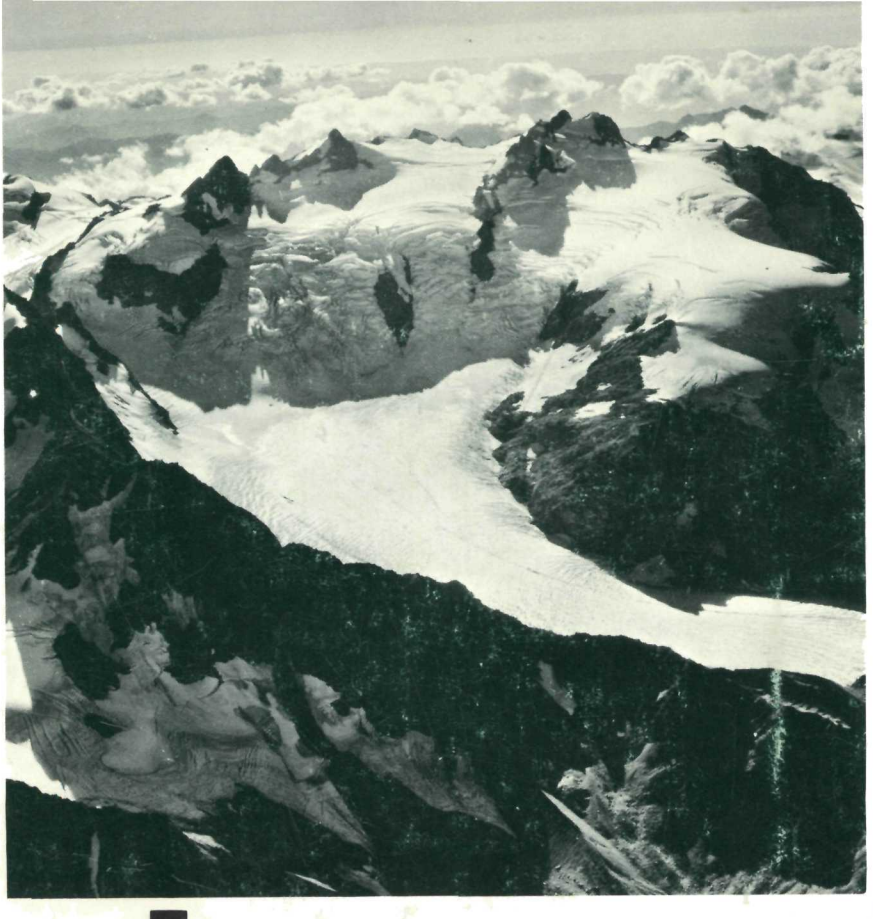

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national park·Washington

UNITED STATES
DEPARTMENT OF THE INTERIOR
Stewart R. Udall

NATIONAL PARK SERVICE
George B. Hartzog, Jr.

NATURAL HISTORY HANDBOOK NUMBER ONE

This publication is one of a series of handbooks explaining the natural history of scenic and scientific areas in the National Park System. It is printed by the Government Printing Office and may be purchased from the Superintendent of Documents, Washington, D.C., 20402. Price .55 cents.

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By GUNNAR O. FAGERLUND

NATURAL HISTORY HANDBOOK SERIES No. 1
WASHINGTON, D. C., 1954 (Revised 1965)

Administration

Olympic National Park, established on June 29, 1938, and containing about 1,400 square miles, is administered by the National Park Service, U.S. Department of the Interior.

The National Park System, of which this park is a unit, is dedicated to conserving the scenic, scientific, and historic heritage of the United States for the benefit and enjoyment of its people.

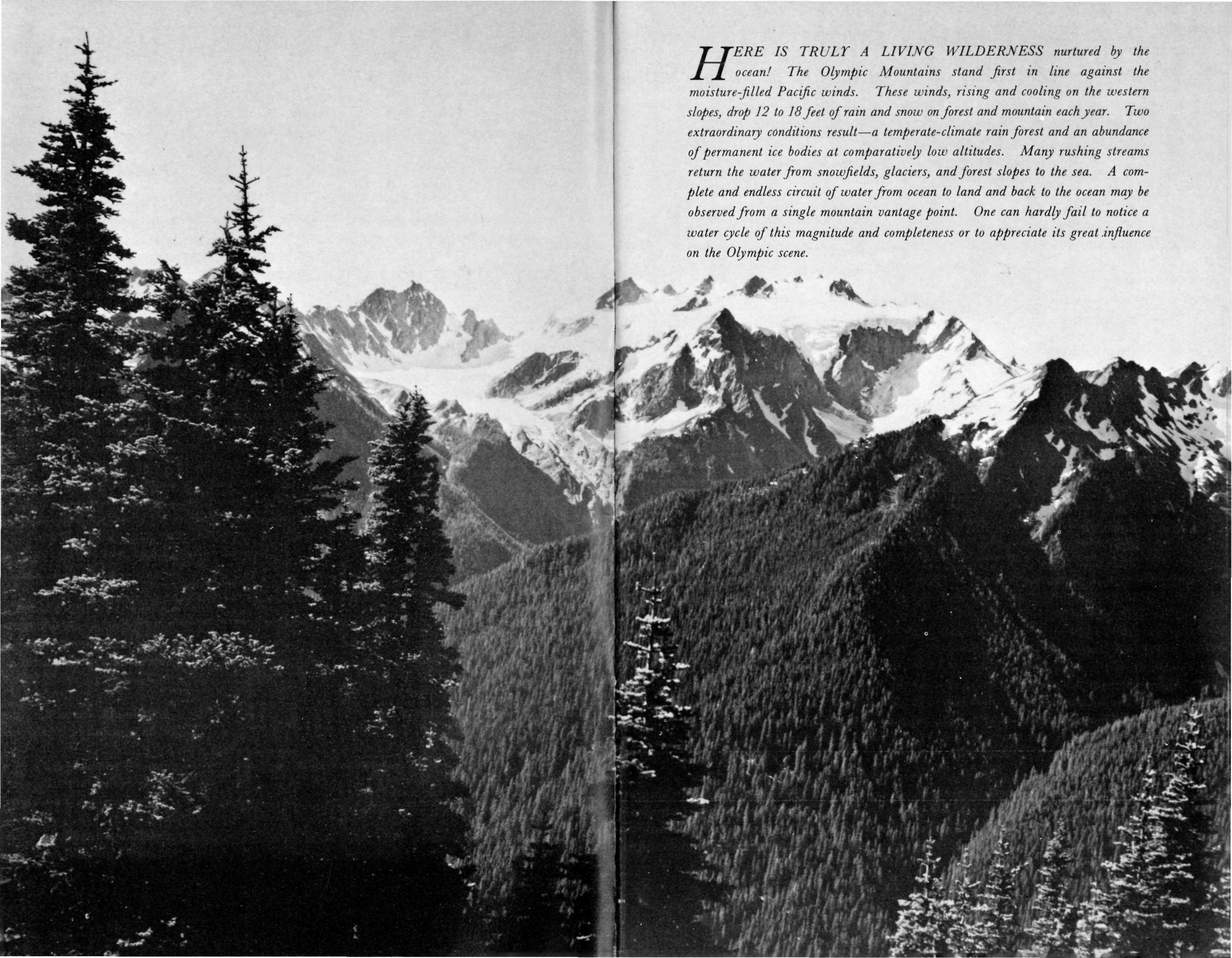
A superintendent, whose address is 600 East Park Avenue, Port Angeles, Wash., 98362, is in immediate charge of the park.

America's Natural Resources

Created in 1849, the Department of the Interior—America's Department of Natural Resources—is concerned with the management, conservation, and development of the Nation's water, wildlife, mineral, forest, and park and recreational resources. It also has major responsibilities for Indian and territorial affairs.

As the Nation's principal conservation agency, the Department works to assure that nonrenewable resources are developed and used wisely, that park and recreational resources are conserved, and that renewable resources make their full contribution to the progress, prosperity, and security of the United States—now and in the future.

Contents



HERE IS TRULY A LIVING WILDERNESS nurtured by the ocean! The Olympic Mountains stand first in line against the moisture-filled Pacific winds. These winds, rising and cooling on the western slopes, drop 12 to 18 feet of rain and snow on forest and mountain each year. Two extraordinary conditions result—a temperate-climate rain forest and an abundance of permanent ice bodies at comparatively low altitudes. Many rushing streams return the water from snowfields, glaciers, and forest slopes to the sea. A complete and endless circuit of water from ocean to land and back to the ocean may be observed from a single mountain vantage point. One can hardly fail to notice a water cycle of this magnitude and completeness or to appreciate its great influence on the Olympic scene.

Olympic rocks tell of their having been formed of mud, sand, and lava, uplifted from the sea; they tell of earth disturbance that alternately submerged the land beneath the sea and elevated it into mountains. The rocks and the shape of the land also tell of colder climates, when ice from the north made almost a glacier island of the Olympic Mountains, and of mountain valley glaciers which sculptured the mountains during thousands of years. The rugged beauty of the Olympic high country, enhanced by scores of mountain lakes, bears testimony to the former presence of these extensive glaciers.

Only about 11,000 years have passed since the last wave of northern ice retreated and laid bare Olympic rocks. Since then the moist and gentle climate has favored the growth of plants and the development of soil. The present Olympic forests and flowering meadows are products of a succession of plantlife from the first lichens and mosses that grew on Olympic rocks. Animals returned when the ice retreated. Plant eaters and meat eaters, large and small, throve in abundance. When primitive man came, he found the land and sea kindly. He easily obtained what he needed for food, clothing, and shelter without depleting the supply.

While most of the Northwest was being explored and settled by the white man during the 19th century, the bulk of the Olympic Peninsula remained virtually unknown. Its rugged mountains, dense forests, and isolation contributed to the delayed advance of modern civilization to this northwesternmost corner of conterminous United States. The Olympic Peninsula thus remained one of the last frontiers, and the park retains genuine wilderness quality, even to its boundaries which descend to sea level.

In this piece of original America the perceptive eye and mind will find a functioning model of nature—a model of earth forces, climate, and life.

The Mountains Are Formed

The present Olympic Mountains were born between 12 and 20 million years ago when western Washington was pushed up into a great range that extended from Cape Flattery southeastward to the eastern part of the State. At the same time, the land to the north and south was depressed and remains depressed today as Juan de Fuca Strait and Chehalis Valley, respectively. The Olympics were further elevated about 5 million years ago. This coincided with the building of the Cascade Mountains and the down-folding of the land between to form the Puget Sound trough. The Olympics were now isolated, having lowland on all sides.

Olympic rocks formed in shallow seas that at least five times have covered western Washington. Sediments washed from adjacent land areas and accumulated on the sea bottom. Muds became shales and

sands were cemented into sandstones. Molten lava erupted through these beds and was quickly cooled by the water. Thousands of feet of rock material formed in this way.

When earth forces lifted the sea floor, the sea disappeared, and for long periods there were mountains where the sea had been.

Pressure and heat changed the rocks, especially the sedimentary rocks, which became harder and tougher. Shale changed progressively into slate and phyllite. All of these rocks are found in the Olympic Mountains. The sedimentary rocks and lava flows, originally horizontal on the sea floor, were tilted and folded when uplifted and this is how we see them today.

Long periods of erosion have removed thousands of feet of rock and remolded the Olympics into magnificently rugged mountains. Thus, earth forces build mountains and water slowly carries them back to the sea. So it has been since the first rains fell upon the cooling earth.

Today only the oldest rocks remain, for these were the bottom layers. The greater part of the Olympic Mountains are made up of these rocks, now mostly slates and hardened sandstones. This includes all the rock inside a horseshoe-shaped line running from the village of Sappho east to Lake Crescent, Lake Mills, and Deer Park, then south to the west side of Mount Constance and the north end of Lake Cushman and then west to Lake Quinault. The horseshoe-shaped rim of the mountains outside this line is mostly basaltic lava.

Because fossils are scarce in the oldest rocks, geologists are not certain about their age, but they are thought to be about 120 million years old. The rocks in the outer rim of the Olympic Mountains contain more fossils. These have been found in the sandstones, shales, and limestones interbedded with the thick volcanic rocks. Fish teeth, marine clams, snails, algae, wood fragments, and microscopic shells found here represent forms of life that existed 50 to 60 million years ago.

MOUNT ANGELES SHOWS TILTED ROCKS UPHEAVED FROM THE SEA BOTTOM.

Glaciation

Other important geological events started about a million years ago. As the climate of the world became colder a great ice sheet formed to the north and moved down across Canada into the United States. There were periods when the climate warmed and the ice retreated. It advanced again when temperatures lowered during tens of thousands of years. The sheet moved southward at least four times during the last million years.

At the same time, valley glaciers flowed out of the mountains of British Columbia, joined forces, and formed a piedmont glacier that moved southward into Puget Sound and against the eastern edge of the Olympic Mountains. A lobe of this glacier branched off and flowed westward through Juan de Fuca Strait. This piedmont glacier, at least 3,000 feet thick, rubbed the northern edge of the Olympic Mountains and sent ice fingers up the valleys. It brought granite boulders from the north and dropped them along the way when it melted. Some of these granite boulders have been found near Camp Wilder, 25 miles up the Elwa River Valley, and as high as 3,000 feet on the side of Klahhane Ridge.

As the ice moved west along the northern border of the mountains, it plowed and scraped the deepened and ancient valley that filled with water when the ice melted. This valley contains Lakes Crescent and Sutherland. These and numerous other telltale marks attest to the work of a thick ice sheet.

Approximately 11,000 years have elapsed since the retreat of the last northern ice sheet from Washington.

With the onset of colder climate, valley glaciers also formed in the Olympic Mountains. They flowed from high mountain cirques down the valleys, probably filling the valleys during times of greatest ice volume and becoming thinner and shorter during times of warmer climate. Like the larger ice sheets from the north, the valley glaciers of the mountains must have advanced and retreated periodically. The greatest advance was as much as 25 to 40 miles in the Hoh, Queets, and Quinault Valleys. A terminal moraine left by a glacier dams Quinault Valley and holds the lake behind it.

The Shape of the Land Today

Knowledge of the geological history of an area enables us to better understand the shape of the land today. It will be recalled that earth movements depressed the land on the north, south, and east, leaving the Olympic Mountains standing alone, isolated from other mountains. However, they are a segment of that elongated western fringe of

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mountains known as the Coast Range. In all that range the Olympics are the highest; yet, for western mountains they are not high, dominating Mount Olympus being only 7,965 feet above sea level. This is not to suggest, however, that the Olympics are small. These mountains have their base at sea level, or not much above, and viewed from any lowland position they appear impressive indeed. A mountain climb will confirm this idea of their size.

