier Bay National Park and Preserve
Katmai National Park and Preserve
Kenai Fjords National Park
Klondike Gold Rush NHP
Lake Clark National Park and Preserve
Wrangell-St. Elias National Park and Preserve

Streams
Aniakchak NM and Preserve
Denali National Park and Preserve
Glacier Bay National Park and Preserve
Katmai National Park and Preserve
Kenai Fjords National Park
Klondike Gold Rush NHP
Lake Clark National Park and Preserve
Sitka NHP
Wrangell-St. Elias National Park and Preserve

INTERIOR AND WESTERN ALASKA

Landforms of the Present
Plains, Plateaus, and Mesas

Mountain Systems
Bering Land Bridge National Preserve
Denali National Park and Preserve
Yukon-Charley Rivers National Preserve

Works of Volcanism
Bering Land Bridge National Preserve
Denali National Park and Preserve

Hot Water Phenomena
Bering Land Bridge National Preserve

Sculpture of the Land
Bering Land Bridge National Preserve
Denali National Park and Preserve
Yukon-Charley Rivers National Preserve

Eolian Landforms
Bering Land Bridge National Preserve

River Systems and Lakes
Bering Land Bridge National Preserve
Denali National Park and Preserve
Yukon-Charley Rivers National Preserve

Works of Glaciers
Bering Land Bridge National Preserve
Denali National Park and Preserve
Yukon-Charley Rivers National Preserve

Seashores, Lakeshores, and Islands
Bering Land Bridge National Preserve
Denali National Park and Preserve
Yukon-Charley Rivers National Preserve

Caves and Springs
Bering Land Bridge National Preserve

Geologic History
Precambrian Era
Bering Land Bridge National Preserve
Denali National Park and Preserve
Yukon-Charley Rivers National Preserve

Cambrian-Early Silurian Periods
Bering Land Bridge National Preserve
Denali National Park and Preserve

Yukon-Charley Rivers National Preserve

Late Silurian-Devonian Periods
Denali National Park and Preserve
Yukon-Charley Rivers National Preserve

Mississippian-Permian Periods
Denali National Park and Preserve
Yukon-Charley Rivers National Preserve

Triassic-Cretaceous Periods
Bering Land Bridge National Preserve
Denali National Park and Preserve
Yukon-Charley Rivers National Preserve

Paleocene-Eocene Epochs
Denali National Park and Preserve
Yukon-Charley Rivers National Preserve

Oligocene-Recent Epochs
Bering Land Bridge National Preserve
Denali National Park and Preserve
Yukon-Charley Rivers National Preserve

Land Ecosystems
Tundra
Bering Land Bridge National Preserve
Denali National Park and Preserve
Yukon-Charley Rivers National Preserve

Boreal Forest
Denali National Park and Preserve
Yukon-Charley Rivers National Preserve

Aquatic Ecosystems
Marine Environments
Bering Land Bridge National Preserve

Estuaries
Bering Land Bridge National Preserve

Lakes and Ponds
Bering Land Bridge National Preserve
Denali National Park and Preserve
Yukon-Charley Rivers National Preserve

Streams
Bering Land Bridge National Preserve
Denali National Park and Preserve
Yukon-Charley Rivers National Preserve

BROOKS RANGE

Landforms of the Present
Mountain Systems
Cape Krusenstern NM
Gates of the Arctic National Park and Preserve
Kobuk Valley National Park
Noatak National Preserve

Hot Water Phenomena
Gates of the Arctic National Park and Preserve

Sculpture of the Land
Cape Krusenstern NM
Gates of the Arctic National Park and Preserve
Kobuk Valley National Park
Noatak National Preserve

Eolian Landforms
Cape Krusenstern NM
Gates of the Arctic National Park and Preserve
Kobuk Valley National Park

River Systems and Lakes
Cape Krusenstern NM
Gates of the Arctic National Park and Preserve

Kobuk Valley National Park
Noatak National Preserve

Works of Glaciers
Cape Krusenstern NM
Gates of the Arctic National Park and Preserve
Kobuk Valley National Park
Noatak National Preserve

Seashores, Lakeshores, and Islands
Cape Krusenstern NM
Gates of the Arctic National Park and Preserve
Kobuk Valley National Park
Noatak National Preserve

Caves and Springs
Gates of the Arctic National Park and Preserve

Geologic History
Precambrian Era
Noatak National Preserve

Cambrian-Early Silurian Periods
Noatak National Preserve

Late Silurian-Devonian Periods
Cape Krusenstern NM
Gates of the Arctic National Park and Preserve
Noatak National Preserve

Mississippian-Permian Periods
Cape Krusenstern NM
Noatak National Preserve

Triassic-Cretaceous Periods
Gates of the Arctic National Park and Preserve
Kobuk Valley National Park
Noatak National Preserve

Paleocene-Eocene Epochs
Noatak National Preserve

Oligocene-Recent Epochs
Cape Krusenstern NM
Gates of the Arctic National Park and Preserve
Kobuk Valley National Park
Noatak National Preserve

Land Ecosystems
Tundra
Cape Krusenstern NM
Gates of the Arctic National Park and Preserve
Kobuk Valley National Park
Noatak National Preserve

Boreal Forest
Cape Krusenstern NM
Gates of the Arctic National Park and Preserve
Kobuk Valley National Park
Noatak National Preserve

Aquatic Ecosystems
Marine Environments
Cape Krusenstern NM

Estuaries
Cape Krusenstern NM

Lakes and Ponds
Cape Krusenstern NM
Gates of the Arctic National Park and Preserve
Kobuk Valley National Park
Noatak National Preserve

Streams
Cape Krusenstern NM
Gates of the Arctic National Park and Preserve
Kobuk Valley National Park
Noatak National Preserve

ARCTIC LOWLAND

Landforms of the Present
*Plains, Plateaus, and Mesas

*River Systems and Lakes

*Seashores, Lakeshores, and Islands

Geologic History
*Triassic-Cretaceous Periods

*Oligocene-Recent Epochs

Land Ecosystems
*Tundra

Aquatic Ecosystems
*Marine Environments

*Estuaries

*Lakes and Ponds

*Streams

VIRGIN ISLANDS

Landforms of the Present
Mountain Systems
Virgin Islands National Park

Works of Volcanism
Virgin Islands National Park

Seashores, Lakeshores, and Islands
Buck Island Reef NM
Virgin Islands National Park

Coral Islands, Reefs, and Atolls
Buck Island Reef NM
Virgin Islands National Park

Geologic History
Paleocene-Eocene Epochs
Virgin Islands National Park

Oligocene-Recent Epochs
Buck Island Reef NM
Virgin Islands National Park

Land Ecosystems
Tropical Ecosystems
Buck Island Reef NM
Virgin Islands National Park

Aquatic Ecosystems
Marine Environments
Buck Island Reef NM
Virgin Islands National Park

Estuaries
Virgin Islands National Park

PUERTO RICO

Landforms of the Present
*Plains, Plateaus, and Mesas

*Mountain Systems

*Works of Volcanism

*River Systems and Lakes

*Seashores, Lakeshores, and Islands

*Coral Islands, Reefs, and Atolls

*Caves and Springs

Geologic History
*Paleocene-Eocene Epochs

Land Ecosystems
*Tropical Ecosystems

Aquatic Ecosystems
*Marine Environments

*Estuaries

*Streams

GUAM

Landforms of the Present
*Plains, Plateaus, and Mesas

*Mountain Systems

*Works of Volcanism

*River Systems and Lakes

Seashores, Lakeshores, and Islands
War in The Pacific NHP

Coral Islands, Reefs, and Atolls
War in The Pacific NHP

Caves and Springs
War in The Pacific NHP

Geologic History
Oligocene-Recent Epochs
War in The Pacific NHP

Land Ecosystems
Tropical Ecosystems
War in The Pacific NHP

Aquatic Ecosystems
Marine Environments
War in The Pacific NHP

*Estuaries

*Streams

AMERICAN SAMOA

Landforms of the Present
*Mountain Systems

*Works of Volcanism

River Systems and Lakes
American Memorial Park

Seashores, Lakeshores, and Islands
American Memorial Park

*Coral Islands, Reefs, and Atolls

Caves and Springs
American Memorial Park

Geologic History
Oligocene-Recent Epochs
American Memorial Park

Land Ecosystems
Tropical Ecosystems
American Memorial Park

Aquatic Ecosystems
*Marine Environments

*Estuaries

Lakes and Ponds
American Memorial Park

THE TRUST TERRITORIES

Landforms of the Present
*Mountain Systems

*Works of Volcanism

*Seashores, Lakeshores, and Islands

*Coral Islands, Reefs, and Atolls

Geologic History
*Oligocene-Recent Epochs

Land Ecosystems
*Tropical Ecosystems

Aquatic Ecosystems
*Marine Environments

*Estuaries
Redwood National Park

*Works of Volcanism
Olympic National Park
Point Reyes NS

Sculpture of the Land
Golden lake NRA
Olympic National Park
Point Reyes NS
Redwood National Park

