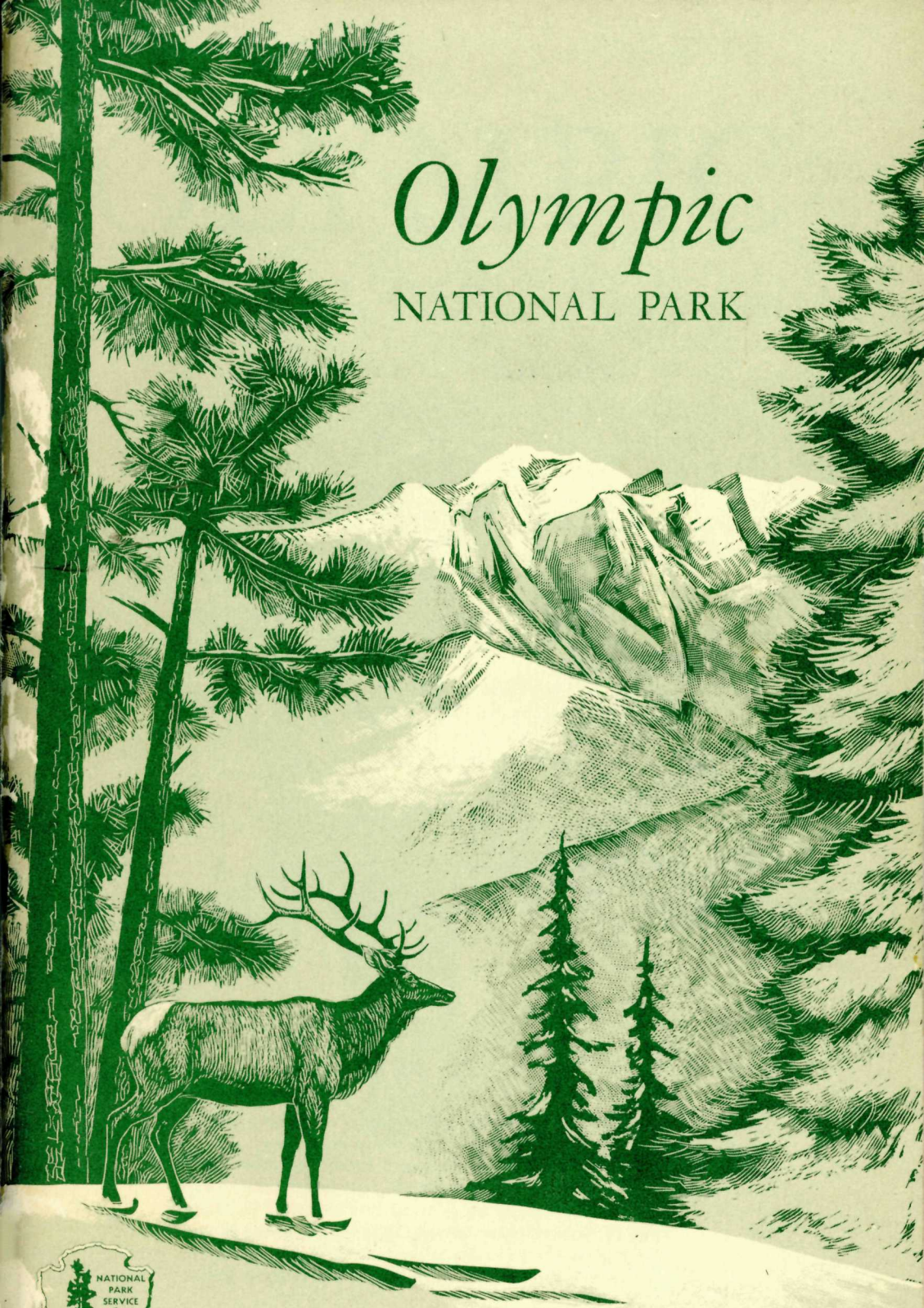
Olympic
NATIONAL PARK



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DEPARTMENT OF THE INTERIOR

NATURAL HISTORY HANDBOOK

UNITED STATES DEPARTMENT OF THE INTERIOR
Douglas McKay, *Secretary*

NATIONAL PARK SERVICE
Conrad L. Wirth, *Director*

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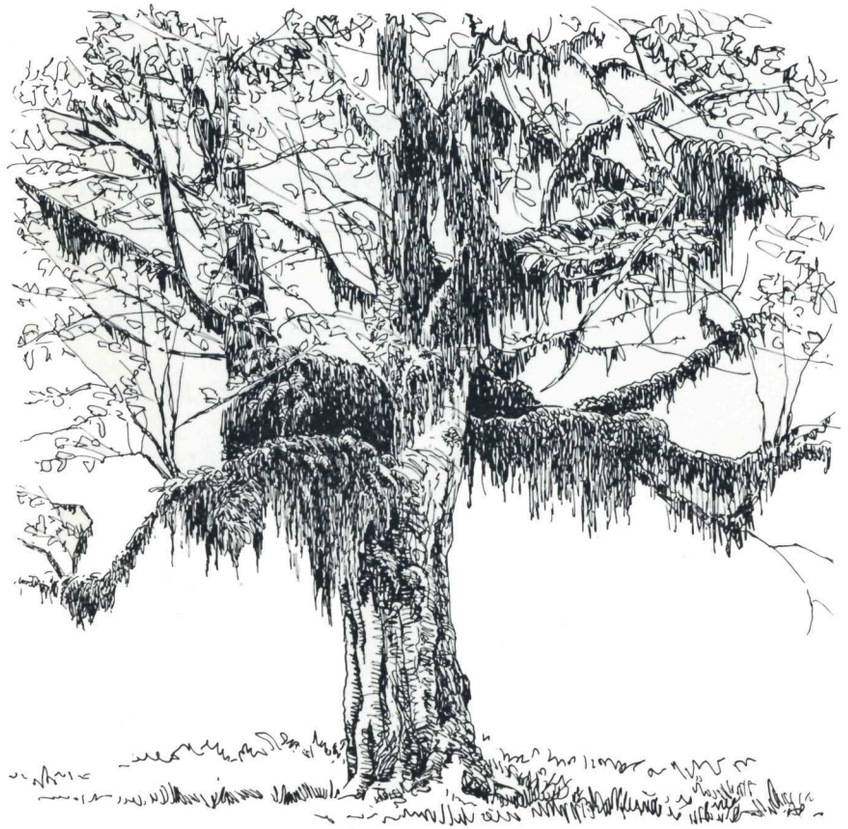
OLYMPIC

NATIONAL PARK · *Washington*

By GUNNAR O. FAGERLUND
WITH THE ASSISTANCE OF FRANCES I. FAGERLUND



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The National Park System, of which Olympic National Park is a unit, is dedicated to the conservation of America's scenic, scientific, and historic heritage for the benefit and enjoyment of the people.

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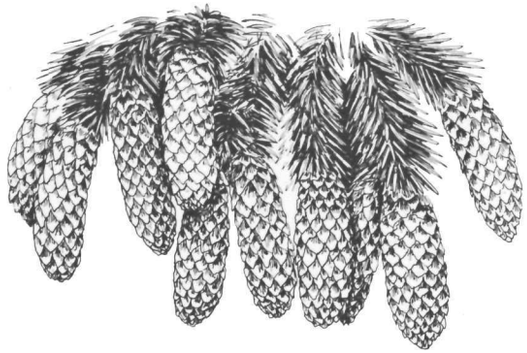

The Olympic Scene

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 altitude. 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. Within the span of human vision, 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 plant life 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 our country. 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 STAGE IS SET

Olympic geology has not been fully explained. Geologists have attempted to piece together the rock records, but the story is not yet complete. The following describes the probable sequence of events.[1]

THE FIRST SEA

Our story begins about 120 million years ago. There were no Olympic Mountains then; instead, all of western Washington was covered by a shallow sea. Streams carried mud and sand into the sea and these settled to the bottom. During millions of years at least 10,000 feet of sediments accumulated on the sea floor. Eventually, these compacted into shale and sandstone. Lava that poured out of fissures in the sea floor from time to time became buried in the sediments.