The Olympics are not a single range of mountains but a profusion of peaks and ridges with intervening valleys—a mountain dome 60 miles across from north to south and east to west, cut by glaciers and numerous streams into rugged peaks and steep-walled valleys. There are nearly a hundred named peaks in Olympic National Park.

Mount Olympus occupies a central position on the Peninsula. To the west the ridges descend gradually and merge with the coastal plain which varies from a few to 20 miles in width. The eastern half of the Olympics maintains a high elevation all the way to the eastern edge. There they drop steeply to Hood Canal, an arm of Puget Sound, leaving but little lowland on that side of the Peninsula. The mountains end abruptly on the north side, too, but with some foothills between them and the shores of Juan de Fuca Strait, some 3 to 6 miles distant. Except for the western slopes, the ridges have a fairly uniform elevation of between 5,000 and 6,000 feet, and the peaks rise 1,000 to 2,000 feet higher.

The Olympic high country shows the effects of glacier scouring everywhere. Numerous lakes lie in basins that were scooped out by the same glaciers that carved circular hollows at the heads of valleys. Slopes sweep upward from the basins with increasing steepness and in many places end in serrated rock ridges and pinnacles.

More than a dozen streams flow out of the Olympic Mountains, returning rain and melt water to the ocean. They drop down steeply from the high level basins; after a few swift miles they flatten out and the water takes a slower pace.

Glaciers Today

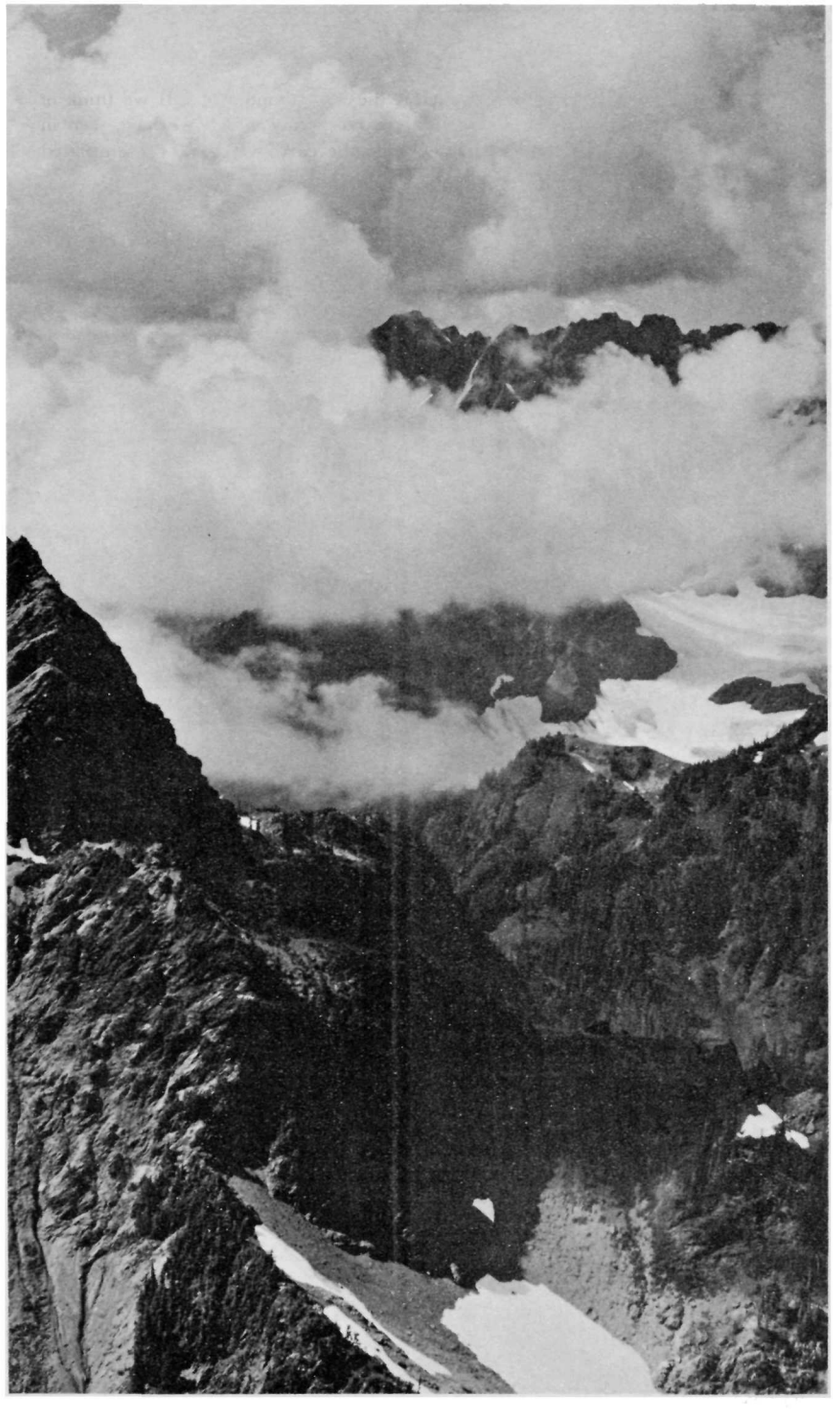
A glacier is an accumulation of ice large enough to move of its own weight. Mountain glaciers form at high altitudes where snowfall exceeds melting and the snow builds up annually until, largely due to its weight, the lower layers become solid ice. When the depth of this ice becomes great enough—100 feet or more—it will flow down slope and the ice is transported to lower altitudes where warmer temperatures cause the ice to melt. The glacier terminates where this melting equals the amount of ice moving down from the area of accumulation.

LAKE ANGELES LIES IN A CIRQUE ON THE SIDE OF MOUNT ANGELES.

The glaciers in the Olympic Mountains today are small indeed compared to the extensive glaciers that formerly filled the valleys and sculptured the mountains. The shape of the land testifies that a greater number of glaciers once were here. However, more than 60 glaciers, having a collective area of at least 20 square miles, are present today in the Olympic Mountains. Mount Olympus alone has 6 major glaciers, and the total area of permanent snow and ice on it is more than 10 square miles. Several other mountains also have glaciers, notably Mounts Anderson, Christie, Tom, and Carrie.

In addition, there are numerous snow patches that remain from one winter to the next but are not thick enough to form glaciers. Viewed from a high position, a panorama of north-facing slopes presents a profusion of snow and ice patches. The presence of so much snow and ice in mountains of modest height does not mean they are enveloped with inhospitable cold. It is due to the abundance of winter snow and considerable cool weather which retards its melting.

Glaciers are very sensitive to climate. Even slight changes in snowfall or temperature can cause them to advance or recede. Most glaciers everywhere have been shrinking during the past century. In recent years, western Washington climate has been cooler and wetter. As a result, many glaciers in this region, including Blue Glacier, have enlarged slightly.



ANDERSON GLACIER NESTLES ON THE FLANK OF MOUNT ANDERSON, ONE OF SEVERAL HIGH AND RUGGED PEAKS ON THE PARK'S EASTERN EDGE.

Climate and the Water Cycle

Of all inorganic substances, acting in their own proper nature, and without assistance or combination, water is the most wonderful. If we think of it as the source of all the changefulness and beauty which we have seen in clouds; then as the instrument by which the earth we have contemplated was modeled into symmetry, and its crags chiseled into grace; then as, in the form of snow, it robes the mountains it has made, with that transcendent light which we could not have conceived if we had not seen; then as it exists in the foam of the torrent—in the iris which spans it, in the morning mist which rises from it, in the deep crystalline pools which mirror its hanging shore, in the broad lake and glancing river; finally, in that which is to all human minds the best emblem of unwearied, unconquerable power, the wild, various, fantastic, tameless unity of the sea; what shall we compare to this mighty, this universal element, for glory and for beauty? or how shall we follow its eternal changefulness of feeling? It is like trying to paint a soul.—*Ruskin*

The earth's supply of water is fixed—it is used over and over again. What falls on land as rain or snow runs off, evaporates, or sinks into the ground. That which sinks into the ground may return: (1) to the air, by transpiration from plants and by evaporation from soil; and (2) to the sea, as ground water either flowing into streams or directly into the sea. All water falling upon the land eventually returns to the sea or to lakes whence it came. It evaporates and precipitates again and again. This continuous round of moisture is known as the hydrologic, or water, cycle. It is impressively demonstrated in the Olympics.

Salt water borders the Olympic Peninsula on three sides. Lowland on the south completes the isolation of the mountains. From atop some mountain peaks one can see the Olympic water cycle in its entirety—ocean, "cloudscape," snowfields, glaciers, streams from source to mouth returning water to the sea, and forests transpiring moisture into the air.

A landscape is an expression of climate. The Olympic landscape, with its rain forests, snowfields, glaciers, lakes, and numerous streams in deep valleys, is a superb expression of a superhumid climate. Abundant water is the prime source of Olympic's character. The prevailing on-shore winds acquire much moisture in passing over the ocean. The windward slopes of the Olympics cause this nearly saturated ocean air to rise. Consequently, the western slopes of the Olympic Mountains receive the greatest precipitation in the conterminous United States.

The Hoh Ranger Station has a mean annual precipitation of 142 inches, with 174.6 inches recorded in 1961. Precipitation on Mount Olympus recorded in 1958 was 149 inches but this same year only 130 inches were received at the Hoh. Scientists who have been study-

ing Blue Glacier on Mount Olympus since 1957 believe the heads of the western valleys receive 200 inches in some years.

Marine climates have greater precipitation in winter than in summer. Seventy-six percent of the yearly precipitation in northwest Washington occurs during the 6 months between October 1 and March 31. There is no definite time for the beginning and ending of the "dry" and "rainy" seasons, as the transition is gradual and variable.

The Olympic Peninsula would be well watered even if there were no mountains. The mountains, however, are responsible for wringing the bulk of the moisture from the saturated clouds and for creating local variations in the amount of precipitation. After passing over the mountains, the air is warmed in descending the leeward slopes. Consequently, the lowland areas on the lee side of the mountains are much drier than on the windward side. For instance, on the Olympic Peninsula at Sequim (pronounced Squim) the mean annual precipitation is less than 17 inches, and irrigation is required for successful agriculture.

Another prominent characteristic of the climate is the mildness of the winters at low elevations. In fact, western Washington is milder in winter than any other section of the continent in the same latitude. The reasons for this are the warming influence of the ocean and the protecting influence of the Cascade Mountains and of the Rocky Mountains against the flow of cold continental air westward to the coast.

Storm centers that pass eastward across Washington in winter shift to the north in summer, resulting in sunny summer weather that is delightfully cool under the influence of the ocean.

THE SOLEDUCK RIVER RUSHES THROUGH THE DEEP FOREST.

Our continent has a variety of climates, and each climatic area has its appropriate vegetation. Generally, the interiors of continents do not have forests, but have grass or desert vegetation. The most luxuriant forests develop near oceans where climate is sufficiently moist. This is true of other continents as well as North America.

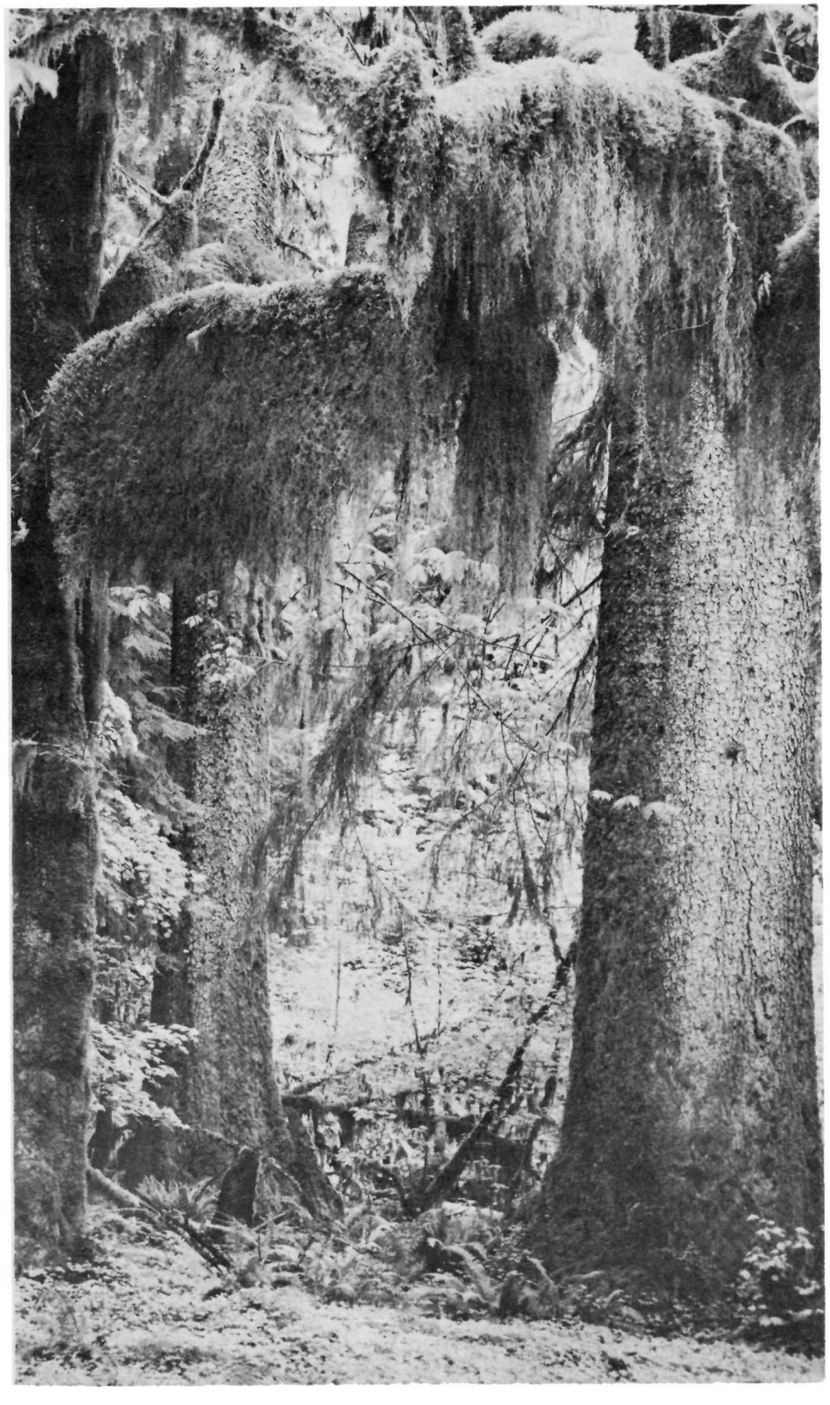
The differences in the general character of our natural vegetation from coast to coast and border to border are apparent despite three centuries of man's disturbance in the East and one century in the West. Sizeable samples of some of the many kinds of original vegetation are preserved in national parks and monuments. These are precious remnants of our plant heritage that become more valued year by year in proportion to their scarcity elsewhere.