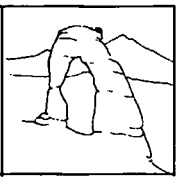
*Eolian Landforms
Point Reyes NS

River Systems and Lakes
Golden Lake NRA
Olympic National Park
Point Reyes NS
Redwood National Park

Works of Glaciers
Olympic National Park

*Seashores, Lakeshores, and Islands

THEMATIC REPRESENTATION: NATIONAL NATURAL LANDMARKS



NORTH PACIFIC BORDER

Landforms of the Present
*Mountain Systems

*Works of Volcanism

*Eolian Landforms

*River Systems and Lakes

*Works of Glaciers

Seashores, Lakeshores, and Islands
Point of Arches, WA

*Caves and Springs

Geologic History
*Triassic-Cretaceous Periods

*Paleocene-Eocene Epochs

Land Ecosystems
*Tundra

*Boreal Forest

Pacific Forest
Point of Arches, WA
Pygmy Forest, CA

Dry Coniferous Forest
Audubon Canyon Ranch, CA
Elder Creek, CA

Grassland
Mima Mounds, WA

*Chaparral

Aquatic Ecosystems
Marine Environments
Point of Arches, WA

*Estuaries

*Lakes and Ponds

Streams
Elder Creek, CA
Nisqually Delta, WA

SOUTH PACIFIC BORDER

Landforms of the Present
Mountain Systems
Mt. Diablo State Park, CA
San Andreas Fault, CA

Works of Volcanism
Mt. Diablo State Park, CA

Sculpture of the Land
Anza-Borrego Desert State Park, CA

Eolian Landforms
Nipomo Dunes-Point Sal Coastal Area, CA

*River Systems and Lakes

* Not Represented

Seashores, Lakeshores, and Islands
Ano Nuevo Point and Island, CA
Nipomo Dunes-Point Sal Coastal Area, CA
Point Lobos, CA
Torrey Pines State Reserve, CA

Geologic History
Triassic-Cretaceous Periods
Mt. Diablo State Park, CA

Oligocene-Recent Epochs
Rancho La Brea, CA

Land Ecosystems
Pacific Forest
Point Lobos, CA
Torrey Pines State Reserve, CA

Dry Coniferous Forest
Consumnes River Riparian Woodlands, CA

Grassland
Pixley Vernal Pools, CA
Sand Ridge Wildflower Preserve, CA

Chaparral
American River Bluffs and Phoenix Park Vernal Pools, CA
Ano Nuevo Point and Island, CA
Miramar Mounds, CA
Mt. Diablo State Park, CA
Nipomo Dunes-Point Sal Coastal Area, CA
Tijuana River Estuary, CA

Aquatic Ecosystems
Marine Environments
Ano Nuevo Point and Island, CA
Nipomo Dunes-Point Sal Coastal Area, CA

Estuaries
Tijuana River Estuary, CA
Torrey Pines State Reserve, CA

Lakes and Ponds
American River Bluffs ad Phoenix Park Vernal Pools, CA
Pixley Vernal Pools, CA

Streams
Consumnes River Riparian Woodlands, CA
Sand Ridge Wildflower Preserve, CA

CASCADE RANGE

Landforms of the Present
Mountain Systems
Mount Shasta, CA

Works of Volcanism
Burney Falls, CA
Mount Shasta, CA

*Hot Water Phenomena

Sculpture of the Land
Burney Falls, CA
Crown Point, OR

Eolian Landforms
Burney Falls, CA
Crown Point, OR

*Works of Volcanism

*River Systems and Lakes

*Works of Glaciers

*Caves and Springs

Geologic History
*Oligocene-Recent Epochs

Land Ecosystems
*Tundra

*Boreal Forest

*Dry Coniferous Forest

Aquatic Ecosystems
*Lakes and Ponds

*Streams

SIERRA NEVADA

Landforms of the Present
*Mountain Systems

*Works of Volcanism

*River Systems and Lakes

Works of Glaciers
Emerald Bay, CA

Geologic History
*Triassic-Cretaceous Periods

Oligocene-Recent Epochs
Sharktooth Hill, CA

Land Ecosystems
*Tundra

*Boreal Forest

*Pacific Forest

*Dry Coniferous Forest

Chaparral
Sharktooth Hill, CA

Aquatic Ecosystems
Lakes and Ponds
Emerald Bay, CA

*Streams

COLUMBIA PLATEAU

Landforms of the Present
Plains, Plateaus, and Mesas
Hell's Half Acre Lava Field, ID
Steptoe and Kamiak Buttes, WA

Mountain Systems
Newberry Crater, OR
Steptoe and Kamiak Buttes, WA
Umtanum Ridge Water Gap, WA

Works of Volcanism
Big Southern Butte, ID
Crater Rings, ID
Fort Rock State Monument, OR
Ginko Petrified Forest, WA
Grand Coulee, WA
Grande Ronde Goosenecks, WA
Grande Ronde Feeder Dikes, WA
Great Rift System, ID
Hell's Half Acre Lava Field, ID
Newberry Crater, OR
Sheep Rock, ID

*Hot Water Phenomena

Sculpture of the Land
Drumheller Channels, WA
Grand Coulee, WA
Grande Ronde Gooseneck, WA
Sheep Rock, ID
Umtanum Ridge Water Gap, WA
Wallula Gap, WA

River Systems and Lakes
The Great Gravel Bar of Moses Coulee, WA

Works of Glaciers
Boulder Park and McNeil Canyon Haystack Rocks, WA
Drumheller Channels, WA
Grand Coulee, WA
Sims Corner Eskers and Kames Complex, WA
The Great Gravel Bar of Moses Coulee, WA
Wallula Gap, WA
Withrow Moraine and Jameson Lake Drumlin Field, WA

*Caves and Springs

Geologic History
Oligocene - Recent Epochs
Ginko Petrified Forest, WA
Hagerman Fauna Sites, ID

Land Ecosystems
*Tundra

*Boreal Forest

Dry Coniferous Forest
Horse Ridge Natural Area, OR
Rose Creek Preserve, WA

Grassland
Davis Canyon, WA
Lawrence Memorial Grassland Preserve, OR

Deserts
Hell's Half Acre Lava Field, ID

Aquatic Ecosystems
*Lakes and Ponds

Streams
Rose Creek Preserve, WA

GREAT BASIN

Landforms of the Present
*Plains, Plateaus, and Mesas

Mountain Systems
Valley of Fire, NV

Works of Volcanism
Lunar Crater, NV
Timber Mountain Caldera, NV

*Hot Water Phenomena

Sculpture of the Land
Cassia Silent City of Rocks, ID
Valley of Fire, NV

Eolian Landforms
Eureka Dunes, CA

*River Systems and Lakes

*Works of Glaciers

*Seashores, Lakeshores, and Islands

Caves and Springs
Hot Creek Springs and Marsh, NV

Geologic History
*Cambrian-Early Silurian Periods

*Late Silurian-Devonian Periods

*Mississippian-Permian Periods

Triassic-Cretaceous Periods
Ichthyosaur Site, NV

Oligocene-Recent Epochs
Timber Mountain Caldera, NV

Land Ecosystems
*Tundra

*Boreal Forest

*Dry Coniferous Forest

Deserts
Deep Springs Marsh, CA
Eureka Dunes, CA
Fish Slough, CA
Hot Creek Springs and Marsh, NV
Joshua Tree Natural Area, UT
Lunar Crater, NV
Ruby Marsh, NV
Timber Mountain Caldera, NV
Valley of Fire, NV