THE FIRST MOUNTAINS

The great mass of the Pacific basin was pressing against the continent. This caused the under-water edge of the continent to fold upward into mountains above sea level. The rock layers were folded, and crumpled. The great pressures changed the shale to slate and made the sandstone harder. More millions of years passed while the mountains were lowered considerably by erosion.

[1] Adapted from a paper by Wilbert R. Danner.

THE SECOND SEA

The land subsided again about 60 million years ago and was flooded by the sea once more. Immense quantities of lava poured out of fissures onto the sea floor. It piled up in large masses with at least 5,000 feet accumulating. Under water, the flowing lava cooled quickly to form masses with pillowlike structures. Several hundred feet of sediments settled upon the lava before the second sea withdrew.

THE SECOND MOUNTAINS

The sea bottom was elevated into mountains again and much of the new sediments probably eroded during this mountain phase.

THE THIRD SEA

Again the land subsided beneath the level of the sea and new sediments accumulated on top of the older rocks.

THE THIRD MOUNTAINS

About 20 million years ago western Washington was pushed up into a great range of mountains that extended from Cape Flattery southeastward to the eastern part of the State. At the same time the land to the north and to the south was depressed and remains depressed today as the Juan de Fuca Strait and Chehalis Valley, respectively.

These ancestral Olympic Mountains received another upward push about 5 million years ago. This coincided with the building of the Cascade Mountains and the down-folding of the land in between to form the Puget Sound trough. Now the Olympics were isolated, having lowland on all sides.

EROSION

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. Each mountain phase in Olympic history was characterized by erosion. Thousands of feet of sedimentary rocks have been removed. Only the older rocks remain, for these were the bottom layers.

ROCKS

The rocks that were formed in the first sea, now mostly slates and hardened sandstones, are the oldest rocks known in the Olympics and make up the greater part of the mountains. 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 OLYMPUS, FROM HOH-SOLEDUCK DIVIDE; BLUE GLACIER IN THE UPPER LEFT.

Mount Constance and the north end of Lake Cushman, then west to Lake Quinault are of this age. The horseshoe-shaped outer rim of the mountains outside this line is mainly of basaltic lava deposited in the second sea.

GLACIATION

The next 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. 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 Elwha River Valley, and as high as 3,000 feet on the side of Mount Angeles.

As the ice moved west along the northern border of the mountains it plowed and scraped and deepened an ancient valley that filled with water when the ice melted. This is Lake Crescent. 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.

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

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the Olympic Mountains standing alone, isolated from other mountains. However, they are a segment of that elongated western fringe of 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 7,954 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.

There is no single range of mountains in the Olympics, 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 maintain 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. Out of the basins the valleys continue broadened and U-shaped. The larger valleys of the west side—the Hoh, Queets, and Quinault—carry this glaciated U-shape almost to the foot of the mountains.

Some of the mountain valleys have ridges of rock materials on their floors. These are moraines left by the glaciers. Some are end moraines and mark the farthest advance of the ice down the valley. Others represent places where the glaciers halted in their retreat. Most of the end moraines are imperfect, having been cut through and partly destroyed by the flow of water from the melting glaciers.

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.

In summary, we may say that Olympic rocks were formed beneath the sea during at least three periods of submergence. Each submergence

THE GLACIERS WERE ONCE MUCH LARGER. THE SHARP TREE LINE IN THIS PICTURE REPRESENTS A FORMER POSITION OF WHITE GLACIER.

was followed by a period of uplift when the land was elevated above the sea. Thousands of feet of sedimentary rock with interbedded lava sheets were removed by erosion during millions of years. Valley glaciers and streams have had 20 million years to work on the mountains since their last emergence from the sea; from the interior Olympic mass all but the oldest sediments and lavas have been stripped away. The dense lavas along the outer rim of the mountains on the north, east, and south have resisted erosion more successfully than the softer sediments. Their presence strongly influenced the development of the pattern of ridges and valleys that we see today.