The mild, humid climate of the northern half of the Pacific slope is unusually favorable for forest growth. The most luxuriant of the western forests developed here in unbroken stretches. The forests that girdle the Olympic Peninsula represent the best development of this evergreen forest domain. Its ultimate composition is of western hemlock and western redcedar in dense stands, with trunks commonly 4 to 6 feet in diameter and 125 to 200 feet tall. Their crowns shut out most of the sunlight, but enough gets through to the bottom of the forest for the growth of mosses and ferns. Shrubs grow dense and tall, in places becoming almost impenetrable to hikers. Fallen trees of all sizes soon are enveloped by the lush growth in the damp shade, and in time return to the soil through decay.

Hemlock and redcedar seedlings take root in the forest litter or on prostrate, moss-covered trunks. They are able to live in the deep shade. The most hardy of them outstrip their rivals, and when a vacancy occurs in the forest canopy their growth speeds up. Thus a forest of hemlock and redcedar is maintained. This is the climax forest in the lowlands of the northwest coast. It is the kind of forest the climate here will produce and maintain in the absence of interference.

Interference has been the rule, however, both before and since the coming of man. Therefore, the climax forest is less common than the subclimax in which Douglas-fir is the dominant tree. Forest fires have repeatedly exposed the forest floor to sunlight and thus allowed the development of Douglas-fir, by far the most abundant and widespread tree in northwest forests. In the regeneration of a forest after fire, logging, or other disturbance, it is Douglas-fir that is ever present.

The northwest coast is an evergreen land. This may not be apparent in summer, however, when all plants are green. Not counting the numerous mosses that are always green, there are 73 species of evergreen plants on the Olympic Peninsula.



DRAPERIES OF CLUBMOSS HANG FROM LIMBS IN THE RAIN FOREST.

RAIN FOREST

An extraordinary forest has developed along the western slopes of the Coast Range where moisture is available in the greatest abundance. The most typical and beautiful expression of this coastwise forest is found in the western valleys and on the coastal plain of the Olympic Peninsula. It is the most luxuriant growth in any temperate climate and may properly be called a rain forest. This temperate-climate rain forest, however, is not like the rain forests of the hot, superhumid tropics. Here, there are tall conifers instead of broad-leaved trees; there are mosses and ferns on the ground instead of an understory of vines.

The rain forest is principally distinguished by the presence of Sitka spruce. This tree grows only in a narrow belt along the coast from northern California to Alaska. The other trees of the rain-forest community have much wider distribution.

The trees of this forest are among the largest in the world. Many of them have trunks that exceed 10 feet in diameter at 4½ feet above the ground, and are up to 300 feet tall. The largest known trees in the park for the most common species are: western redcedar, 21 feet 4 inches in diameter; Sitka spruce, 13 feet 4 inches; Douglas-fir, 14 feet 5 inches; western hemlock, 9 feet; and Pacific silver fir, 6 feet 10 inches.

A visit to the rain forest offers a surprisingly enjoyable experience. Although it is possible to drive through some sections, this provides only a view of the trees. A forest is more than a stand of trees—it includes animal life, smaller plants, and micro-organisms, such as bacteria. All these serve the forest and in turn, their well-being depends upon the forest. They form the forest community.

Splendid examples of rain forest may be seen in the Hoh, Queets, and Quinault Valleys, but the Hoh Valley is the most accessible. A paved road runs 19 miles up the Hoh from U.S. 101, ending 7 miles inside the park boundary where a National Park Service campground has been developed. The Hoh River Trail starts just beyond the nearby visitor center. It extends 18 miles to Glacier Meadow, close to Blue Glacier on Mount Olympus. Approximately 12 miles of it is in rain forest along the valley bottom. Only a small fraction of this distance need be traveled, however, to see the forest.

Unexpectedly, one finds this forest beautifully luminous. It is filled with soft, green light that drops down where it can find room between the towering spruces and hemlocks. In the lower levels of the forest it filters through the translucent leaves of the vine maple and bounces from one green surface to another. Nature, in an exuberant mood, has lavishly decorated this forest with mosses and clubmosses. Moss carpets, with patterns of Oregon oxalis and beadruby, cover the forest floor. The same material upholsters fallen trees and the trunks of

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MOSS AND BEADRUBY PATTERN ON THE FLOOR OF THE RAIN FOREST.

those standing. Mosses ascend to the very tops of some of the tallest trees. Arched trunks of vine maple are cushioned with them. Curtains of clubmosses hang from the same archways, separating one green forest room from another.

The forest cycle from seed germination to death of giant trees and their return to soil may be seen here in the course of a short stroll. This is a cycle endlessly repeated. No part of it is disturbed by man. Trees felled either by uprooting or by breaking of the trunk are scattered everywhere in various degrees of decay. Rain-forest trees have shallow but widespreading roots. To obtain nourishment, there is no need for deep roots where water is available in dependable abundance. But shallow roots in saturated soil do not always anchor trees firmly enough against storm winds.

Though dead and prostrate, the fallen trees still have an important function in the forest. They are soon accepted into the forest-floor community and become covered with lichens and mosses. Various fungi and bacteria attack them from within. They become nurseries for spruce and hemlock, whose seedlings prefer rotting wood. The most vigorous seedlings outgrow all others and send their roots down the flanks of the rotting log and into the ground. Such old nurse

THE SHELF FUNGUS IS ONE OF THE NUMEROUS ATTRACTIVE FUNGI.

logs, if big enough, will last until the trees they foster grow to large size. Colonnades of huge trees may thus be seen straddling old moldering logs. Seeds may even take root upon a broken stump 12 feet or more above the ground. The roots reach the soil after creeping down the full length of the stump. The result, when the stump rots and crumbles away, is a tree standing on stilts. Thus the forest is regenerated. New life compensates death. There is neither increase nor decrease in total amount. What is dead eventually returns to soil and feeds the living. This is brought about through the work of saprophytes—plants without chlorophyll, the substance which gives plants their green color. They must obtain their food already made and are content to take it dead. Many of these are mushrooms and other fungi with colorful and beautifully shaped fruiting bodies. No better description of their function in the forest can be found than that written by Donald Culross Peattie.

> Breaking up the debris of what was living, releasing the precious materials in it, these fungi, and certain bacteria, retrieve the vital elements from what would otherwise be a permanent and cumulative and ultimately disastrous loss. They are part of what we call decay, but they are as much a part of life. They turn over its wheels . . . .

MOUNTAIN VEGETATION

A visit to Olympic is not complete without at least one trip into the high country. Aside from the numerous trails that lead up into the mountains, there are two high country areas that may be reached by car. These are Hurricane Ridge and Deer Park. Whether the trip is made on trail or on road, an understanding of the changing pattern of plantlife will make it more enjoyable.

The climate at the top of a mountain is unlike that at the base; accordingly, the plants are different. Plant scientists have found that these vegetation differences on a mountain are similar to the changes seen between the equator and the poles. Generally speaking, each 100-foot rise in elevation is equivalent to about a 20-mile distance north. Although the change may be gradual, there are distinguishable belts of vegetation on a mountain. These belts are called life zones and have names that indicate their correspondence to zones between the equator and the poles.

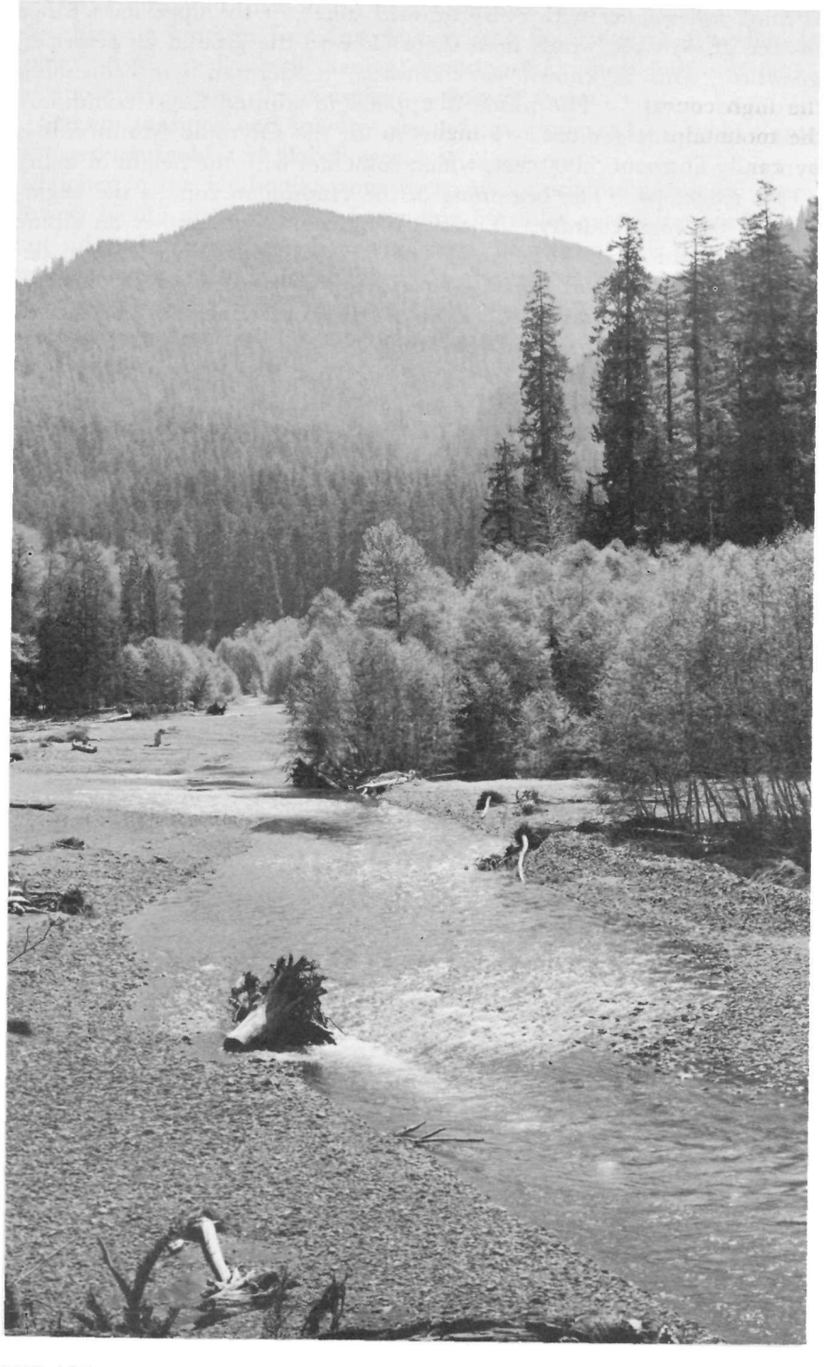
Altogether there are four life zones in the Olympic Mountains: Transition, Canadian, Hudsonian, and Arctic-Alpine. The vegetation of the last three is similar to that of regions to the north at lower elevations, as indicated by their names.

The Transition zone in the Olympics is the lowest. It is intermediate between southern and northern vegetation. The lowland forests, including the rain forest already described, are in this zone.

The next two zones also are forest, but somewhat different. The highest, or fourth, zone is treeless. The boundaries between the forest zones here are not sharp; it is difficult to know exactly where one ends and the next begins. This merging of forest zones in the Olympic Mountains may be due to the equable temperature extending well up the mountain slopes.

The Canadian zone should be apparent when an elevation of 2,000 feet is reached. The forest of this zone is somber compared with that of the Transition zone. Although it has many kinds of small shrubs and herbaceous plants, it lacks the striking greenness of the Transition forest. Western white pine and Pacific silver fir have entered it. Western redcedar is absent, while Douglas-fir and western hemlock remain. There are numerous saprophytes on the forest floor—most of them flowering plants such as pinedrops, Indian-pipe, and coralroot.

The Hudsonian zone is next, and is the highest one having forest vegetation. Around 3,500 feet elevation there is a mingling of Canadian and Hudsonian trees. Some trees of the Canadian zone are still found, but some different kinds are included in the forest composition. The characteristic Hudsonian zone trees are mountain hemlock, Pacific silver fir, alpine fir, and Alaska-cedar. The last-named has typical cedar foliage. Its branches and twigs droop as if they were wilted. Trees in this zone are much smaller than those at lower altitudes and



RED ALDER IS THE FIRST TREE TO GROW AT THE EDGE OF THE CHANGING COURSES OF THE RAIN FOREST RIVERS.

become still smaller with every upward step. At the uppermost fringe of tree growth the winds hold them close to the ground as deformed growths. This is known as *krummholz,* a German word meaning "crooked wood." The name is applied to stunted forest commonly found in alpine regions. Timberline in the Olympic Mountains is generally at about 5,000 feet, which coincides with the height of many of the ridgetops. The beginning of the Hudsonian zone is the beginning of the high country. The sky is bluer and in summer an alpine fragrance adds zest to the air. The forested slopes give way, in depressions, to meadows that are brilliant with wildflowers in summer. Basins carved by snow and ice hold numerous mountain lakes, with streams flowing into and out of them.