Aquatic Ecosystems
Lakes and Ponds
Deep Springs Marsh, CA
Fish Slough, CA

Hot Creek Springs and Marsh, NV
Ruby Marsh, NV

*Streams

MOHAVE-SONORAN DESERT

Landforms of the Present
*Plains, Plateaus, and Mesas

Mountain Systems
Amboy Crater, CA

Works of Volcanism
Cinder Cone Natural Area, CA
Turtle Mountains Natural Area, CA

Sculpture of the Land
Rainbow Basin, CA
Ramsey Canyon, AZ
Turtle Mountains Natural Area, CA

River Systems and Lakes
San Felipe Creek Area, CA

Seashores, Lakeshores, and Islands
Trona Pinnacles, CA

Caves and Springs
Canelo Hills Cienega, AZ
Mitchell Caverns and Winding Stair Cave, CA
Onyx Cave, AZ

Geologic History
*Precambrian Era

*Cambrian-Early Silurian Periods

Oligocene-Recent Epochs
Rainbow Basin, CA
Trona Pinnacles, CA

Land Ecosystems
*Boreal Forest

Dry Coniferous Forest
Patagonia-Sonoita Creek Sanctuary, AZ
Ramsey Canyon, AZ

Grassland
Canelo Hills Cienega, AZ
Patagonia-Sonoita Creek Sanctuary, AZ

*Chaparral

Deserts
Amboy Crater, CA
Canelo Hills Cienega, AZ
Grapevine Mesa Joshua Trees, AZ
Patagonia-Sonoita Creek Sanctuary, AZ
Ramsey Canyon, AZ
San Felipe Creek Area, CA

Aquatic Ecosystems
Streams
Canelo Hills Cienega, AZ
Patagonia-Sonoita Creek Sanctuary, AZ
Ramsey Canyon, AZ

CHIHUAHUAN DESERT - MEXICAN HIGHLAND

Landforms of the Present
*Cuestas and Hogbacks

*Mountain Systems

Works of Volcanism
Kilbourne Hole, NM

*Sculpture of the Land

*Eolian Landforms

*River Systems and Lakes

*Caves and Springs

Geologic History
*Mississippian-Permian Periods

*Paleocene-Eocene Epochs

Oligocene-Recent Epochs
Willcox Playa, AZ

Land Ecosystems
*Tundra

*Boreal Forest

*Dry Coniferous Forest

*Grassland

*Chaparral

Deserts
Kilbourne Hole, NM
Willcox Playa, AZ

Aquatic Ecosystems
Lakes and Ponds
Willcox Playa, AZ

*Streams

COLORADO PLATEAU

Landforms of the Present
*Plains, Plateaus, and Mesas

*Cuestas and Hogbacks

Mountain Systems
Little Rockies, UT

Works of Volcanism
Grants Lava Flow, NM
Ship Rock, NM

Sculpture of the Land
Barringer Meteor Crater, AZ
Ship Rock, NM

*River Systems and Lakes

Works of Glaciers
Little Rockies, UT

Caves and Springs
Niagara Springs, ID

Geologic History
*Precambrian Era

*Mississippian-Permian Periods

Triassic-Cretaceous Periods
Cleveland-Lloyd Dinosaur Quarry, UT
Comb Ridge, AZ

Land Ecosystems
*Tundra

*Boreal Forest

Dry Coniferous Forest
Kaibab Squirrel Area, AZ

*Grassland

Deserts
Grants Lava Flow, NM

Aquatic Ecosystems
Lakes and Ponds
Grants Lava Flow, NM

*Streams

NORTHERN ROCKY MOUNTAINS

Landforms of the Present
*Mountain Systems

*River Systems and Lakes

Works of Glaciers
Glacial Lake Missoula, MT

Geologic History
*Precambrian Era

Paleocene-Eocene Epochs
Middle Fork Canyon, MT

Land Ecosystems
*Tundra

*Boreal Forest

Pacific Forest
Hobo Cedar Grove Botanical Area, ID

Dry Coniferous Forest
Red Rock Lakes National Wildlife Refuge, MT

Aquatic Ecosystems
Lakes and Ponds
Red Rock Lakes National Wildlife Refuge, MT

*Streams

MIDDLE ROCKY MOUNTAINS

Landforms of the Present
*Cuestas and Hogbacks

*Mountain Systems

*Works of Volcanisms

*Hot Water Phenomena

*Sculpture of the Land

*River Systems and Lakes

*Works of Volcanism

Caves and Springs
Big Springs, ID
Neffs Canyon Cave, UT

Geologic History
*Precambrian Era

Triassic-Cretaceous Periods
Bridger Fossil Area, MT
Crooked Creek Natural Area, MT

*Paleocene-Eocene Epochs

Land Ecosystems
*Tundra

*Boreal Forest

*Dry Coniferous Forest

Aquatic Ecosystems
*Lakes and Ponds

Streams
Two Ocean Pass, WY

WYOMING BASIN

Landforms of the Present
*Plains, Plateaus, and Mesas

Cuestas and Hogbacks
Red Canyon, WY

Eolian Landforms
Big Hollow, WY

*River Systems and Lakes

Geologic History
Mississippian-Permian Periods
Sand Creek, WY

Triassic-Cretaceous Periods
Bone Cabin Fossil Area, WY
Como Bluff, WY

*Paleocene-Eocene Epochs

Land Ecosystems
*Grassland

Deserts
Big Hollow, WY

Aquatic Ecosystems
*Lakes and Ponds

*Streams

SOUTHERN ROCKY MOUNTAINS

Landforms of the Present
*Mountain Systems

Works of Volcanism
Valles Caldera, NM

Sculpture of the Land
Lost Creek Scenic Area, CO
Slumguillion Earthflow, CO

*Eolian Landforms

*River Systems and Lakes

*Works of Glaciers

Geologic History
*Precambrian Era

Triassic-Cretaceous Periods
Ghost Ranch, NM

*Oligocene-Recent Epochs

Land Ecosystems
Tundra
Summit Lake, CO

*Boreal Forest

*Dry Coniferous Forest

Aquatic Ecosystems
*Lakes and Ponds

*Streams

GREAT PLAINS

Landforms of the Present
Plains, Plateaus, and Mesas
Border Hills Structural Zone, NM
Muleshoe National Wildlife Refuge, TX

Cuestas and Hogbacks
Morrison Fossil Area, CO
Rock City, KS
Roxborough State Park, CO

Mountain Systems
Border Hills Structural Zone, NM
Cathedral Spires and Limber Pine Natural Area, SD
Garden of the Gods, CO
High Plains Natural Area, TX
Roxborough State Park, CO

Works of Volcanism
Bear Butte, SD
Raton Mesa, CO
Spanish Peaks, CO
Square Butte, MT
Steptoe and Kamiak Buttes, WA

Sculpture of the Land
Big Basin Preserve, KS
Bijou Hills, SD
Cathedral Spires and Limber Pine Natural Area, SD
Dinosaur Valley, TX
Enchanted Rock, TX
Garden of the Gods, CO
Lost Maples State Natural Area, TX
Monument Rocks Natural Area, KS
Odessa Meteor Crater, TX
Palo Duro Canyon State Park, TX
Rock City, KS
Snake Butte, SD
The Castles, SD
Two-Top Mesa and Big Top Mesa, ND

Eolian Landforms
Mescalero Sands South Dune, NM
Nebraska Sand Hills, NE
Valentine National Wildlife Refuge, NE

River Systems and Lakes
Muleshoe National Wildlife Refuge, TX
Nebraska Sand Hills, NE
Salt Plains National Wildlife Refuge, OK

Works of Glaciers
Fischer Lake, ND
Medicine Lake Site, MT
Sibley Lake, ND

Caves and Springs
Caverns of Sonora, TX
Devil's Sink Hole, TX
Fort Station Cave, NM
Longhorn Cavern, TX
Torgac Cave, NM

Geologic History
Cambrian-Early Silurian Periods
Indian Springs Trace Fossil Site, CO

Mississippian-Permian Periods
Garden of the Gods, CO
Mammoth Site of Hot Springs, SD