Glaciers Today

A glacier is a body of snow compacted into ice, large enough to move under its own weight. Valley glaciers start as snow fields in the mountains where snow accumulates layer by layer. The snow first becomes granular and finally changes to solid ice. Ice is a rather weak

PRECIPITATION ON MOUNT OLYMPUS MAY BE AS MUCH AS 250 INCHES SOME YEARS.
—Photo by Richard Owens, Jr.

solid and will spread like batter on a griddle if there is sufficient pressure on it. When the ice is thick enough, its weight causes the bottom ice to spread out—to flow down the steepest slope. The ice is then a glacier.

The glaciers that remain in the Olympic Mountains today are small indeed compared to the extensive glaciers that formerly filled the valleys and sculptured the mountains. Many have disappeared completely, leaving only the shape of the land to testify that they once were here. However, more than 100 glaciers, having a collective area of at least 25 square miles, remain 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 cloudy weather which retards its melting. Glaciers develop where snowfall exceeds the amount melted.

Like nearly all glaciers everywhere, those in the Olympic Mountains are dwindling. Each year they become shorter and thinner. Between 1938 and 1951, Blue Glacier, on the north side of Mount Olympus, melted back 776 feet. A comparison of old and recent photographs of Blue Glacier indicates that it may have shortened by as much as three-fourths of a mile since 1919. If excessive melting continues the glaciers will eventually disappear.

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 modelled 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 from 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 and a quarter sides. Low land 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 North America.

Quinault has a mean annual precipitation of 128 inches. For want of records, precipitation at high levels in the Olympic Mountains can only be guessed or roughly estimated. Based on the flow of some streams draining the western slopes, it has been calculated that precipitation on Mount Olympus and neighboring high country may be 250 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, lowland areas on the lee side of the mountains are much drier than on the windward side. For instance, on the Olympic Peninsula the mean annual precipitation at Sequim (pronounced Squim) 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 even the Rocky Mountains, against the flow of cold continental air westward to the coast.

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

The Forests and Wildflowers

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

CLEAR, COOL WATER. SOLEDUCK RIVER.

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 6 to 8 feet in diameter and 125 to 200 feet tall. Their crowns shut out most of the light, 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 an almost impenetrable jungle. 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 they are ready to speed up their growth. 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, which is 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. These include the cone-bearing trees, the red-barked Pacific madrone, and many shrubs and ferns. Residents and visitors are grateful for the enduring green of the forest that tempers the depressing grey of the winter sky.

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 forest jungles of the hot, superhumid tropics. Here, there are tall conifers instead of interlocking trunks of broad-leaved trees; there are mosses and ferns on the ground instead of an understory of vines.

DRAPERIES OF CLUBMOSS HANG FROM THE LIMBS IN THE RAIN FOREST.

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

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 taller than 200 feet. Four trees growing in the rain forests of the park are the largest on record. These and their respective breast-height diameters are: Western redcedar, 20 feet; Douglas-fir, 17 feet 8 inches; Sitka spruce, 16 feet 3 inches; and western hemlock, 9 feet.

A visit to the rain forest offers a surprisingly enjoyable experience, if it is made leisurely. 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 the animal life, the smaller plants, and even the 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

dirt road runs 19 miles up the Hoh from U. S. No. 101, ending 7 miles inside the park boundary where an excellent Government campground has been developed. The Hoh River Trail starts just beyond the nearby ranger station. 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, in order to see the rain forest.

Unexpectedly, one finds this forest beautifully luminous. It is filled with soft, green light. The light drops down where it can find room between the towering spruce and hemlock trees. 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 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 and are 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 have still 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 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. The forest is thus 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

SINGLEFLOWERED INDIANPIPE.

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 Deer Park and Hurricane Ridge. Whether the trip

is made on trail or on road, an understanding of the changing pattern of plant life 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 that they correspond to zones between the equator and the poles.