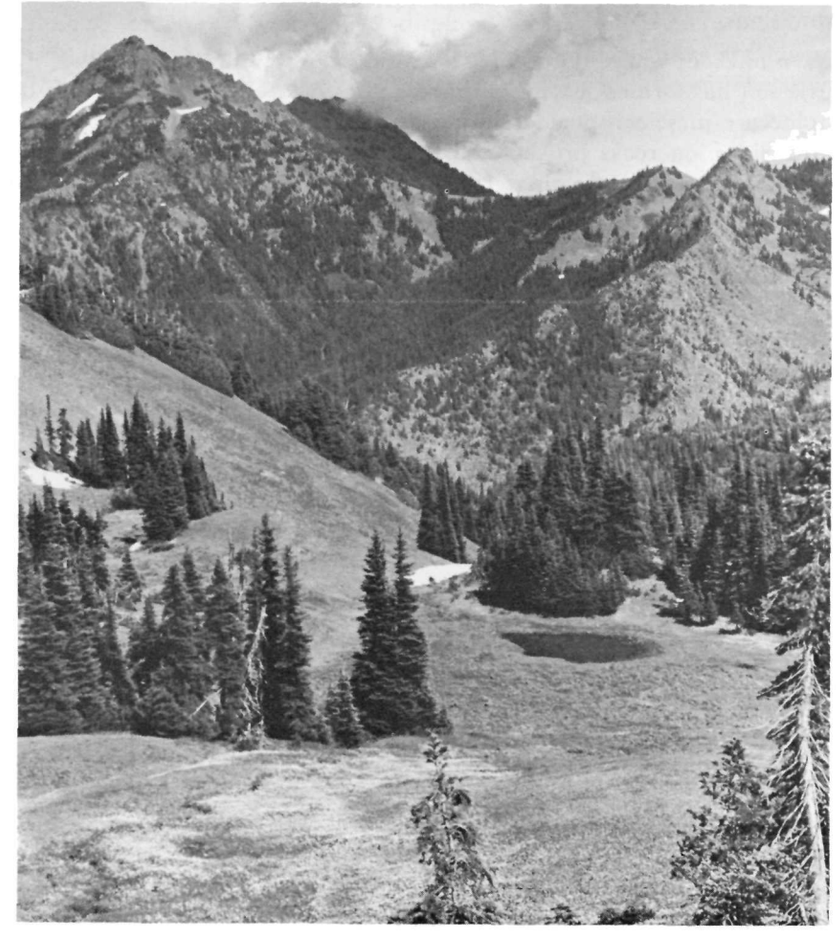
THE CANADIAN AND HUDSONIAN LIFE ZONES ARE REPRESENTED IN THE RESPECTIVELY HIGHER FOREST BELTS THAT LIE ABOVE LUSH RAIN FORESTS.

The Hudsonian meadows, in depressions above 3,500 feet, are knee-deep in grass in July and August, and flowers form a medley of color. Aster, pedicularis, arnica, shootingstar, cinquefoil, and false-hellebore are among the conspicuous flowers there.

Stream margins and marshy ground are preferred by such plants as marshmarigold and globeflower.

Higher in the Hudsonian zone there are prairielike meadows where flowers bloom in profusion. Extending 60 miles across the north and east sides of the park there are thousands of acres of this meadowland on the ridges. Hurricane Ridge is in the midst of this and presents some of the finest flower displays. Some slopes in early summer are white with avalanche lilies, one of the most abundant and widespread

MEADOWS AND CLUSTERS OF TREES OF THE HUDSONIAN ZONE.



of the mountain flowers. Near timberline they grow among the trees, as well as in the open. Other meadows are yellow with pure stands of glacier lily, one of the earliest of spring flowers. Impatient with winter, it pushes through the thinning snowbanks. Where soil is deep, subalpine lupine blooms profusely. Among the most common and conspicuous in rich meadows are larkspur, buttercup, cinquefoil, paintbrush, arnica, tiger lily, and mountain buckwheat.

Several plants found in the mountains in the northeast part of the park, where rainfall is lighter, are more typical of the hot, arid lowlands of eastern Washington and Oregon. Some of these are nodding onion, woolly eriophyllum, and barestem lomatium—their presence in the mountains may be due to the fact that the broad ridgetop meadows in the northeastern part of the park are remnants of a lower plain where these plants grew before the Olympic Mountains had risen to their present height. As the mountains were pushed up, these plants could have continued to grow and reproduce despite changing conditions.

On hillsides where the rock has weathered only into chips, or where little soil has formed, carpets of spreading phlox and rosettes of Lyall lupine are most conspicuous in early summer. Some plants grow on talus slides, on rocks broken and tumbled from peaks above, and on rocks laid bare by retreating glacial ice. Lichens and mosses, pioneers among plants, etch the rock with weak acids and thus start the slow conversion of rock into soil. Some flowering plants are pioneers, too. Common ones growing in crevices and soil pockets among the rocks in the Hudsonian zone are smooth douglasia, alumroot, and bluebell. Eventually, a flowered meadow or forested slope develops where first there was only bare rock.

The Arctic-Alpine zone is the region above timberline. It corresponds to the arctic meadows of northern Canada. In the Olympics its lower limit is about 5,000 feet and its upper limit is the tops of the peaks.

It is a harsh environment. Its shallow soil and rocks, its wind and prolonged snow and cold exclude all but the hardiest perennials. Annuals cannot live there. One growing season is too short for a plant to start from seed, complete its vegetative growth, flower, and ripen its seeds. Many of the plants are surface plants, such as mosses and lichens, which do not produce flowers. But even the flowering plants hug the ground. Their over-wintering buds are at or below the ground surface. It is a struggle for moisture and against time. Only low perennials, having small, tough leaves covered with hairs or wax, are able to survive. These properties help protect the plants against loss of water.

There are 8 kinds of mountain plants in the Olympics that are

not known to grow anywhere else. It appears that these plants grew in the Olympic Mountains before the ice came and were able to survive on ridgetops that remained free of glacial ice during the long cold periods. They are thus relicts from preglacier time. None of them are trees and only two are shrubs. All the rest are herbs. Several of these, among which piper bellflower and Flett violet are especially attractive, may be found on Hurricane Ridge and on the upper slopes of Mount Angeles.

Snow is vital to mountain flowers. It provides most of the moisture for their growth and governs the length of the growing season. Spring flowers appear earliest where the snow melts first. Where snow piles up deeply, it may not melt completely till midsummer or may melt too late for plants to complete a season's growth. On northern slopes the snow may remain all summer, and there can be no growing season.

The high country has many floral patterns, which change as the seasons progress. The flower displays are usually best around the middle of July. Flowers of spring, summer, and autumn are blooming then, according to the progress of the seasons in different elevations and habitats.

ALPINE FIR GROWS NEAR TIMBERLINE.

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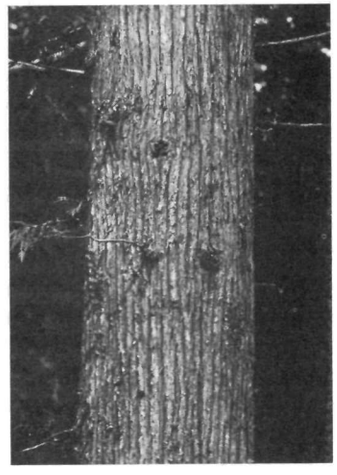
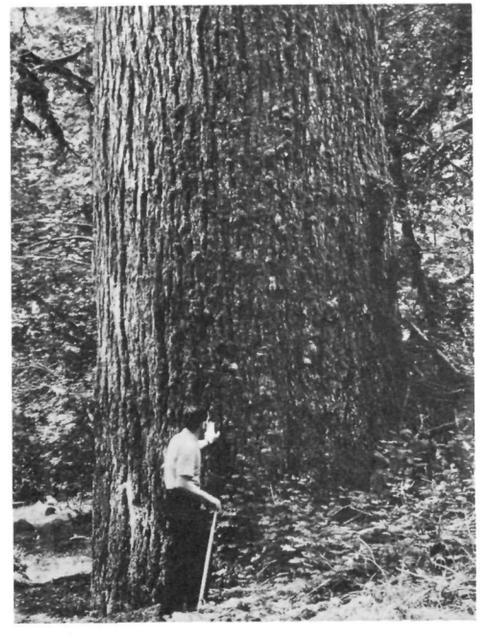
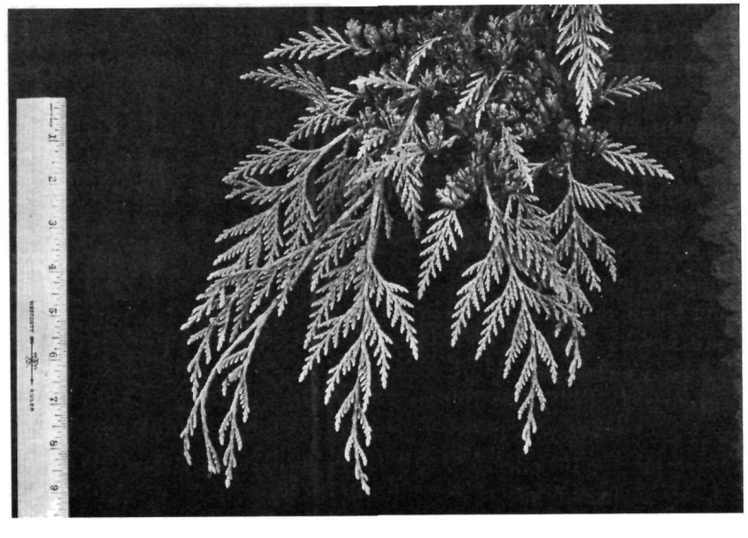


WESTERN REDCEDAR BARK HAS FAIRLY REGULAR NARROW GROOVES AND RIDGES.



NEXT TO THE SEQUOIAS OF CALIFORNIA, DOUGLAS-FIR IS THE GREATEST TREE IN THE FORESTS OF THE WESTERN HEMISPHERE.

WESTERN REDCEDAR. CONES ARE ABUNDANT ON SOME TREES.



Out of more than a thousand kinds of trees, shrubs, ferns, and flowering herbs on the Olympic Peninsula, 28 are described in the following paragraphs. While this is but a small fraction of the total, they represent the most common and noticeable plants that can be identified easily.

The park is a sanctuary for all natural features, and care should be taken not to disturb, injure, or destroy trees, flowers, or other plantlife.

TREES

DOUGLAS-FIR *(Pseudotsuga menziesii)* gives principal distinction to the Northwest forests. Growing from sea level to 5,000 feet elevation, it is the most abundant and widespread tree on the Olympic Peninsula. Average mature trees in the virgin forests of the lowlands are 180 to 250 feet in height and 4 to 6 feet in diameter. The largest on record—14 feet 5 inches in diameter—is located in the Queets River Valley, about 3½ miles by trail from the end of the road. Next to the sequoias of California the Douglas-fir is the largest tree in the forest of the Western Hemisphere.

Large Douglas-firs in the forest commonly have nearly cylindrical boles, clear of limbs for a hundred feet. Such trees have a reddish-brown bark which is rough with ridges and deep furrows. The cones, whether on the tree or on the ground beneath the tree, provide easy and reliable identification. They are mostly 2½ to 3 inches long with 3-pointed, thin bracts protruding among the scales. The seeds are a favorite food of the Douglas squirrel.

WESTERN REDCEDAR *(Thuja plicata)* grows in the valley bottoms and other moist places. Although it is mainly a lowland tree, it extends up into the Canadian zone wherever conditions are favorable. Large trees in the forest average 150 to 175 feet in height and 3 to 8 feet in diameter. The largest western redcedar on record is 21 feet 4 inches in diameter. It is located in the Pacific Coast Area near Kalaloch and can be reached by a short spur road near Beach Trail 6.

The trunk of the western redcedar commonly tapers rapidly from a swollen and sometimes fluted base. Its bark is thin, fibrous, and stringy. The foliage hangs in long, lacy sprays. It is the only tree of the lowland forests which has leaves that are tiny, overlapping scales.

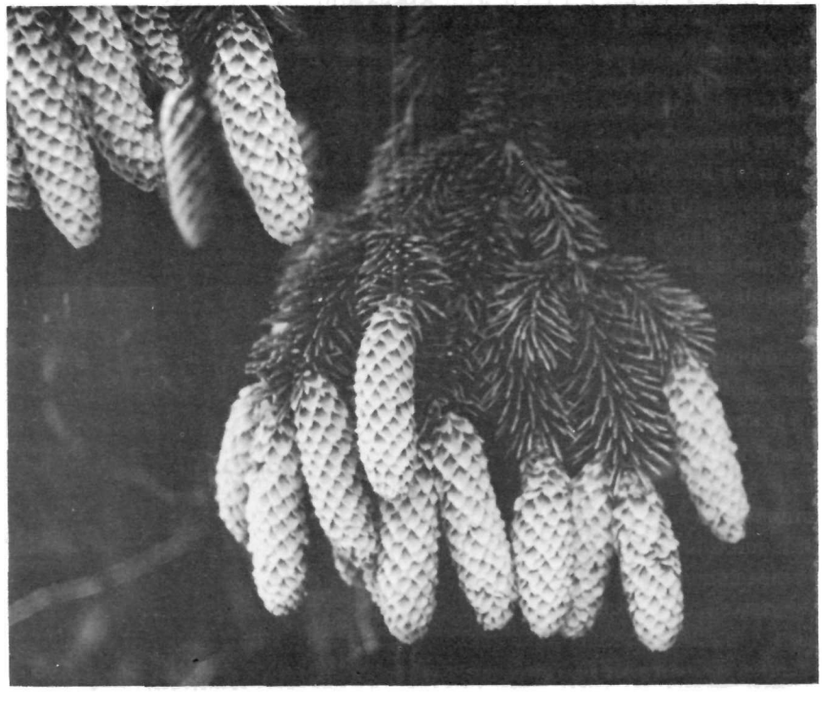
WESTERN HEMLOCK *(Tsuga heterophylla)* is abundant in Northwest forests up to about 3,000 feet elevation. Large forest trees are 125 to 175 feet in height and 2 to 4 feet in diameter. The largest recorded specimen of this tree, 9 feet in diameter, is located above Enchanted Valley in the

park. Western hemlock can be identified by its foliage and cones. The needles vary in length from ¼ to 1 inch and are pliable and round-pointed. The lacy sprays of foliage have a delicate appearance. The top shoot of the tree bends over in an arc—another identifying characteristic. The cones, about three-quarters of an inch long, are usually abundant near the ends of the branches.

SITKA SPRUCE *(Picea sitchenis)* is a coastwise tree from Alaska to California. In the park it is common only in the rain forest on the west side. There, large trees are 225 to 300 feet in height and 5 to 8 feet in diameter. Many are 10 feet or more in diameter. The largest specimen recorded, 13 feet 4 inches in diameter, is located in the park about 4 miles above the Hoh Ranger Station. Sitka spruce and the three preceding species comprise what might be called the "big four" in Olympic forests.

Sitka spruce can be identified by its stiff and very sharp-pointed needles. They are ½ to ¼ inches long and extend outward from all sides of the twig. It can be distinguished from other associated trees by the thin silvery-gray to purplish-gray scales on its bark. The base of the tree is commonly enlarged because of the massive roots that grew downward from the top of a stump or large fallen tree where the seed germinated.