Triassic-Cretaceous Periods
Bug Creek Fossil Area, MT
Capitol Rock, MT
Dinosaur Trackway, CT
Garden of the Gods, CO
Hell Creek Fossil Area, MT
Lance Creek Fossil Area, WY
Mammoth Site of Hot Springs, SD
Monument Rocks Natural Area, KS
Palo Duro Canyon State Park, TX
The Castles, SD

Paleocene-Eocene Epochs
Capitol Rock, MT
The Castles, SD

Oligocene-Recent Epochs
Capitol Rock, MT
Garden of the Gods, CO

Land Ecosystems
*Boreal Forest

Dry Coniferous Forest
Cathedral Spires and Limber Pine Natural Area, SD
Garden of the Gods, CO
Little Blanco River Bluff, TX
Lost Maples State Natural Area, TX
Mathers Research Natural Area, NM
Roxborough State Park, CO

Eastern Deciduous Forest
Fort Randall Eagle Roost, SD

Grassland
Big Basin Preserve, KS
Bueyeros Shortgrass Plains, NM
Fischer Lake, ND
Mathers Research Natural Area, NM
Mescalero Sands South Dune, NM
Muleshoe National Wildlife Refuge, TX
Nebraska Sand Hills, NE
Palo Duro Canyon State Park, TX
Salt Plains National Wildlife Refuge, OK
Two-Top Mesa and Big Top Mesa, ND
Valentine National Wildlife Refuge, NE

Deserts
Bitter Lake Group, NM
Garden of the Gods, CO

Aquatic Ecosystems
*Underground Systems

Lakes and Ponds
Bitter Lake Group, NM
Fischer Lake, ND
Red Lake, SD
Salt Plains National Wildlife Refuge, OK
Sibley Lake, ND
Valentine National Wildlife Refuge, NE

*Streams

CENTRAL LOWLANDS

Landforms of the Present
Plains, Plateaus, and Mesas
Davis-Purdue Agricultural Center Forest, IN

Hueston Woods, OH
Shrader-Weaver Woods, IN

Cuestas and Hogbacks
Duke Natural Research Area, MI

Mountain Systems
Baraboo Range, WI

Sculpture of the Land
Allerton Natural Area, IL
Baldwin Woods, KS
Big Walnut Creek, IN
Clifton Gorge, OH
Devil's Canyon, OK
Fults Hill Prairie Nature Preserve, IL
Glen Helen Natural Area, OH
Grand Mere Lakes, MI
Greenwood Canyon, TX
Highbanks Natural Area, OH
Kickapoo River Natural Area, WI
Lakeview Marsh and Barrier Beach, NY
Loess Hills, IA
Mississippi Palisades, IL
Pine Hills Natural Area, IN
Portland and Arch Nature Preserve, IN
Rocky Hollow-Falls Canyon Nature Preserve, IN

Eolian Landforms
Cowles Bog, IN
Dunes Nature Preserve, IN
Grand Mere Lakes, MI
Hoosier Prairie, IN
Loess Hills, IA

River Systems and Lakes
Allerton Natural Area, IL
Avoca River-Bottom Prairie, WI
Bergen-Byron Swamp, NY
Big Walnut Creek, IN
Clifton Gorge, OH
Dead Stream Swamp, MI
Forest of the Wabash, IL
Funks Grove, IL
Glen Helen Natural Area, OH
Hanging Rock and Wabash Reef, IN
Hoosier Prairie, IN
Hueston Woods, OH
Kickapoo River Natural Area, WI
Newton Woods, MI
Pine Hills Natural Area, IN
Portland and Arch Nature Preserve, IN
Rocky Hollow-Falls Canyon Nature Preserve, IN
Shrader-Weaver Woods, IN
Sica Hollow, SD
Tamarack Bog Nature Preserve, IN
Volo Bog Nature Preserve, IL
Warren Woods Natural Area, MI
Wauconda Bog Natural Preserve, IL

Works of Glaciers
Abraham's Woods, WI
Ancient River Warren Channel, SD
Anderson Goose Lake, IA
Avoca River-Bottom Prairie, WI
Baraboo Range, WI
Bergen-Byron Swamp, NY
Black Spruce Bog Natural Area, MI
Buffalo Slough, SD
Busse Forest Natural Preserve, IL
Calvert and Porter Woods Nature Preserve, IN
Clifton Gorge, OH
Cottonwood Slough-Dry Run, SD
Davis-Purdue Agricultural Center Forest, IN
Dead Stream Swamp, MI
Dewey Pasture and Smith's Slough, IA
Duke Natural Research Area, MI
Funks Grove, IL
Glacial Grooves State Memorial, OH
Hanging Rock and Wabash Reef, IN
Harts Woods, NY
Haven Hill State Natural Area, MI
Ironsides Island, NY
Lake Agassiz Peatlands Natural Area, MN
Loess Hills, IA
Meltzler Woods, IN
Mendon Ponds Park, NY
Montezuma Marshes, NY

Newton Woods, MI
Pinhook Bog, IN
Roscommon Virgin Pine Stand, MI
Rush Lake, ND
Shrader-Weaver Woods, IN
Sica Hollow, SD
Summerton Bog, WI
Tamarack Bog Nature Preserve, IN
Toumey Woodlot, MI
Upper Red Lake Peatland, MN
Volo Bog Nature Preserve, IL
Warren Woods Natural Area, MI
Zurich Bog, NY

Seashores, Lakeshores, and Islands
Dunes Nature Preserve, IN
Grand Mere Lakes, MI
Illinois Beach Natural Preserve, IL
Ironsides Island, NY
Lakeview Marsh and Barrier Beach, NY
Point Beach Ridges, WI
Presque Isle, PA
Ridges Sanctuary-Toft's Point Mud-Lake Area, WI
Tobico Marsh, MI

Coral Islands, Reefs, and Atolls
Hanging Rock and Wabash Reef, IN

Caves and Springs
Glen Helen Natural Area, OH
Kickapoo River Natural Area, WI
Marengo Cave, IN
Mark Twain and Cameron Caves, MO

Geologic History
Precambrian Era
Baraboo Range, WI

Cambrian-Early Silurian Periods
Duke Natural Research Area, MI
Hanging Rock and Wabash Reef, IN

Late Silurian-Devonian Periods
Fossil Coral Reef, NY
Glen Helen Natural Area, OH

Mississippian-Permian Periods
Big Walnut Creek, IN
Fults Hill Prairie Nature Preserve, IL
Pine Hills Natural Area, IN
Rocky Hollow-Falls Canyon Nature Preserve, IN

Triassic-Cretaceous Periods
Greenwood Canyon, TX

Oligocene-Recent Epochs
Allerton Natural Area, IL
Black Spruce Bog Natural Area, MI
Davis-Purdue Agricultural Center Forest, IN
Loess Hills, IA
Mendon Ponds Park, NY
Montezuma Marshes, NY

Land Ecosystems
Boreal Forest
Cedar Creek Natural History Area-Allison Savanna, MN
Lake Agassiz Peatlands Natural Area, MN
Pine Point Research Natural Area, MN
Ridges Sanctuary-Toft's Point-Mud Lake Area, WI
Spruce Lake Bog, WI
Summerton Bog, WI
Upper Red Lake Peatland, MN

Dry Coniferous Forest
Cedar Creek Natural History Area-Allison Savanna, MN

Eastern Deciduous Forest
Abraham's Woods, WI
Allerton Natural Area, IL
Baldwin Woods, KS
Baraboo Range, WI
Bergen-Byron Swamp, NY
Big Walnut Creek, IN
Black Spruce Bog Natural Area, MI
Blacklick Woods, OH
Bose Lake Hemlock Hardwoods, WI
Busse Forest Natural Preserve, IL