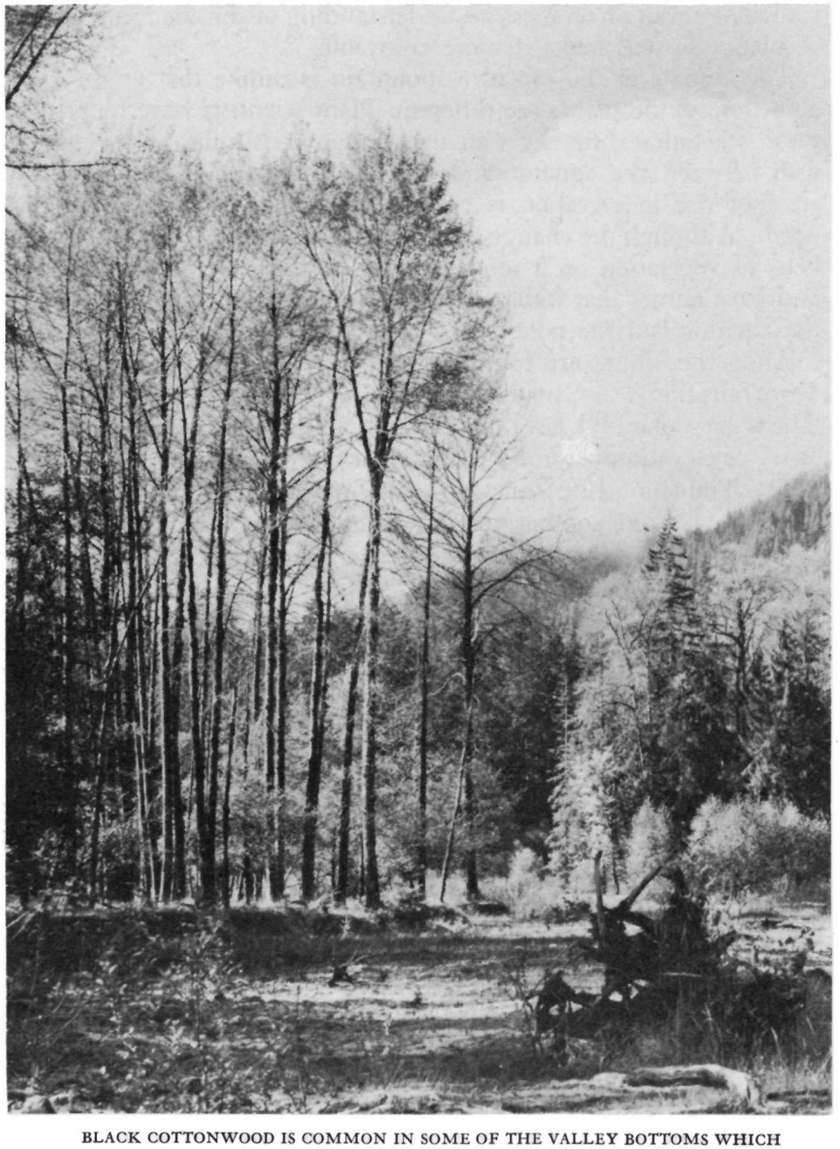
Altogether there are four life zones in the Olympic Mountains: (1) Transition, (2) Canadian, (3) Hudsonian, and (4) Arctic-Alpine. The vegetation of the last three is similar to that of regions to the north at lower elevations, as indicated by their names.

The Transition Life 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 the Transition Life 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 forest zone ends and the next one begins. This merging of forest zones in the Olympic Mountains may be due to the equable temperature extending well up the mountain slopes.