SITKA SPRUCE CONES HANG IN CLUSTERS AT THE ENDS OF BRANCHES.



PACIFIC SILVER FIR *(Abies amabilis)* is a tree of middle elevations, or the Canadian zone. In favorable sites, it attains a height of 140 to 160 feet and a diameter of 2 to 4 feet. The record tree, 6 feet 10 inches in diameter, is by the Bogachiel River about 8 miles by trail from the end of the road. A striking characteristic of this needle-leaved tree is its smooth, ashy-gray bark, conspicuously marked with chalky-white areas and numerous resin blisters.

ALPINE FIR *(Abies lasiocarpa)* is the spirelike tree of the highest life zone, the Hudsonian. Under favorable conditions it reaches a height of 60 to 90 feet, but at timberline it is a twisted, stunted growth only a few feet high. Its narrow crown extends to the ground, which makes this tree particularly susceptible to crown fires. Many ridgetop areas have "silver" forests of bleached trunks of fire-killed alpine fir. The purple to gray-purple cones, 2 to 4 inches long, stand upright on the branches as in all true firs.

ALASKA-CEDAR *(Chamaecyparis nootkatensis)* is a Hudsonian zone tree, easily identified by its foliage. The slender, drooping branches and flat, weeping sprays appear to be wilted. The leaves are of tiny, overlapping scales. This tree could be confused with the western red-cedar, but as the two grow at different elevations identification should

NUMEROUS SMALL RESIN-FILLED BLISTERS ON A PACIFIC SILVER FIR.

THIS SITKA SPRUCE STARTED LIFE ON TOP OF A HIGH STUMP WHICH ROTTED AWAY LEAVING THE GROWING TREE STANDING ON STILTLIKE ROOTS.

PACIFIC MADRONE'S REDDISH-BROWN BARK SCALES OFF IN THIN LAYERS.

be easy. The largest specimen recorded, 7 feet 8 inches in diameter, is on the trail to Hart Lake above Enchanted Valley.

PACIFIC MADRONE *(Arbutus menziesii)* is a tree of the lower elevations distinguished by its smooth, reddish-brown trunk and branches and its shiny, leathery, broad-leaved, evergreen foliage. The bark of the trunk may be loosely scaly, peeling off in long, thin, irregular pieces. This is especially noticeable in late summer when new, light-green bark is exposed by the flaking away of the older red bark.

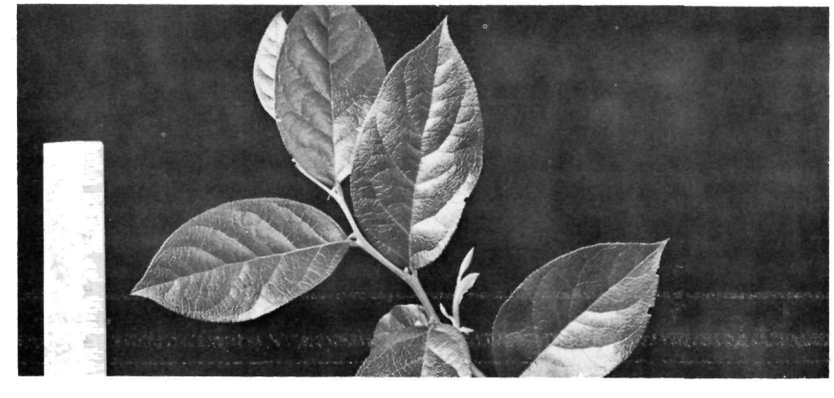
SHRUBS

SALAL *(Gaultheria shallon)* is the most common shrub in the forests of the Olympic Peninsula. Near the coast it grows 6 to 10 feet high in nearly impenetrable stands. Inland and at higher elevations up to about 3,000 feet, it is much smaller. Its evergreen, leathery leaves with finely toothed edges are easily distinguished from those of other shrubs. They are oblong and mostly 2 to 3 inches long. Urn-shaped, white to pink flowers in 1-sided racemes become black, edible berries later in summer. These berries were gathered by coast Indians and made into syrup or thick, dried cakes.

PACIFIC RED ELDER *(Sambucus callicarpa)*. This large shrub becomes noticeable along roadsides in summer because of its large, dense clusters of brilliant red "berries."

CREAMBUSH ROCKSPIREA *(Holodiscus discolor)* is an erect shrub, growing 5 to 14 feet high. In June it becomes conspicuous in lowlands because of its numerous, large, dense, drooping sprays of cream-colored flowers. Ocean spray is another common name for this shrub.

SALAL IS ONE OF MANY BROAD-LEAVED EVERGREEN PLANTS.



NONWOODY PLANTS

FIREWEED *(Epilobium angustifolium)*. The rose-colored, spirelike, flowered tops attract attention wherever it is found. The name fireweed has been given because it comes up quickly in burned areas. It is not restricted to burned places, however, for it grows wherever there is unpreempted space in sunny locations, as along roadsides. It may be seen in flower throughout the summer, since it grows from sea level to 5,000 feet in elevation. The blooming progresses to higher elevations as the season advances. Its leaves are similar to those of willow, which accounts for another common name—willowweed.

WESTERN SWORDFERN *(Polystichum munitum)*. This is the western counterpart of the common Christmasfern. It is a large, conspicuous, evergreen fern—the most prominent fern in these forests. The individual leaflets are lance-shaped, have fine-toothed edges, and are attached to the stem of the frond by means of a short stalk.

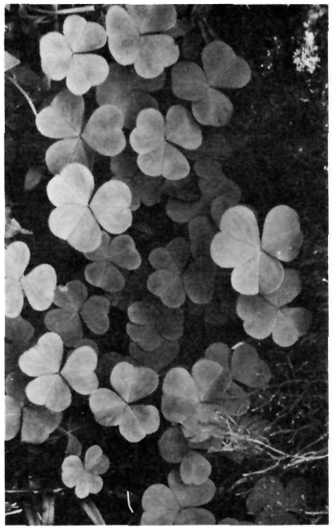
DEERFOOT VANILLALEAF *(Achlys triphylla)*. This is probably the most common herbaceous, flowering plant in these forests from sea level to about 4,000 feet in elevation. It is a foot or more in height and commonly forms extensive patches. It can be identified easily by the three broad, fan-shaped leaves at the top of the slender, wiry stem. If the central leaf is bent back, the other two represent a spreading, green-winged butterfly. The small flowers form a slender, white, upright spike above the leaves. The foliage contains a compound which has the fragrance of vanilla. This is given off when the leaves wilt and accounts for another popular name—sweet-after-death.

OREGON OXALIS *(Oxalis oregana)*. This small, delicate, white-flowered plant, has leaves that resemble a three-leaf clover. It grows among the mosses in the moist, shady forest and is especially noticeable in the plant carpet on the floor of the rain forest. The plant contains oxalic acid, which gives the leaves a pleasant sour taste. Another common name is wood sorrel.

QUEENCUP BEADLILY *(Clintonia uniflora)*. The hiker will find this attractive plant in flower at middle elevations, mostly in the Canadian zone. Each plant has two or three prominent, narrowly oblong, lilylike leaves growing from the base of the plant and one clear-white, lilylike flower. The fruit is a single turquoise berry.

OREGON WINTERGREEN *(Pyrola rotundifolio)*. This handsome pyrola is found up to about 3,000 feet elevation. Several leathery, roundish leaves, which have stems as long as the leaves, arise from the base of

DEERFOOT VANILLALEAF.



OREGON OXALIS.

QUEENCUP BEADLILY.

WESTERN SWORDFERN.

the plant and spread out to form a rosette. They are glossy green on top. From the center of this rosette rises a reddish flower stalk, 8 to 16 inches tall, that bears pink to reddish, waxy flowers about a quarter of an inch in diameter.

SUBALPINE LUPINE *(Lupinus subalpinus)*. Early in July the mountain meadows become ornamented with large patches of this blue-flowered plant. Its flowers are the shape of pea blossoms. Lupine can be identified by the leaf, which consists of many leaflets radiating from a central point like the spokes of a wheel. This lupine is a leafy plant 8 to 24 inches high.

LYALL LUPINE *(Lupinus lyallii)*. This small lupine grows in dry, rocky soil at higher elevations, mostly above timberline in the Arctic-Alpine zone. Its small, but typically lupine, leaves are hairy and spread out to form a rosette. The blue flowers, in many short, compact spikes, usually are spread in rosette manner.

SUBALPINE LUPINE.

AVALANCHE LILY *(Erythronium montanum)* is a white lily, with a yellow center, abundant in early summer on mountain meadows and in woods near timberline.

GLACIER LILY *(Erythronium grandiflorum)*. This plant is similar, except that the flowers are yellow and slightly smaller. It blooms earlier than its white counterpart and one must look for it where the snow is melting. Both the avalanche and glacier lilies have two basal leaves.

MAGENTA PAINTBRUSH.

SCARLET PAINTBRUSH *(Castilleja miniata)*. The brilliant color of this plant is not in its flowers, which are hidden, but in the leafy bracts that surround them. One can imagine that the "flowers" are brushes dipped in scarlet paint and then turned upward.

MAGENTA PAINTBRUSH *(Castilleja oreopola)* is similar to the scarlet paintbrush, except in color.

AVALANCHE LILY.

TIGER LILY.

OWLCLOVER *(Orthocarpus imbricatus)* is a relative of the paintbrushes; it may be incorrectly identified as one of them. The "flower" is magenta-colored, but it differs from that of the paintbrush in being compact and nearly ball-like. Each plant has only one flower stalk, while paintbrush usually has more than one. Paintbrush and owl-clover bloom in the mountain meadows in midsummer.

TIGER LILY *(Lilium columbianum)* is a tall, leafy plant of the rich meadows that bears from two to many large, orange, brown-spotted flowers. On the lowland meadows the flowers appear in May, but in the meadows of the Hudsonian zone, they do not bloom until July.

MOUNTAIN BUCKWHEAT *(Polygonum bistortoides)*. Although this flower is not especially attractive, its abundance in mountain meadows gives it importance among the common plants of the park. It grows thickly among grasses and sedges, is 10 to 20 inches tall, and in July and August bears a compact, oblong spike of white flowers at the top of the slender stem.

SPREADING PHLOX *(Phlox diffusa)* is a prickly, mosslike plant that forms cushions or mats on dry, gravelly slopes above timberline. In early summer, it bears numerous, small, white-to-lavender flowers close to the foliage. Entire hillsides may be covered with a patchwork of this hardy alpine plant.

BLUEBELL *(Campanula rotundifolia)* grows from sea level to the dry, rocky slopes above timberline. At the higher elevations it blooms from July to September and can be recognized easily by its pale blue, nodding, bell-like flowers about three-quarters of an inch long.

SPREADING PHLOX.

ROOSEVELT ELK. THE BULLS GROW NEW ANTLERS EACH YEAR.

One of the reasons for establishing Olympic National Park was to insure "protection and preservation of interesting fauna, notably the rare Roosevelt elk . . ." There are 54 species and subspecies of wild mammals occupying their primitive homes on the Olympic Peninsula (Murray L. Johnson and Sherry Johnson, *Check List of Mammals of the Olympic Peninsula*). Probably all of these occur within the park. The wildlife picture is not a static one, however, as natural disturbances, time, and man bring changes in numbers, kinds, and distribution.

Climatic changes have greatly affected the animal life. There have been periods of extreme cold and periods of warmth. At least four times the ice-age glaciers advanced and melted back. When ice sheets moved down from the north and extensive glaciers formed in the mountains, the animals left. When the ice retreated, the animals returned. Not all animal types were able to survive, so that some animals that once lived in Washington are now extinct. One of these was the mastodon, resembling the present-day elephant. In 1950, a fossil skeleton of a mastodon was found in an excavation on a farm near Port Angeles, and tusks and parts of skeletons have been found from time to time in the bluffs east of Port Angeles.

Because the Olympic Mountains are isolated from other mountains, some animals of the Pacific Northwest have never found their way to the park. For instance, several kinds of animals in the Cascade Mountains are unknown in the Olympics. These include the mantled ground squirrel, pika or cony, and red fox. The wolverine, now rare in the Cascades, has never been seen in the Olympics. But animals move about, and it is entirely possible that there will be natural additions to the Olympic fauna. Dr. Victor B. Scheffer has stated that the red fox and the porcupine are expected to invade the Peninsula sometime in the present century. During 1951, two porcupines were seen on the Peninsula near the ocean—one at Kalaloch and another south of Queets Village.

Other changes have been brought about directly or indirectly by man. The Olympic wolf—a big, gray, magnificent animal—was once fairly numerous, but, because of merciless poisoning and hunting before the park was established, it is now probably extinct.

The coyote, renowned for his ability to survive civilization, has invaded the Olympic Peninsula during the present century. To some extent this animal fills the ecologic niche left vacant by the disappearance of the Olympic wolf.

Long before the National Park was established, mountain goats were brought from British Columbia and Alaska and released on Mount Storm King, near Lake Crescent. The transplanted animals have thrived and multiplied, and have spread eastward across the park.

YOU AND THE ANIMALS

The animals of the park are an integral part of the wilderness scene. The principal purpose for which the park was established was to preserve and display the natural wilderness. Thus, the animals are wild, living in their natural habitat. Not only must the animals and their normal habits be preserved, but their wilderness home as well. Whether the presence of man will be disturbing to the wilderness and its dwellers depends upon how humans behave in it. Any act that would tend to break down wilderness animal behavior is harmful to wildlife and is a violation of park rules.

Proper behavior of park visitors in the presence of national park animals may need explanation. The feeding of wild animals by man is harmful to their best interest. For thousands of years they have been able to feed themselves, and their continued well-being depends on their doing so now and in the future. For example, black bears in Olympic have not yet become troublesome, but bears, by nature, are inclined to become spoiled if artificial feeding habits are encouraged. Bears normally eat many kinds of plant and animal foods, but a camper's larder contains tidbits that would tickle the palate of any bear. If an animal learns to associate food delicacies with campers, he will repeatedly seek experiences of that kind to the everlasting annoyance, misfortune, and even tragedy of the campers. The thoughtless camper who wilfully, or negligently, starts the bear on the road to ruin may escape the consequences. It is the bear himself and people who appear on the scene later who suffer for the deeds of earlier campers. The bear may become a dangerous nuisance and may have to be destroyed.