Calvert and Porter Woods Nature Preserve, IN
Cedarburg Bog, WI
Chippewa River Bottoms, WI
Cowles Bog, IN
Crall Woods, OH
Davis-Purdue Agricultural Center Forest, IN
Dead Stream Swamp, MI
Devil's Canyon, OK
Duke Natural Research Area, MI
Dunes Nature Preserve, IN
Dunes Nature Preserve, IN
Fern Cliff, IN
Fontenelle Forest, NE
Forest of the Wabash, IL
Fort Worth Nature Center and Refuge, TX
Fults Hill Prairie Nature Preserve, IL
Funks Grove, IL
Goll Woods, OH
Harts Woods, NY
Haven Hill State Natural Area, MI
Hazelwood Botanical Preserve, OH
Highbanks Natural Area, OH
Highbanks Natural Area, OH
Hoosier Prairie, IN
Hoot Woods, IN
Hueston Woods, OH
Illinois Beach Natural Preserve, IL
Ironsides Island, NY
Itasca Natural Area, MN
Kickapoo River Natural Area, WI
Lakeview Marsh and Barrier Beach, NY
Maple Woods Natural Area, MO
Meltzer Woods, IN
Mentor Marsh, OH
Mississippi Palisades, IL
Montezuma Marshes, NY
Newton Woods, MI
Oak Orchard Creek Marsh, NY
Pine Hills Natural Area, IN
Pinhook Bog, IN
Point Beach Ridges, WI
Portland and Arch Nature Preserve, IN
Rocky Hollow-Falls Canyon Nature Preserve, IN
Roscommon Virgin Pine Stand, MI
Shrader-Weaver Woods, IN
Sica Hollow, SD
Summerton Bog, WI
Tamarack Bog Nature Preserve, IN
Tobico Marsh, MI
Toumey Woodlot, MI
Warren Woods Natural Area, MI
White Pine Hollow Preserve, IA
Wyalusing Hardwood Forest, WI
Zurich Bog, NY

Grassland
Allerton Natural Area, IL
Avoca River-Bottom Prairie, WI
Baker University Wetlands, KS
Buffalo Slough, SD
Cayler Prairie, IA
Cedar Creek Natural History Area-Allison Savanna, MN
Chiwaukee Prairie, WI
Cottonwood Slough-Dry Run, SD
Fontenelle Forest, NE
Fort Worth Nature Center and Refuge, TX
Fults Hill Prairie Nature Preserve, IL
Golden Prairie, MO
Hayden Prairie, IA
Hoosier Prairie, IN
Illinois Beach Natural Preserve, IL
Sica Hollow, SD
Taberville Prairie, MO
Tucker Prairie, MO

Aquatic Ecosystems
Estuaries
Dexter Marsh, NY
Montezuma Marshes, NY

Lakes and Ponds
Anderson Goose Lake, IA
Appleton Bog Atlantic White Cedar Stand, ME
Baker University Wetlands, KS
Beckley Bog, CT

Bergen-Byron Swamp, NY
Bingham Pond Bog, CT
Black Spruce Bog Natural Area, MI
Busse Forest Natural Preserve, IL
Cabin Creek Raised Bog, IN
Carrying Place Cove Bog, ME
Cedarburg Bog, WI
Cowles Bog, IN
Crystal Bog, ME
Dead Stream Swamp, MI
Devil's Canyon, OK
Dewey Pasture and Smith's Slough, IA
Dexter Marsh, NY
Duke Natural Research Area, MI
East Inlet Natural Area, NH
Fischer Lake, ND
Floating Island, NH
Grand Mere Lakes, MI
Haven Hill State Natural Area, MI
Hawley Bog, MA
Heath Pond Bog, NH
Hoosier Prairie, IN
Illinois Beach Natural Preserve, IL
Lake Agassiz Peatlands Natural Area, MN
Lake Thompson, SD
Lakeview Marsh and Barrier Beach, NY
Mantua Swamp, OH
Mendon Ponds Park, NY
Mentor Marsh, OH
Mentor Marsh, OH
Molly Bog, VT
Montezuma Marshes, NY
No. 5 Bog and Jack Pine Stand, ME
Oak Orchard Creek Marsh, NY
Orono Bog, ME
Pinhook Bog, IN
Pinhook Bog, IN
Pondicherry Wildlife Refuge, NH
Rush Lake, ND
Spruce Lake Bog, WI
Spruce Hole Bog, NH
Summerton Bog, WI
Tamarack Bog Nature Preserve, IN
Tobico Marsh, MI
Upper Red Lake Peatland, MN
Volo Bog Nature Preserve, IL
Wauconda Bog Natural Preserve, IL
Zurich Bog, NY

Streams
Big Walnut Creek, IN
Kickapoo River Natural Area, WI

SUPERIOR UPLANDS

Landforms of the Present
Mountain Systems
Porcupine Mountain, MI

Eolian Landforms
Strangmoor Bog, MI

River Systems and Lakes
Porcupine Mountain, MI

*Works of Glaciers

Seashores, Lakeshores, and Islands
Kakagon Sloughs, WI

Geologic History
Oligocene-Recent Epochs
Porcupine Mountain, MI
Strangmoor Bog, MI

Land Ecosystems
Boreal Forest
Finnerud Forest Scientific Area, WI
Keeley Creek Natural Area, MN
Lac La Croix Research Natural Area, MN

Eastern Deciduous Forest
Flambeau River Hemlock-Hardwood Forest, WI
Lac La Croix Research Natural Area, MN
Porcupine Mountain, MI
Strangmoor Bog, MI

Aquatic Ecosystems
Lakes and Ponds
Kakagon Sloughs, WI
Porcupine Mountain, MI
Strangmoor Bog, MI

INTERIOR HIGHLANDS

Landforms of the Present
*Plains, Plateaus, and Mesas

*Mountain Systems

Hot Water Phenomena
Grand Gulf, MO
Little Grand Canyon Area, IL

*River Systems and Lakes
Cupola Pond, MO
Little Grand Canyon Area, IL

Caves and Springs
Carroll Cave, MO
Grand Gulf, MO
Greer Spring, MO
Mammoth Spring, MO
Marmec Spring, MO
Marvel Cave, MO
Onondaga Cave, MO
Pickle Springs, MO
Tumbling Creek Cave, MO

Geologic History
*Cambrian-Early Silurian Periods

*Mississippian-Permian Periods

Land Ecosystems
Eastern Deciduous Forest
Greer Spring, MO
Lake Wiona Natural Area, AR
LaRue-Pine Hills Ecological Area, IL
Little Grand Canyon Area, IL
McCurtain County Wilderness Area, OK
Roaring Branch Research Natural Area, AR
Wegener Woods, MO

Aquatic Ecosystems
Underground Systems
Carroll Cave, MO
Tumbling Creek Cave, MO

Lakes and Ponds
Cupola Pond, MO
LaRue-Pine Hills Ecological Area, IL

Streams
Onondaga Cave, MO

INTERIOR LOW PLATEAUS

Landforms of the Present
Plains, Plateaus, and Mesas
Officer's Woods, IN

Sculpture of the Land
Bell Smith Springs, IL
Giant City Geological Area, IL
Heron Pond-Little Black Slough Nature Area, IL
Lusk Creek Canyon, IL

River Systems and Lakes
Ohio Coral Reef (Falls of the Ohio), KY and IN
Heron Pond-Little Black Slough Nature Area, IL
Officer's Woods, IN

*Seashores, Lakeshores, and Islands

Caves and Springs
Big Bone Cave, TN
Conley County, TN
Cumberland Cavern, TN
Donaldson Cave System and Woods, IN
Harrison Spring, IN
Rise at Orangeville, IN
Shelta Cave, AL
Tolliver Swallowhole, IN
Wesley Chapel Gulf, IN
Wyandotte Cave, IN

Geologic History
Cambrian-Early Silurian Periods
Fort Hill State Memorial, OH

Late Silurian-Devonian Periods
Ohio Coral Reef (Falls of the Ohio), KY and IN
Fort Hill State Memorial, OH

Mississippian-Permian Periods
Fort Hill State Memorial, OH
Wyandotte Cave, IN

Oligocene-Recent Epochs
Big Bone Cave, TN

Land Ecosystems
Eastern Deciduous Forest
Arnold Engineering Development Center Natural Areas, TN
Bell Smith Springs, IL
Cedar Glades Natural Area, TN
Donaldson Cave System and Woods, IN
Fort Hill State Memorial, OH
Giant City Geological Area, IL
Hemmer Woods, IN
Henderson Sloughs, KY
Heron Pond-Little Black Slough Nature Area, IL
Kramer Woods, IN
Lower Cache River Swamp, IL
Lusk Creek Canyon, IL