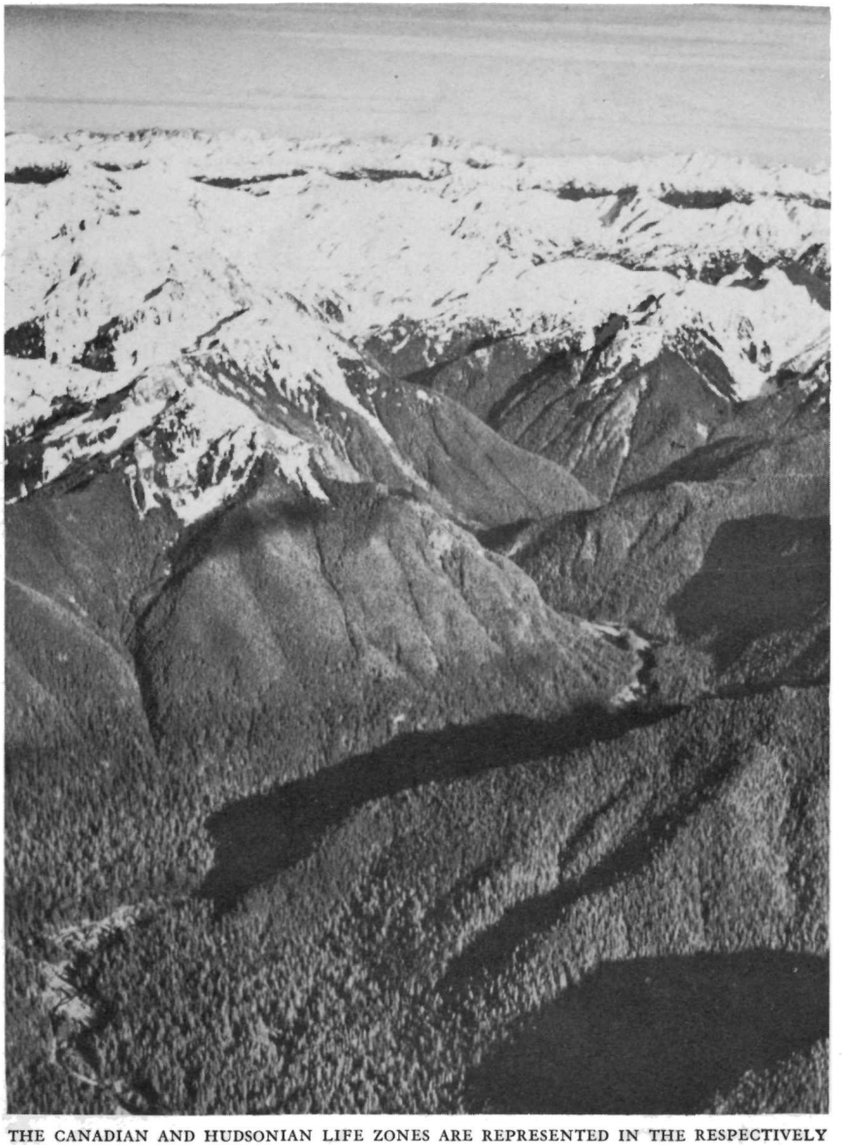
The Canadian Life Zone should be apparent when an elevation of 2,000 feet is reached. The forest of the Canadian Life Zone is somber compared with that of the Transition Life Zone. Although it has many kinds of small shrubs and herbaceous plants, it lacks the striking greenness of the Transition forest. 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, Indianpipe, and coralroot.

The Hudsonian Life 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 Life Zone are still found, but some new kinds have entered into the forest composition. The characteristic Hudsonian Life Zone trees are mountain hemlock, Pacific silver fir, alpine fir, and Alaska yellow-cedar. The last-named has typical cedar foliage. Its branches and twigs droop as if they were wilted. The trees in this zone are much smaller than those at lower altitudes and 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 the *Krummholz,*



BLACK COTTONWOOD IS COMMON IN SOME OF THE VALLEY BOTTOMS WHICH BELONG TO THE TRANSITION LIFE ZONE.

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 Life Zone is the beginning of the "high country." The sky is



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

bluer and in summer an alpine fragrance from above 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.

VIEW IN SEVEN LAKES BASIN, TYPICAL OF THE HIGHER HUDSONIAN LIFE ZONE.

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 places where the ground is marshy are preferred by such plants as marshmarigold and globeflower.