The only intelligent and humane solution is to refrain from all practices which tend to disturb or change the animal's normal way of life. Self-restraint and good camping practice are necessary in order to accomplish this. Under no circumstances offer food to a bear or leave food or garbage where he can get at it. Remember that he is powerfully muscled and can climb trees. Refuse, including cans and bottles, should be burned not only to destroy all that is edible but to destroy food odors. Then, when the charred cans and bottles are placed in refuse containers or buried, the bears will not smell them and dig them out.

While emphasis has been placed on the proper relationship with the bear, the same attitude toward other animals will help insure their well-being and your safety. Any attempt to feed a deer or a bear invites injury. Proper conduct in relation to wild animals is so important that regulations now prohibit the feeding, touching, teasing, or molesting of any bear, deer, elk, moose, bison, bighorn, or pronghorn in National Parks. The first three are found in Olympic.

SEEING THE MAMMALS

As long as animals remain completely wild there is little danger from them. The majority of mammal species are small, rare, secretive, or nocturnal, so for these or other reasons they may not easily be seen. They will try to avoid contact with people, and your problem will be to find them and to get close enough to see them well, without disturbing them. To do this, it is necessary to study their habits and to meet them on their own terms.

There is no scarcity of animals in Olympic; but the conditions for seeing even the larger ones, such as elk, deer, and bear, are not as favorable as in Yellowstone National Park, for instance. Olympic has less open country where unobstructed views may be enjoyed, especially in the lowlands. Even in the high country the rolling or rugged topography allows animals to move quickly out of sight behind ridges or rock outcrops.

Do not let these difficulties discourage you. The following suggestions may help you to see some of the more interesting mammals:

The ROOSEVELT ELK is also popularly known as the Olympic elk, because the largest remaining herds of this animal are on the Olympic Peninsula. The number here totals approximately 6,000 animals. These elk, however, still are found in various other parts of their original range, which includes the coastal forests from southern British Columbia to northern California.

The elk is the largest of the American deer family, except the moose. The bulls sometimes weigh as much as 1,000 pounds and the cows, 700. Both sexes have a heavy brown mane and a pale, yellowish rump patch. The bulls carry antlers, which are shed in late winter.

ROOSEVELT ELK IN A LUSH MOUNTAIN MEADOW IN OLYMPIC'S WILDERNESS.

Generally, the elk spend winters in the lowland forests and summers in the higher mountain meadows. Many of them, however, remain in the lowlands even in summer, so that it is possible to see elk in some of the western valleys of the park the year round.

During certain times of the year they are vocal. In May and June when the calves are born the cows sometimes bugle, and more frequently the calves give a high-pitched squeal.

Elk are polygamous and during the rutting season a bull will gather a harem, consisting of a few to a dozen or more cows, which he attempts to hold against all other bulls. There is much bugling by the bulls then—thrilling wilderness calls. You will probably recognize the source of this call the first time you hear it. The bulls become less shy during the rutting season and will permit closer approach. This should be done cautiously, however.

Almost any high-country meadow, except in the north to northeast part of the park, may hold a herd of elk from July through September. Cows, calves, and yearlings gather and remain in large herds until split up by the bulls when the mating season begins in the autumn. During summer, bulls remain apart from the cows, either in small groups or alone. The rutting period lasts from early September to mid-November, tapering off in the last month.

When the snow deepens in the mountains the elk that have summered in the high country come down into the valleys, where they gather in herds that may number 50 or more animals.

The COLUMBIAN BLACK-TAILED DEER is one of the most frequently observed larger mammals. Usually, it is seen in the early morning, late afternoon, evening, and often at night—the preferred feeding times. It remains bedded down in some secluded spot during much of the day. Anyone driving in western Washington at night is likely to see a deer suddenly bound out of the forest onto the highway. Where highways pass through localities having large deer populations, signs warn motorists of this danger.

In summer, deer prefer the upper Hudsonian zone, where forest and meadow mingle to provide both nutritious food and nearby secluded shelter. Hurricane Ridge and Deer Park are favorite summering grounds, and a visit to either area at deer mealtime is likely to be rewarding.

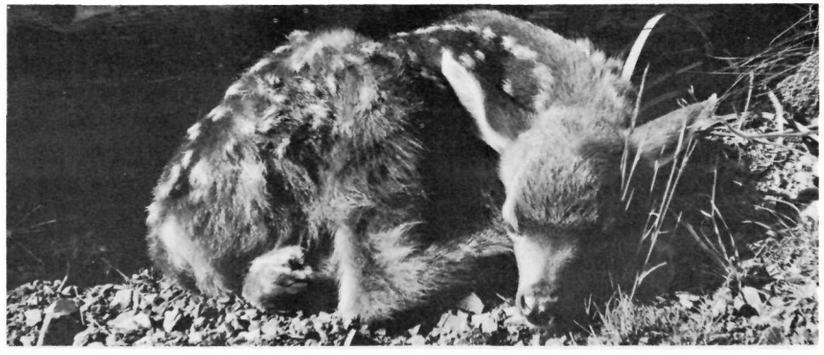
With encouragement and repeated opportunities to sample human food, a deer will become "spoiled"—a beggar lacking the sleekness and alertness of a wild creature. It is then no more than a specimen—like a plucked flower about to wilt. Also, it is potentially dangerous to the person who tries to feed it, for it can, and may, strike damaging blows with its sharp hooves. In the autumn mating season, males, "tame" or wild, can be dangerous.

COLUMBIAN BLACK-TAILED BUCK.

BLACK BEARS may be seen from sea level to alpine meadows in summer and early autumn. The socially disinclined bear travels alone, except for the mother with cubs. However, several bears may be in the same neighborhood for the same reason—food. From a ridgetop, the sleek, black forms may be seen against the green of the lush meadows below, where they search out ants, small rodents, and succulent herbage of various kinds. On mountain slopes covered with ripened huckleberries in late summer, bears become so engrossed with gorging on the delectable fruits that they may be stalked from downwind. A bear's keen nose quickly distinguishes nonwilderness odors. Should a shifting breeze waft a scent message his way, you will have to find yourself another bear to stalk. A bear's hearing is good, but his vision is less acute.

Bears frequent valley bottoms and other lowland areas during late autumn, winter, and spring and may be seen along streams during salmon runs. Apparently, bears in the Olympics do hibernate, but the mild winters make a long dormancy unnecessary. It appears that all Olympic bears are black—the brown pelage phase has not been reported.

A black bear is not a dangerous animal unless he has learned to seek food from people or from their camps. Although a mother bear with cubs is not to be trifled with, a bear without those family responsibilities is easily frightened by a shout or other sudden loud noise.

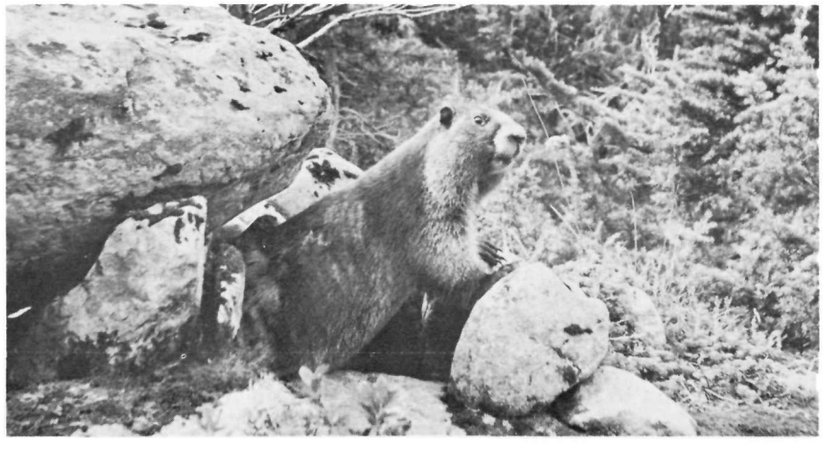


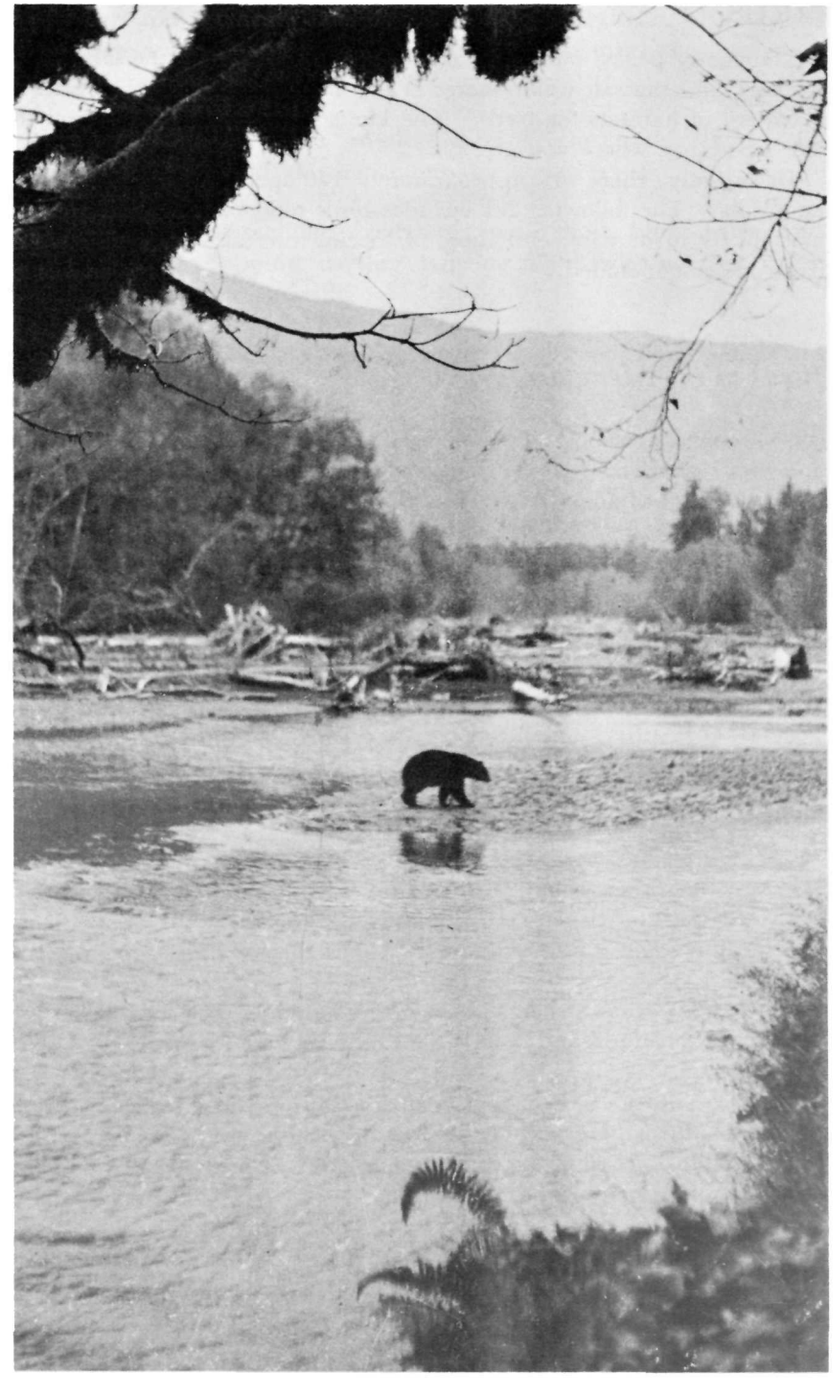
DEER FAWNS ARE COMMONLY LEFT ALONE WHILE THE MOTHER FEEDS.

OLYMPIC MARMOTS live just above or below timberline usually near well-watered meadows bordered by alpine fir clumps. Some are found on windswept ridgetop meadows or on rockslide areas. Marmots come out of hibernation in May and remain active until early September. They are most active in the early morning or evening during warm summer days. They have many burrows, which are easily spotted on alpine meadows. While they may feed long distances from their home dens, they are seldom far from burrows down which they can scurry at the first sign of danger.

Although marmots can best be seen and photographed on Hurricane Hill or Deer Park, they also occur in other high-country locations. The marmot blends well with his surroundings. You may not be aware of his presence until you hear his shrill alarm whistle, which at first you may mistake for a human whistle. It is so frequently heard in marmot territory that the name "whistler" has been given the animal.

OLYMPIC MARMOT LIVES IN BURROWS AND ROCKPILES NEAR TIMBERLINE.





BLACK BEAR. AN UNSPOILED ANIMAL IN ITS NATIVE WILDERNESS.

BIRDS

The snowy peaks, the mountain meadows, the forests, the lakes and streams, and the salt-water shores of the Olympic Peninsula constitute a variety of habitats for birds. The kinds of birds you can expect to see depend on where you are.

In summer, there are approximately 140 species on the Olympic Peninsula. The following list includes birds most easily identified and most likely to be seen, and those of special interest. Many common birds are not included.

Birds of the Mountain Peaks

GRAY-CROWNED ROSY FINCH—a rose-colored, sparrowlike bird, tame and easily observed. It feeds characteristically on or near open, rocky slopes and snowbanks.

Birds of the Mountain Meadows and Timberline

HORNED LARK—a brownish ground bird, whitish beneath, a little larger than a sparrow. Usually in pairs on bare field and open ground; they utter a plaintive *tee* when startled into flight. At close range, the forehead and throat show a pale yellow, bordered and striped with black. The male has two black, hornlike feather tufts on the head.

SPARROW HAWK—a small, slender hawk with pointed wings and a rusty-red tail and back. It commonly hovers in the air above fields and meadows and is numerous on the ridges during grasshopper season.

BLUE GROUSE—a dark, hen-shaped bird commonly seen feeding on the ground in meadows and woodland.

GRAY JAY—a usually silent, gray bird with a whitish area on top of the head and a black patch behind the white. It is a little larger than a robin. This jay appears at your camp or picnic expecting food and sometimes helping himself to it.

COMMON RAVEN—distinguished from the crow by its greater size and coarse, guttural croaks. It is seen on the meadows when grasshoppers are abundant.

MOUNTAIN BLUEBIRD—". . . a flash of azure blue—a crumb from the blue sky above!" (E. A. Kitchin in *Birds of the Olympic Peninsula.*)

OREGON JUNCO is the size of a sparrow, with black head, rusty-brown upperparts and white underparts. The blackish tail has white outer tail feathers.

RUFOUS HUMMINGBIRD—the smallest bird in the park. It can be identified by the rapid, darting, humming flight.

COOPER'S HAWK—a medium-sized hawk with short, blunt wings and a long tail. Its flapping, darting, twisting flight, with comparatively little soaring, is characteristic.