Grassland
May Prairie, TN

Aquatic Ecosystems
Underground Systems
Cumberland Cavern, TN
Shelta Cave, AL

Lakes and Ponds
Arnold Engineering Development Center Natural Areas, TN
Beaverdam Creek Swamp, AL
Henderson Sloughs, KY
Heron Pond-Little Black Slough Nature Area, IL
Lower Cache River Swamp, IL

Streams
Tolliver Swallowhole, IN

APPALACHIAN PLATEAUS

Landforms of the Present
*Plains, Plateaus, and Mesas

Cuestas and Hogbacks
Buzzardroost Rock-Lynx Prairie-The Wilderness, OH

*Mountain Systems

Works of Volcanism
Palisades of the Hudson, NJ

Sculpture of the Land
Deer Lick Nature Sanctuary, NY
Fall Brook Gorge, NY
Holden Natural Areas, OH
Newsome Sinks Karst Area, AL
Palisades of the Hudson, NJ
Pine Creek Gorge, PA
Piney Falls, TN
Red River Gorge, KY
Serpent Mound Cryptoexplosive Structure, OH

Eolian Landforms
The Glens Natural Area, PA

River Systems and Lakes
Lake Lacawac, PA
Pine Creek Gorge, PA
Round Lake, NY

Works of Glaciers
Brown's Lake Bog, OH
Clear Fork Gorge, OH
Hickory Run Boulder Field, PA
McConnell's Mill State Park, PA
McLean Bogs, NY

Moss Island, NY
Moss Lake Bog, NY
Palisades of the Hudson, NJ
Tamarack Swamp, PA

Seashores, Lakeshores, and Islands
Moss Island, NY

Caves and Springs
Cathedral Caverns, AL
Grassy Cove Karst Area, TN
Lost World Caverns, WV
Newsome Sinks Karst Area, AL

Geologic History
*Cambrian-Early Silurian Periods

Late Silurian-Devonian Periods
Fall Brook Gorge, NY

*Mississippian-Permian Periods

Triassic-Cretaceous Periods
Palisades of the Hudson, NJ

Oligocene-Recent Epochs
Canaan Valley, WV
Fischer Spring Run Bog, WV
Moss Island, NY
Palisades of the Hudson, NJ

Land Ecosystems
Boreal Forest
Canaan Valley, WV
Gaudineer Scenic Area, WV
Long Hope Creek Spruce Bog, NC
Mount Mitchell State Park, NC
Shavers Mountain Spruce-Hemlock Stand, WV

Eastern Deciduous Forest
Arthur B. Williams Memorial Woods, OH
Bear Swamp, NY
Buzzardroost Rock-Lynx Prairie-The Wilderness, OH
Camp E. F. Boyd Natural Area, GA
Cathedral Park, WV
Clear Fork Gorge, oH
Cook Forest, PA
Cranberry Bog, OH
Deer Lick Nature Sanctuary, NY
Dick Cove, TN
Dysart Woods, OH
Ferncliff Peninsula Natural Area, PA
Hearts Content Scenic Area, PA
Holden Natural Areas, OH
Lilley Cornett Woods, KY
McConnell's Mill State Park, PA
McLean Bogs, NY
Moss Lake Bog, NY
Piney Falls, TN
Red River Gorge, KY
Rock Creek Research Natural Area, KY
Round Lake, NY
Savage Gulf, TN
Shavers Mountain Spruce-Hemlock Stand, WV
Tamarack Swamp, PA
Tannerville Cranberry Bog, PA
The Glens Natural Area, PA
Tinkers Creek Gorge, OH
Tionesta Scenic and Research Natural Areas, PA

Aquatic Ecosystems
Lakes and Ponds
Bear Swamp, NY
Big Run Bog, WV
Blister Run Swamp, WV
Brown's Lake Bog, OH
Cranberry Glades Botanical Area, WV
Cranesville Swamp Nature Santuary, WV
Fischer Spring Run Bog, WV
Lake Lacawac, PA
Mantua Swamp, OH
McLean Bogs, NY
Moss Lake Bog, NY
Reynolds Spring and Algerine Swamp Bogs, PA
Round Lake, NY
Tamarack Swamp, PA
Tamarack Swamp, PA

Tannerville Cranberry Bog, PA
Titus and Wattsburg Bogs, PA
White Pine Bog Forest, OH

Streams
Ferncliff Peninsula Natural Area, PA

APPALACHIAN RANGES

Landforms of the Present
Plains, Plateaus, and Mesas
Stone Mountain, NC

Mountain Systems
Hawk Mountain Sanctuary, PA

Sculpture of the Land
Susquehanna Water Gaps, PA

River Systems and Lakes
Sunfish Pond, NJ

Works of Glaciers
Sunfish Pond, NJ
Susquehanna Water Gaps, PA

Caves and Springs
Butler Cave-Breathing Cave, VA
Ellenville Fault-Ice Caves, NY
Germany Valley Karst Area, WV
Grand Cavern, VA
Greenbrier Caverns, WV
Greenville Saltpeter Cave, WV
Lost Sea, TN
Luray Caverns, VA
Sinnett-Thorn Mountain Cave System, WV
Swago Karst Area, WV

Geologic History
Cambrian-Early Silurian Periods
Petrified Gardens, NY

*Late Silurian-Devonian Periods

*Mississippian-Permian Periods

*Triassic-Cretaceous Periods

Land Ecosystems
*Boreal Forest

*Dry Coniferous Forest

Eastern Deciduous Forest
Box Huckleberry Site, PA
Florence Jones Reineman Wildlife Sanctuary, PA
Hawk Mountain Sanctuary, PA
Hemlocks Natural Area, PA
Long Hope Creek Spruce Bog, NC
Marshall Forest, GA
Mount Jefferson State Park, NC
Rich Hole, VA
Sag Ponds Natural Area, GA
Snyder-Middleswarth Natural Area, PA
Stone Mountain, NC

Aquatic Ecosystems
*Underground Systems

Lakes and Ponds
Bear Meadows Natural Area, PA
Sag Ponds Natural Area, GA

*Streams

PIEDMONT

Landforms of the Present
Plains, Plateaus, and Mesas
Panola Mountain, GA

Mountain Systems
Flat Creek Natural Area and 40 Acre Rock, SC
Gilpin's Falls, MD
Hook Mountain and Nyack Beach State Park, NY
Orbicular Diorite, NC
Sugar Loaf Mountain, MD

Sculpture of the Land
Flat Creek Natural Area and 40 Acre Rock, SC
Hook Mountain and Nyack Beach State Park, NY
Moggy Hollow Natural Area, NJ

*River Systems and Lakes

Works of Glaciers
Hook Mountain and Nyack Beach State Park, NY
Moggy Hollow Natural Area, NJ

Caves and Springs
Flat Creek Natural Area and 40 Acre Rock, SC

Geologic History
Cambrian-Early Silurian Periods
Wissahickon Valley, PA
Gilpin's Falls, MD

Late Silurian-Devonian Periods
Monroe Border Fault, PA

Mississippian-Permian Periods
Flat Creek Natural Area and 40 Acre Rock, SC

Triassic-Cretaceous Periods
Hook Mountain and Nyack Beach State Park, NY

Land Ecosystem
Eastern Deciduous Forest
Cason J. Calloway Memorial Forest, Ga
Flat Creek Natural Area and 40 Acre Rock, SC
Ferncliff Wildflower and Wildlife Preserve, PA
Heggie's Rock, GA
John De La Howe Forest, SC
Panola Mountain, GA
Piedmont Beach Natural Area, NC
Stevens Creek Natural Area, NC
William L. Hutcheson Memorial Forest, NJ

Aquatic Ecosystems
Marine Environments
Tinicum Wildlife Preserve, PA

Lakes and Ponds
Iona Island Marsh, NY

Streams
Gilpin's Falls, MD

NEW ENGLAND-ADIRONDACKS

Landforms of the Present
Mountain Systems
Bigelow Mountain, ME
Camel's Hump, VT
Franconia Notch, NH
Mount Katahdin, ME
Mount Mansfield Natural Area, VT

Works of Volcanism
Great Falls of Patterson-Garrett Mountain, NJ

Sculpture of the Land
Franconia Notch, NH
Great Falls of Patterson-Garrett Mountain, NJ
Gulf Hagas, ME
Mianus River Gorge, NY

River Systems and Lakes
Appleton Bog Atlantic White Cedar Stand, ME
Fannie Stebbins Refuge, MA
Gulf Hagas, ME
Lake Willoughby Natural Area, VT

Works of Glaciers
Carrying Place Cove Bog, ME
Franconia Notch, NH
Great Swamp, NJ
Lake Willoughby Natural Area, VT
Madison Boulder, NH

Monhegan Island, ME
Mount Katahdin, ME
Passadumkeag Marsh and Boglands, ME
Penny Pond-Joe Pond Complex, ME
Spruce Hole Bog, NH
Thompson Pond, NY

*Seashores, Lakeshores, and Islands

Geologic History
*Precambrian Era

Cambrian-Early Silurian Periods
Camel's Hump, VI

Triassic-Cretaceous Periods
Dinosaur Trackway, CT
Riker Hill Fossil Site, NJ

Land Ecosystems
Tundra
Bigelow Mountain, ME
Camel's Hump, VT
Mount Katahdin, ME
Mount Mansfield Natural Area, VT

Boreal Forest
Camel's Hump, VT
Gulf Hagas, ME
Meddybemps Heath, ME
Monhegan Island, ME
Mount Katahdin, ME
Mount Mansfield Natural Area, VT
Passadumkeag Marsh and Boglands, ME

Eastern Deciduous Forest
Appleton Bog Atlantic White Cedar Stand, ME
Bartholomew's Cobble, MA
Barton River Marsh, VT
Battell Biological Preserve, VT
Beckley Bog, CT
Bingham Pond Bog, CT
Camel's Hump, VT
Carrying Place Cove Bog, ME
Cathedral Pines, CT
Chester Cedar Swamp, CT
Colby-Marston Preserve, ME
Cold River Virgin Forest, MA
Cornwall Swamp, VT
Crystal Bog, ME
Ell Pond, RI
Fannie Stebbins Refuge, MA
Fisher-Scott Memorial Pines, Vt
Floating Island, NH
Franconia Notch, NH
Franklin Bog, VT
Gifford Woods, VT
Heath Pond Bog, NH
Lake Willoughby Natural Area, VT
Little Otter Creek Marsh, VT
Lynnfield Marsh, MA
McLean Game Refuge Natural Area, CT
Mianus River Gorge, NY
Molly Bog, VT
Mount Katahdin, ME
Mount Mansfield Natural Area, VT
New Gloucester Black Gum Stand, ME
Orono Bog, ME
Pachaug-Great Meadow Swamp, CT
Passadumkeag Marsh and Boglands, ME
Penny Pond-Joe Pond Complex, ME
Poutwater Pond, MA
Rhododendron Natural Area, NH
Spruce Hole Bog, NH
The Hermitage, ME
White Lake Pitch Pine, NH
Thompson Pond, NY

Aquatic Ecosystems
Marine Environments
Monhegan Island, ME

Estuaries
Iona Island Marsh, NY
North and South Rivers, MA

Lakes and Ponds
Achusnet Cedar Swamp, MA
Barton River Marsh, VT

Chester Cedar Swamp, CT
Cornwall Swamp, VT
Ell Pond, RI
Great Swamp, NJ
Iona Island Marsh, NY
Lake Willoughby Natural Area, VT
Little Otter Creek MArsh, Vt
Lynnfield Marsh, MA
Meddybemps Heath, ME
Pachaug-Great Meadow Swamp, CT
Passadumkeag Marsh and Boglands, ME
Penny Pond-Joe Pond Complex, ME
Pondicherry Wildlife Refuge, NH
Poutwater Pond, MA
Troy Meadows, NJ

Streams
Barton River Marsh, VT
North and South Rivers, MA

ATLANTIC COASTAL PLAIN

Landforms of the Present
*Plains, Plateaus, and Mesas

Sculpture of the Land
Camp E. F. Boyd Natural Area, GA

Eolian Landforms
Bear Island, NC
Nags Head Wood and Jockey Ridge, NC
Seashore Natural Area, VA

River Systems and Lakes
Great Dismal Swamp, VA

Works of Glaciers
Muskeget Island, MA

Seashores, Lakeshores, and Islands
Bear Island, NC
Gardiner's Island, NY
Gay Head Cliffs, MA
Goose Creek State Park Natural Area, NC
Long Beach, Orient State Park, NY
Muskeget Island, MA
Nags Head Wood and Jockey Ridge, NC
Seashore Natural Area, VA
Smith Island, NC
St. Phillip's Island, SC
Virginia Coast Reserve, VA
Wassaw Island, GA

Geologic History
Mississippian-Permian Periods
Gay Head Cliffs, MA

*Triassic-Cretaceous Periods

Oligocene-Recent Epochs
Gay Head Cliffs, MA

Land Ecosystems
Eastern Deciduous Forest
Belt Woods, MD
Big Hammock Natural Area, GA
Caledon State Park, VA
Camp E. F. Boyd Natural Area, GA
Congaree River Swamp, SC
Francis Beidler Forest, SC
Green Swamp, NC
Long Green Creek and Sweathouse Branch, MD
Long Beach, Orient State Park, NY
Manahawkin Bottomland Hardwood Forest, NJ
Osceola Research Natural Area, FL
Pigeon Swamp, NJ
Salyer's Ridge Natural Area, NC
Stone Harbor Bird Sanctuary, NJ
Virginia Coast Reserve, VA

Aquatic Ecosystems
Marine Environments
Bear Island, NC
Gardiner's Island, NY
Goose Creek State Park Natural Area, NC
Long Beach, Orient State Park, NY

Nags Head Wood and Jockey Ridge, NC
Smith Island, NC
St. Phillip's Island, SC
Virginia Coast Reserve, VA
Wassaw Island, GA

Estuaries
Gardiner's Island, NY
St. Phillip's Island, SC

Lakes and Ponds
Battle Creek Cypress Swamp, MD
Big Reed Pond, NY
Charles C. Steirly Natural Area, VA
Congaree River Swamp, SC
Ebenezer Creek Swamp, GA
Francis Beidler Forest, SC
Goose Creek State Park Natural Area, NC
Great Dismal Swamp, VA
Green Swamp, NC
Lewis Island Tract, GA
Okefenokee Swamp, GA
Pigeon Swamp, NJ
Seashore Natural Area, VA
St. Phillip's Island, SC

Streams
Ebenezer Creek Swamp, GA
Francis Beidler Forest, SC

GULF COASTAL PLAIN

Landforms of the Present
*Plains, Plateaus, and Mesas

*Cuestas and Hogbacks

Sculpture of the Land
Dismals, AL

River Systems and Lakes
Bayside Resaca Area, TX
Big Lake Natural Area, AR
Catfish Creek, TX
Horseshoe Lake Natural Preserve, IL
Reelfoot Lake, TN

Seashores, Lakeshores, and Islands
Bayside Resaca Area, TX

Caves and Springs
Ezell's Cave, TX
Ichetucknee Springs, FL
Natural Bridge Caverns, TX
Wakulla Springs, FL

Geologic History
*Triassic-Cretaceous Periods

*Paleocene-Eocene Epochs

Oligocene-Recent Epochs
Mississippi Petrified Forest, MS

Land Ecosystems
Eastern Deciduous Forest
Bienville Pines Scenic Area, MS
Big Oak Tree, MO
Chestnut Oak Disjunct, MS
Dismals, AL
Florida Caverns Natural Area, FL
Horseshoe Lake Natural Preserve, IL
McAnulty's Woods, TN
Mobile-Tensaw River Bottomlands, AL
Torreya State Park, FL
White River Sugarberry Natural Area, AR

Grassland
Attwater Prairie Chicken Preserve, TX
Harrell Prairie Hill, MS
Santa Ana National Wildlife Refuge, TX

Aquatic Ecosystems
Marine Environments
Bayside Resaca Area, TX
Mobile-Tensaw River Bottomlands, AL