RED-TAILED HAWK—a large, soaring hawk with broad, blunt wings. In adults the tail is red on top.

Birds of the Forest

Few birds live in the deep forest, but many prefer its edges near streams and openings.

OREGON JUNCO—described in *Birds of the Mountain Meadows and Timberline.*

WINTER WREN—a tiny, dark-brown, short-tailed wren of the deep quiet woods. It sings a trill song from atop a snag or small tree during nesting season and scolds passers-by with staccato, rasping notes.

RUFFED GROUSE—similar to the blue grouse, but reddish-brown, with broad, blackish band toward tip of the tail.

PILIATED WOODPECKER—a big, black, crow-sized woodpecker with a white streak down each side of head and neck. The male has a scarlet tuft on top of head. This bird is found in the deep forest, particularly where there are many dead trees and snags.

GRAY JAY—described in *Birds of the Mountain Meadows and Timberline.*

STELLER'S JAY—a harsh-voiced blue bird with black head and conspicuous black crest.

VARIED THRUSH—somewhat resembles a robin, but has a black bib across the breast. It is a bird of the deep forests, where it is more often heard than seen. ". . . out of the silence comes a long-drawn quavering note with something of the quality of escaping steam; after a short interval the note is repeated in a higher pitch, again in a lower." (Ralph Hoffman in *Birds of the Pacific States.*)

RED-SHAFTED FLICKER—a stoutly built woodpecker with a black bib across the breast and a white rump. Orange underwings can be seen when bird is in flight, which is markedly undulating.

HAIRY WOODPECKER—a medium-sized, black and white woodpecker. It is distinguished from a downy woodpecker by its slightly larger size and the lack of black bars on the white outer tail feathers.

DOWNY WOODPECKER—a smaller edition of the hairy woodpecker; the white outer tail feathers are barred with black.

SWAINSON'S THRUSH—distinguished by its russet back and brown-spotted, buff breast; it is smaller than a robin but larger than a sparrow. It sings in the late afternoon and evening; prefers a moist, shady streamside habitat.

REFOUS HUMMINGBIRD—described in *Birds of the Mountain Meadows and Timberline;* it is abundant in the spruce forests along the coast during nesting time.

Birds Along the Streams

DIPPER—a chunky, dark slate-colored bird, with a short, wren-like tail, seen among boulders along swift-running streams. It bobs up and down as it stands near the water and then plunges into the streams to feed on the bottom.

BELTED KINGFISHER—a grayish-blue bird with white underparts and a blue band across the breast; the female has a reddish sash. This bird is distinguished by its large head, stout bill, and loud rattling call. It dives from a tree into the water for fish.

HARLEQUIN DUCK—a rather small, dark-colored duck seen on the rivers in spring and summer. The male is bluish above, has reddish-brown flanks, a crescent of white in front of the eye, and various other striking spots and streaks on head and neck—hence its name. The female, though duller, also has white spots on the head.

GREAT BLUE HERON—a tall, lanky, slate-blue bird usually seen walking knee deep in water. In flight, the neck is drawn back in an S-shape.

BALD EAGLE—a large, powerful hawk with slow wing beats. Mature birds, but not the younger ones, have white head and tail. Seen along streams when fish are spawning.

Birds of the Ocean Shore

GLAUCOUS-WINGED GULL—common along the shores even in summer.

GREAT BLUE HERON—described in *Birds Along the Streams.*

BALD EAGLE—described in *Birds Along the Streams;* it is common along roadless stretches of the Pacific Coast area, where it nests in trees near the shore.

BLACK OYSTERCATCHER—a large, black, sandpiperlike bird with a long red bill and pink legs and feet, about the size of a half-grown chicken.

DOUBLE-CRESTED CORMORANT—a large, slender, black bird with a slender, hooked bill; it is often seen with body nearly erect on a rock in the water.

COMMON CROW—occurs in flocks; it caws, while ravens croak.

COMMON RAVEN—described in *Birds of the Mountain Meadows and Timberline;* it is much larger than a crow and occurs chiefly in pairs, singly, or in small groups; not in flocks.

YOUNG RACCOONS SEARCHING FOR A MEAL DURING LOW TIDE.

FISH

The Olympic Peninsula is noted for its many miles of beautiful streams. This water provides an abundant world for fishes and gives joy to the fisherman. In these coastal streams the fisherman's fishes are trout and their relatives, the salmon.

Trout found in the streams include cutthroat, rainbow, brook, Dolly Varden, and steelhead. The steelhead spends the greater part of its life in the ocean, but enters fresh-water streams to reproduce. After spawning, it returns to salt water. During its life span it may make several winter spawning trips up the fresh-water streams. The lives of sea-run cutthroat follow the same pattern, except they spawn in autumn.

In autumn or spring, salmon of several species swim up-stream, driving hard to reach the tributaries where they were hatched. Their mission is to spawn. This is their grand and final act, for unlike the steelhead, they do not return to the sea after spawning, but die. Sport fishing for salmon is done chiefly in salt water, and the waters around the Olympic Peninsula have become famous for the excellent salmon sport fishing they afford.

Some mountain lakes contain rainbow and brook trout. Lake Mills, which is impounded water, contains rainbow, brook, and Dolly Varden trout.

The largest lake in the park, Lake Crescent, formerly contained two varieties of trout that have not been found to be native anywhere else. These were the Beardslee and the Crescenti, varieties of the rainbow and cutthroat, respectively, which frequently reached a weight of between 10 and 15 pounds. These varieties of trout probably no longer exist in the pure state. Recent studies indicate that present

A COHO SALMON JUMPING THE RAPIDS OF THE SOLEDUCK RIVER.

trout stocks, contaminated by plantings of hatchery fish that were made before the park was established, are now hybridized from cross-breeding. This is the usual story that follows upon man's interference with natural waters—a story which has been repeated over and over again in the United States.

A license is not required for fishing in the park. There are regulations, however, pertaining to the season, open water, catch limit, and method of fishing. A copy of these regulations may be obtained at the superintendent's office or at a park ranger station.

OTHER ANIMAL LIFE

In addition to mammals and birds there are other animals which, though smaller and with less apparent personality, may be equally interesting. They are part of the native wild fauna of the park and are accorded the same protection as the larger forms. The few listed below are frequently seen along trails.

NORTHWESTERN TOAD. This warty animal can be distinguished by the light-colored line that runs down its back. It is common on forest trails, but blends so well with the ground that it may not easily be seen.

PACIFIC TREEFROG. This delicate, moist animal can be identified by the adhesive pads on its toes with which it can cling to smooth surfaces. It has a black line on each cheek, running through the eye. The eyes have a bronze iridescence.

PACIFIC COAST NEWT. This attractive species of salamander can be identified easily by its color—brown on top and orange underneath. They are commonly seen in the spring when they congregate in ponds and small lakes to spawn.

There are several other species of salamanders in the park that live among the rotting logs in the damp woods.

GARTER SNAKE. This is probably the only snake you will see. *There are no poisonous snakes on the Olympic Peninsula.*

COMMON SNAIL. If not disturbed, this shelled creature of the woods can be seen moving about carrying its "house" on its back. The shell is about an inch across. The eyes are on the ends of two long stalks, enabling the snail to see over obstructions.

COMMON SLUG. The grayish-green slug with its shiny mucous track is abundant on many forest trails. Some of these slugs are blotched with black.

There is a detached section of the park known as the Pacific Coast Area. It is a narrow strip of land that borders the ocean for 50 miles—a scenic coastline of unusual interest. The Olympic Highway (U.S. 101 and Wash. 9) runs through the southern 12 miles of it, but the rest is roadless except for the road to the village of La Push.

The shore is broken by many rocky points separating sandy beaches. Numerous needle rocks and small islands, having survived the abrasion of the encroaching sea, rise offshore.

In places where ocean waves have worn back the land there are rocky platforms that are under shallow water when the tide is in and uncovered when the tide is out. Myriads of animals may be seen among slippery sea plants, under rocks, and in pools left behind when the water recedes. This is a between-the-tides museum, with mussels and barnacles in dense communities holding to rocks near shore, purple shore crabs scurrying for shelter under rocks, ochre and purple starfish (blondes and brunettes of the same species), and numerous limpets clinging tightly to rocks farther from shore. Colorful hydroids, brilliant nudibranchs, chitons, sea urchins, and anemones in pools also thrive where the shore is rocky and protected from strong waves.

Other creatures prefer the sandy beaches. On a weekend in clam season, when the tide is low, the miles-long Kalaloch Beach becomes pock-marked with holes and bumpy with piles from clam diggers' "guns." A clam "gun" is a spade with a long, narrow blade set nearly at right angle with the handle. Each year, seasons and limits for razor clams are prescribed by the Washington State Department of Fisheries. The season, which runs from spring to autumn, generally coincides with the most favorable tides and surf for clam digging.

Quileute and Quinault Indians dip silver smelt out of the surf with nets. These small fish ride in on the surf to spawn in the sand, especially during the highest spring tides. Anyone may engage in this fishing sport, with a hand dip net, under certain restrictions. Current regulations pertaining to razor clam digging and smelt dipping can usually be obtained in the immediate area.

Three Indian reservations lie within the ocean strip and a fourth adjoins it on the south. One of these, the Ozette at the northern end, is no longer inhabited, but there are still signs of the village site. An unimposing bit of rock juts into the water here. This is Cape Alava, which is distinguished by being the western extremity of our country, exclusive of Alaska and Hawaii.

Numerous birds nest on the offshore islands. Many others make rest stops during migration, as the strip lies within a major migration flyway. Birds, including gulls, crows, oystercatchers, and cormorants, are always present along the shore. Usually several bald eagles may

be seen during a hike along the beach. They build their nests mostly in the tops of tall snags.

Mammals, too, appear on the beach. Raccoons and skunks take advantage of low tides to feed on the various and abundant life available then. Deer frequently come to the beaches, perhaps to escape a cougar, to sun themselves, or to obtain salt or certain beach plants. Not infrequently a black bear is seen, and, occasionally, an elk.

Camping on the beach is pleasant during dry weather. There is ample firewood everywhere and small streams flow out of the forest, providing fresh water. Some of the streams may be contaminated, however, and the water should be either boiled or treated chemically if its purity is doubtful.

There are several trails leading to the beach. Starting at the north, the most important of these are the following:

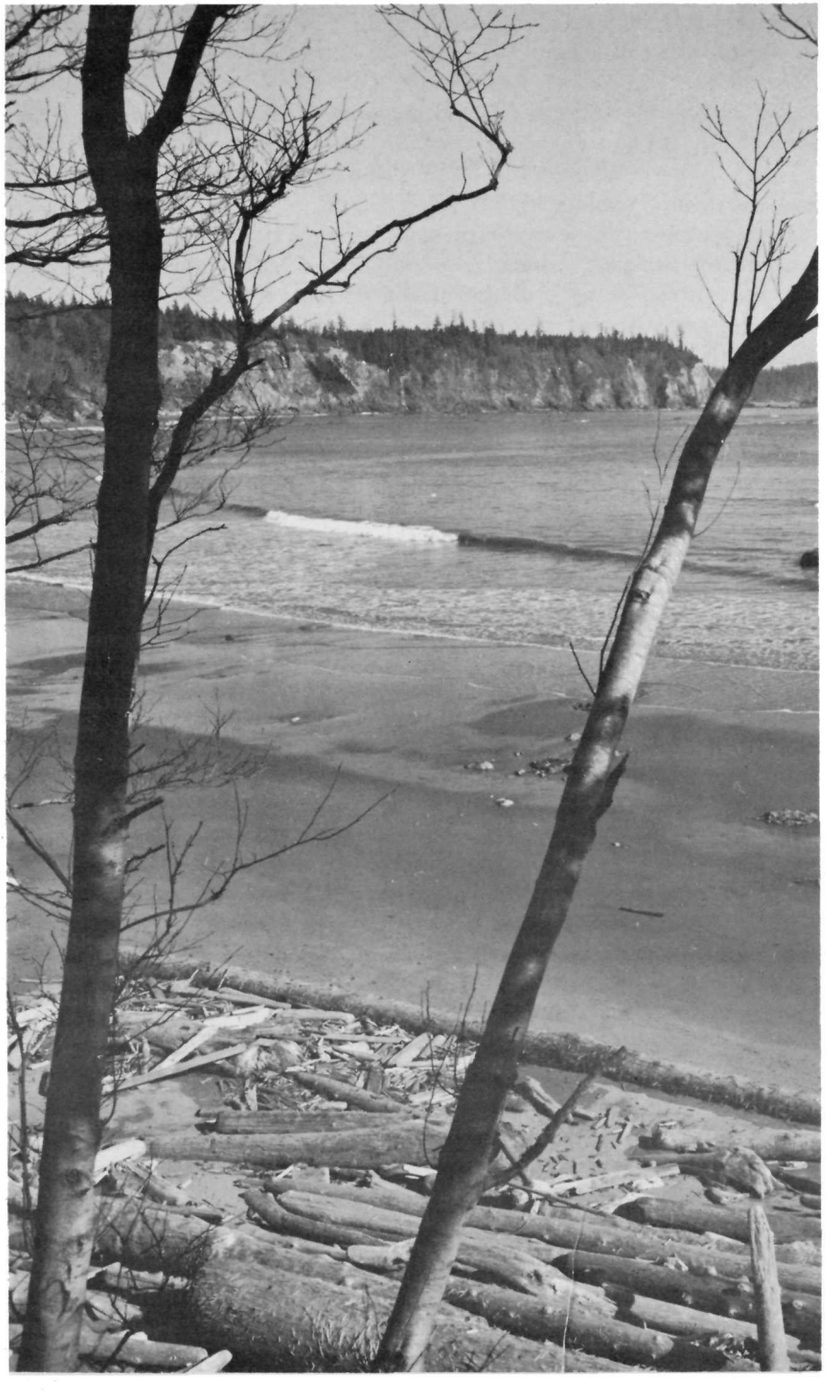
INDIAN VILLAGE TRAIL, starting at Lake Ozette and extending 3 miles to the Ozette village site at the beach, leads through delightful forest and prairie. Much of the trail is a boardwalk made of split cedar puncheon.

SAND POINT TRAIL also starts at Lake Ozette and is 3 miles long. The distance between the Indian Village Trail and this trail is also 3 miles along the beach. Thus, a triangular 9-mile round trip is possible.

SECOND BEACH TRAIL is about one-half of a mile long.