Estuaries
Mobile-Tensaw River Bottomlands, AL

Underground Systems
Florida Caverns Natural Area, FL

Lakes and Ponds
Big Lake Natural Area, AR
Green Ash-Overcup Oak-Sweetgum Research Natural Areas, MS
Horseshoe Lake Natural Preserve, IL
Mobile-Tensaw River Bottomlands, AL
Santa Ana National Wildlife Refuge, TX
Spooner Springs, GA
White River Sugarberry Natural Area, AR

Streams
Catfish Creek, TX
Wakulla Springs, FL

FLORIDA PENINSULA

Landforms of the Present
*Plains, Plateaus, and Mesas

*River Systems and Lakes

Seashores, Lakeshores, and Islands
Lignumvitae Key, FL
Reed Wilderness Seashore Sanctuary, FL
Waccasassa Bay State Preserve, FL

*Coral Islands, Reefs, and Atolls

Caves and Springs
Manatee Springs, FL
Rainbow Springs, FL

Geologic History
*Oligocene-Recent Epochs

Land Ecosystems
Eastern Deciduous Forest
Devil's Millhopper, FL

Tropical Ecosystems
Big Cypress Bend, FL
Corkscrew Swamp Sanctuary, FL
Lignumvitae Key, FL
Reed Wilderness Seashore Sanctuary, FL

Aquatic Ecosystems
Marine Environments
Lignumvitae Key, FL
Reed Wilderness Seashore Sanctuary, FL

*Estuaries

*Underground Systems

Lakes and Ponds
Big Cypress Bend, FL
Corkscrew Swamp Sanctuary, FL
Devil's Millhopper, FL
Emeralda Marsh, FL
Paynes Prairie, FL

Streams
Manatee Springs, FL
Rainbow Springs, FL
Silver Springs, FL

HAWAIIAN ISLANDS

Landforms of the Present
Mountain Systems
Diamond Head, HI
Koolau Range Pali, HI
Mauna Kea, HI

Works of Volcanism
Diamond Head, HI
Iao Valley, HI
Koolau Range Pali, HI
Mauna Kea, HI
North Shore Cliffs, HI

Sculpture of the Land
Iao Valley, HI
Koolau Range Pali, HI

*Eolian Landforms

*River Systems and Lakes

Works of Glaciers
Mauna Kea, HI

Seashores, Lakeshores, and Islands
North Shore Cliffs, HI
*Coral Islands, Reefs, and Atolls

Geologic History
*Oligocene-Recent Epochs

Land Ecosystems
Tropical Ecosystems
Kanaha Pond, HI
Makalawena Marsh, HI

*Aquatic Ecosystems

Marine Environments
North Shore Cliffs, HI

*Estuaries

Lakes and Ponds
Kanaha Pond, HI
Makalawena Marsh, HI
Mauna Kea, HI

*Streams

PACIFIC MOUNTAIN SYSTEM

Landforms of the Present
*Plains, Plateaus, and Mesas

Mountain Systems
Aniakchak Caldera
Iliamna Volcano, AK
Mount Veniaminof, AK
Redoubt Volcano, AK
Shishaldin Volcano, AK

Works of Volcanism
Aniakchak Caldera
Bogoslof Island, AK
Iliamna Volcano, AK
Mount Veniaminof, AK
Redoubt Volcano, AK
Worthington Glacier, AK

Seashores, Lakeshores, and Islands
Simeonoff National Wildlife Refuge, AK

Geologic History
Oligocene-Recent Epochs
Middleton Island, AK

Land Ecosystems
Tundra
Mount Veniaminof, AK

*Boreal Forest

*Pacific Forest

Aquatic Ecosystems
Marine Environments
Bogoslof Island, AK
Simeonoff National Wildlife Refuge, AK

*Estuaries

Lakes and Ponds
Lake George, AK

Streams
McNeil River State Game Sanctuary, AK

INTERIOR AND WESTERN ALASKA

Landforms of the Present
Plains, Plateaus, and Mesas
Clarence Rhode National Wildlife Range, AK

*Mountain Systems

*River Systems and Lakes

*Works of Glaciers

*Seashores, Lakeshores, and Islands

Geologic History
*Oligocene-Recent Epochs

Land Ecosystems
Tundra
Clarence Rhode National Wildlife Range, AK

*Boreal Forest

Aquatic Ecosystems
*Marine Environments

*Estuaries

*Lakes and Ponds

*Streams

BROOKS RANGE

Landforms of the Present
*Mountain Systems

Works of Volcanism
Arrigetch Peaks, AK

*River Systems and Lakes

Works of Glaciers
Arrigetch Peaks, AK

Geologic History
*Triassic-Cretaceous Periods

Land Ecosystems
*Tundra

*Boreal Forest

Aquatic Ecosystems
Lakes and Ponds
Walker Lake, AK

*Streams

ARCTIC LOWLAND

Landforms of the Present
*Plains, Plateaus, and Mesas

*River Systems and Lakes

*Seashores, Lakeshores, and Islands

Geologic History
*Triassic-Cretaceous Periods

*Oligocene-Recent Epochs

Land Ecosystems
*Tundra

Aquatic Ecosystems
*Marine Environments

*Estuaries

*Lakes and Ponds

*Streams

VIRGIN ISLANDS

Landforms of the Present
*Mountain Systems

*Works of Volcanism

*Seashores, Lakeshores, and Islands

Coral Islands, Reefs, and Atolls
Green Cay, VI
Lagoon Point, VI
Salt River Bay, VI
West End Cays, VI

Geologic History
Triassic-Cretaceous Periods
Green Cay, VI
Coki Point Cliffs, VI
Vagthus Point, VI

*Paleocene-Eocene Epochs

Land Ecosystems
Tropical Ecosystems
Sandy Point, VI

Aquatic Ecosystems
Marine Environments
Lagoon Point, VI
Sandy Point, VI
Salt River Bay, VI

Estuaries
Salt River Bay, VI

PUERTO RICO

Landforms of the Present
*Plains, Plateaus, and Mesas

Mountain Systems
Bano De Oro Natural Area, PR

*Works of Volcanism

*River Systems and Lakes

Seashores, Lakeshores, and Islands
Cabo Rojo, PR
Puerto Mosquito, PR

Geologic History
*Paleocene-Eocene Epochs

Land Ecosystems
Tropical Ecosystems
Bano De Oro Natural Area, PR
Cabo Rojo, PR
Rio Abajo Forest, PR

Aquatic Ecosystems
Marine Environments
Mona and Monita Islands, PR
Puerto Mosquito, PR

Estuaries
Cabo Rojo, PR
Puerto Mosquito, PR

*Streams

GUAM

Landforms of the Present
*Plains, Plateaus, and Mesas

Mountain Systems
Facpi Point, GU
Fouha Point, GU
Mount Lamlam, GU

Works of Volcanism
Facpi Point, GU
Fouha Point, GU
Mount Lamlam, GU

*River Systems and Lakes

Seashores, Lakeshores, and Islands
Facpi Point, GU
Fouha Point, GU
Puntan Dos Amantes, GU

Coral Islands, Reefs, and Atolls
Facpi Point, GU
Fouha Point, GU
Puntan Dos Amantes, GU

Caves and Springs
Facpi Point, GU
Fouha Point, GU
Puntan Dos Amantes, GU

Geologic History
*Oligocene-Recent Epochs

Land Ecosystems
Tropical Ecosystems
Mount Lanlam, GU

Aquatic Ecosystems
Marine Environments
Facpi Point, GU
Fouha Point, GU
Poutan Dos Amantes, GU

*Estuaries

*Streams

AMERICAN SAMOA

Landforms of the Present
Mountain Systems
Rainmaker Mountain

Works of Volcanism
Aunuu Island
Fogamaa Crater
Matafao Peak
Rainmaker Mountain
Vaiava Strait

Sculpture of the Land
Leala Shoreline

Seashores, Lakeshores, and Islands
Aunuu Island
Leala Shoreline

Coral Islands, Reefs, and Atolls
Aunuu Island
Cape Taputapu
Leala Shoreline

Geologic History

Land Ecosystems
Tropical Ecosystems
Matafao Peak

Aquatic Ecosystems
Marine Environments
Leala Shoreline

*Estuaries

As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural and cultural resources. This includes fostering wise use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people. The department also promotes the goals of the Take Pride in America campaign by encouraging stewardship and citizen responsibility for the public lands and promoting citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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