THIRD BEACH TRAIL is about three-quarters of a mile long. These two latter trails start from the road near the village of La Push and lead to attractive, clean, sandy beaches.

GIANTS GRAVEYARD, SOUTH OF LA PUSH, IS COMPOSED OF REMNANTS OF RESISTANT ROCKS THAT HAVE SURVIVED THE FORCES OF THE SEA.



THIRD BEACH, BORDERED WITH DRIFTWOOD, IS ACCESSIBLE BY TRAIL.

INDIANS OF THE OLYMPIC PENINSULA

In aboriginal times, the Olympic Peninsula was a part of the Northwest Coast cultural area, which stretched along the Pacific shoreline from northern California to Alaska. The inhabitants of this extensive region shared many cultural traits, perhaps the most distinctive of which were a keen sense of personal property and a veneration of wealth. These people did little to change their natural environment, but they showed great skill in utilizing what resources their primitive technology made available. Their dug-out canoes, for instance, fashioned from tree trunks, were probably the finest which have ever been made by any aboriginal people.

This remarkable culture was possible largely because the environment provided an abundance of the necessities of life. Food was easily obtained, and 3 or 4 months of gathering provided enough for the balance of the year. Fish were the staple food. Salmon swarmed up the streams of the Olympic Peninsula each summer and were trapped or speared in great quantity. Smelt were dipped from the surf, and clams and other shelled creatures were taken from the seashore. The diet was augmented by berries and roots from the woodlands. Elk, deer, and birds provided meat. Some of the Olympic Indians hunted seals, porpoises, and whales. The capture of the whales required daring journeys on the open sea in dug-out canoes 30 to 40 feet long and accommodating 6 to 8 men.

The great forests of the Peninsula were vitally important to the Indian economy. Cedars provided hulls for canoes or were split into planks for houses. From cedar bark were made baskets, mats, sails, cordage, clothing, and other household necessities.

Most of the year these Indians lived in villages located above the beaches along the ocean or arms of the sea, generally at the mouths of rivers. Their permanent houses were stoutly built of planks. Some of these rectangular structures, designed to accommodate several families, were more than 60 feet long and 30 to 40 feet wide. Many of them were beautifully decorated with painted designs. During summer it was a common practice of these people to migrate, either inland to gather berries and hunt, or along the watercourses to fish.

By primitive standards, the Indians of the Northwest Coast were wealthy; that is, they had plenty of things to eat, wear, and use for shelter. They also had much winter leisure. This combination of wealth and leisure gave rise to a remarkable political and social system in which power and prestige generally belonged to the richest individuals.

An important feature of the social structure was the giving away of possessions during a feast, called a potlatch. Years, even a lifetime,

of saving and privation were frequently endured in order to accumulate sufficient wealth for this purpose. Guests were invited from many tribes. The host gave such valuable gifts as canoes, slaves, food, fishing equipment, and, in more recent years, commercial blankets. As a rule, gifts were given only to guests who could afford to give a return potlatch. Gift-giving was a good investment for the host because the recipient was obligated to give a larger gift in return. This act of giving away one's possessions elevated the giver and his family in the social scale. Wealth was measured not so much in terms of what was owned as by what was given away.

In recent years the Bureau of Indian Affairs has exerted pressure to discourage the potlatch system, and it has declined greatly; but potlatches are still held in modified form.

Today, the scene at Indian villages along the Olympic Peninsula is quite unlike that of a century ago. The cedarplank communal houses are no longer built; and, as the climate is not conducive to preservation, the old ones have disappeared. White man's clothes have replaced garments of skin and shredded bark. Customs, too, have been modified under the impact of modern civilization. Still, much of the old Indian tradition survives, though it may not be discernible on the surface.

The main source of livelihood still is fishing. The Indians prefer to use dug-out canoes, but now these are usually propelled by outboard motors. Nearly every family owns a canoe, although only a few expert canoe makers build them. They are similar to the oldtime canoes in design, but the tools used to carve them are steel rather than the stone, shell, or bone used for blades in primitive tools.
tools.

Thrilling dug-out canoe trips on the Quinault River are available in summer for a moderate fee. The Quinault Indians at Amanda Park, where the river flows out of Lake Quinault, offer such trips over the entire distance of 35 miles to the ocean.

EXPLORATION BY SEA

The first white men to explore the Olympic Peninsula came by sea. Spanish navigators venturing northward from Mexico may have coasted the shoreline as early as the 16th century. Juan de Fuca, said to have been a Greek pilot in the service of Spain, claimed to have entered the strait, which bears his name, in 1592, but satisfactory proof of this discovery is lacking.

Extensive exploration of the Northwest Coast did not begin, however, until the latter part of the 18th century, when rumors that the Russians were venturing southward from Alaska stirred the Spaniards to fresh efforts. In 1774, during the first of these renewed voyages,

Juan Perez saw the present Mount Olympus and named it "Santa Rosalia." He was the first European to name a geographic feature in what is now the State of Washington.

During the next 25 years the Northwest Coast, including that of the Olympic Peninsula, was widely explored and mapped by Spaniards, Englishmen, and Americans. The Spaniards were the first actually to set foot on the Peninsula. During a voyage made by Bruno Heceta and Juan de la Bodega y Quadra in 1775, Heceta landed at Point Grenville, near the mouth of the Quinault River.

Capt. James Cook was the first of several English navigators to explore the Northwest Coast. In 1778, during his search for the Northwest Passage, he named Cape Flattery, in the northwest corner of the Olympic Peninsula. While on the coast, some of Cook's crewmen obtained furs from the natives and later sold them in China for high prices. This event turned the eyes of English and American businessmen toward the Pacific Northwest, and thereafter exploration of this region was stimulated by the fur trade.

In 1788, Capt. John Meares, an English trader, saw the mountain which Perez had named 14 years earlier. Not knowing of the earlier discovery, he christened the peak "Mount Olympus."

THE INDIAN VILLAGE TRAIL THROUGH A SWAMP.

Juan Francisco de Eliza, a Spanish captain, entered Juan de Fuca Strait in 1791 and named the harbor, where present Port Angeles is situated, "Puerto de Nuestra Senora de Los Angeles," which means "Port of Our Lady of the Angels." In the following year the Spaniards established a fort and settlement at Neah Bay. The members of this colony, which existed for only 5 months, were the first white settlers to touch the soil of the Olympic Peninsula and, indeed, of the State of Washington.

In 1792, Capt. Robert Grey, an American trader, discovered the harbor at the southern margin of the Olympic Peninsula which was later named in his honor. Of all the explorers who came by sea, George Vancouver, the English navigator, left the greatest mark in northwest Washington. He explored Puget Sound waters in 1792 and named numerous geographic features, including Port Townsend and Discovery Bay, on the Olympic Peninsula.

EXPLORATION BY LAND

At the same time that maritime traders and explorers were making known the features of the coast, other adventuresome men were opening overland trails into the Northwest. By 1810, fur traders following in the wake of Alexander Mackenzie, David Thompson, and Lewis and Clark were well established in the present British Columbia and in the Columbia River drainage basin. After 1821, the British-controlled Hudson's Bay Company dominated the fur trade of the Pacific Northwest and for a number of years virtually excluded rivals from the area.

During the 1830's and 1840's, however, American traders, missionaries, and settlers in ever-increasing numbers pushed into the Northwest. British influence declined as the American population grew, until, in 1846, Great Britain bowed to the inevitable and gave up her hopes of owning the region as far south as the Columbia River. In that year the 49th parallel was established as the boundary between American and British territory west of the Rockies.

Up to this time few American settlers had established homes on the north side of the Columbia River. Following the adjustment of the boundary dispute, pioneers rapidly pushed into the Puget Sound basin. A few of these newcomers established themselves at Port Townsend in 1851.

Although Port Townsend was the first permanent settlement on the Peninsula, two trappers named John Sutherland and John Everett had crossed the strait from Victoria in 1849 and had operated traplines on the two large lakes west of Port Angeles. One lake still bears the name of Sutherland. The other, first named Lake Everett, is now known as Lake Crescent. The first permanent settlers in the Port Angeles area did not take up claims until 1857.

Settlement of the Olympic Peninsula proceeded slowly, and the mountains remained virtually unknown for several decades despite the fact that the first ascent of Mount Olympus reportedly was made as early as 1854. The first real attempt to explore the Olympic Mountains was made in 1885 by an expedition under the leadership of Lt. Joseph P. O'Neil of the 14th Infantry. Starting at Port Angeles, the explorers cut a trail past Mount Angeles to Hurricane Ridge. They returned by the same route after investigating the country to the southeast, perhaps as far as the head of the Lillian River.

The next major expedition into the Olympic Mountains was promoted by Edmond Meany, the 27-year-old city editor of the Seattle *Press*. At his instigation, the paper, on October 23, 1889, carried an article calling attention to this unknown land and the need for exploration. "There is a fine opportunity," said the article, "to acquire fame by unveiling the mystery which wraps the land encircled by the snow-capped Olympic range."

Meany persuaded the *Press* to finance an expedition, and a party was organized, with James H. Christie, former hunter, Indian fighter, and arctic explorer, as its leader. The company started up the Elwha River in December 1889. It was believed that the mountains visible from the coast were but an outer rim within which there was a central valley, and by making a winter start the expedition hoped to be over the first range and ready for work in the valley when spring should come. This ignorance concerning the true character of the mountains might have brought a tragic ending to the expedition had the explorers not been experienced and resourceful in wilderness travel.

Six months later the party emerged from the mountains at Lake Quinault, having endured severe hardships and privations without any serious mishap. They had blazed a crude trail across the heart of the unknown Olympics. They brought back photographs and a rough topographic map of the country. They reported on its plants, animals, and minerals, and they named 50 peaks, rivers, lakes, and other landmarks. Many of these names remain today. Press Valley, on the Elwha, was named for the newspaper which financed the expedition, and the Bailey Range was named for William H. Bailey, the paper's proprietor. Mount Meany perpetuates the name of the young city editor, and Mounts Christie and Barnes honor, respectively, the leader and narrator of the expedition.

The *Press* explorers had been out of the wilderness but a few weeks when another expedition was organized. The Oregon Alpine Club furnished a scientific staff and much of the money; the Army supplied Lieutenant O'Neil to lead the party and soldiers to assist. During the summer of 1890 this expedition crossed the Olympic Mountains from Hood Canal to Lake Quinault by way of the Skokomish and Quinault Rivers. They, too, left names on many geographic features.

O'Neil Pass and O'Neil Creek were named for the leader, Mount Henderson for the botanist of the party, and Mount Bretherton for the naturalist-cartographer. In his report O'Neil stated, "while the country on the outer slope of these mountains is valuable, the interior is useless for all practicable purposes. It would, however, serve admirably for a national park."

These expeditions stimulated settlement on the fringes of the Olympic Peninsula and in the river valleys. They also led to further exploration of the interior and to a realization of the vast recreational resources of this mountain fastness.

ESTABLISHMENT OF THE PARK

Olympic Forest Reserve was established in 1897 by Executive order, and was surveyed during the next 3 years, by Messrs. Arthur Dodwell and Theodore Rixon. They produced the first accurate map and gave a detailed account of the forests.

Efforts to preserve the Olympic wilderness started in 1904 when Representative Francis W. Cushman introduced a bill for the establishment of Elk National Park. The bill did not pass. In 1906 and 1908, Representative William E. Humphrey introduced bills to create a game refuge on the Olympic Peninsula. These bills also failed. Two days before the end of the Theodore Roosevelt administration he asked the President to set aside a National Monument in the Olympic Mountains under authority of the Antiquities Act of 1906. By Presidential proclamation, Mount Olympus National Monument was established in 1909.

The monument was within the boundaries of Olympic National Forest. From 1909 to 1933, it was administered by the Forest Service, U.S. Department of Agriculture. By Executive order, the monument was transferred to the National Park Service, U.S. Department of the Interior, on June 10, 1933.

Efforts to establish a national park in the Olympics were renewed in 1935. Representative Monrad C. Wallgren repeatedly introduced bills to have this done, but without success at first. President Roosevelt visited the Olympic Peninsula in 1937 and expressed approval of a large Olympic National Park. The act of June 29, 1938, established Olympic National Park and abolished Mount Olympus National Monument. The park now has an area of 1,400 square miles.

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U.S. GOVERNMENT PRINTING OFFICE : 1971 OF—442-133

OLYMPIC NATIONAL PARK

WASHINGTON

VANCOUVER ISLAND

Victoria

JUAN DE FUCA STRAIT

CANADA

UNITED STATES

TO BELLINGHAM & CANADA

Cape Flattery

Neah Bay

MAKAH INDIAN RESERVATION

Sekiu

Clallam Bay

Cape Alava

Sand Point

Yellow Banks

Cape Johnson

Rialto Beach

La Push

QUILEUTE INDIAN RESERVATION

Mora

Teahwhit Head

Strawberry Point

Toleak Point

Hoh Head

HOH INDIAN RESERVATION

Ruby Beach

Destruction Island

Kalaloch

Queets

QUINAULT INDIAN RESERVATION

Taholah

Amanda Park

Forks

Sappho

Fairholm

VISITOR CENTER

Crescent and Agate Beaches

Joyce

Port Angeles

Pari Headquarters

VISITOR CENTER

Heart O'the Hills

Sequim

Elwha

Hurricane Hill

Mt. Angeles 6454

HURRICANE RIDGE

Sol Duc Hot Springs

Olympic Hot Springs

Whiskey Bend

Obstruction Point 6450

Deer Park

Blue Mtn. 6007

High Divide

Mt. Carrie 6995

Mt. Olympus 7965

Mt. Tom 7048

Mt. Deception 7788

Mt. Constance 7743

Mt. Anderson 7332

The Brothers 6866

Quilcene

Hoodsport

HOOD CANAL

HOOD CANAL BRIDGE

Port Townsend

Keystone

ADMIRALTY INLET

PUGET SOUND

WHIDBEY ISLAND

Edmonds

Seattle

BAINBRIDGE ISLAND

Winslow

Bremerton

TO ELLENSBURG

VASHON ISLAND

Tacoma

TO YAKIMA & MOUNT RAINIER

Shelton

TO OLYMPIA

TO HOQUIAM & ABERDEEN

PACIFIC COAST AREA

PACIFIC OCEAN

RAIN FOREST

VISITOR CENTER

No Bridge-Wade River

North Fork

Graves Creek

Campground
Shelter
Nature Trail
Picnic Area
Ranger Station
Paved Road
Gravel or Dirt Road
Trail
Foot Trail Only

0 5 10
SCALE IN MILES

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