Higher in the Hudsonian Life 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 fawnlilies, one of the most abundant and widespread 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 lambstongue fawnlily, 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, paintedcup, arnica, Columbia lily, and American bistort.

Several mountain plants in the northeast part of the park, where rainfall is lighter, also grow in the hot, arid section of eastern Washington and in Oregon. Some of these are nodding onion, woolly eriophyllum, and barestem lomatium. It is possible 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 continued to grow and reproduce despite the changing conditions. This may be the reason why some typical lowland plants mingle with mountain plants on the northeastern meadows of the Olympic Mountains.

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 Life 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 Life 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.

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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 closely for as much shelter as possible from the drying wind. No plants dare stand up tall. Their overwintering 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 20 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 which remained free of glacial ice during the long cold periods. They are relicts from preglacier time. None of them is a tree and only two are shrubs. All the rest are herbs. Several of these may be found on Hurricane Ridge and on the upper slopes of Mount Angeles. Piper bellflower and Flett violet are among the most interesting and attractive.

Snow is vital to the 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 start and 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 fall are blooming, then, according to the progress of the seasons in different elevations and habitats.

How To Identify Some Common Plants

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 number, 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 plant life.

NEXT TO THE SEQUOIAS OF CALIFORNIA, DOUGLAS-FIR IS THE GREATEST TREE IN THE FORESTS OF THE WESTERN HEMISPHERE. THIS ONE IS OVER 10 FEET IN DIAMETER.

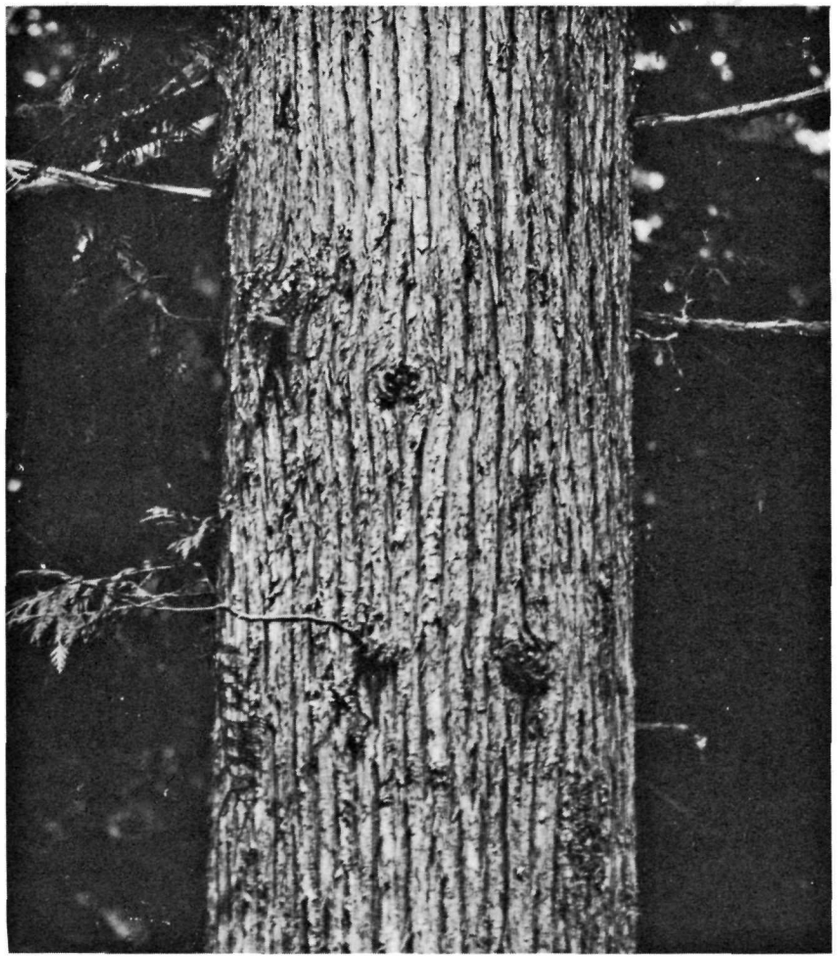
TREES

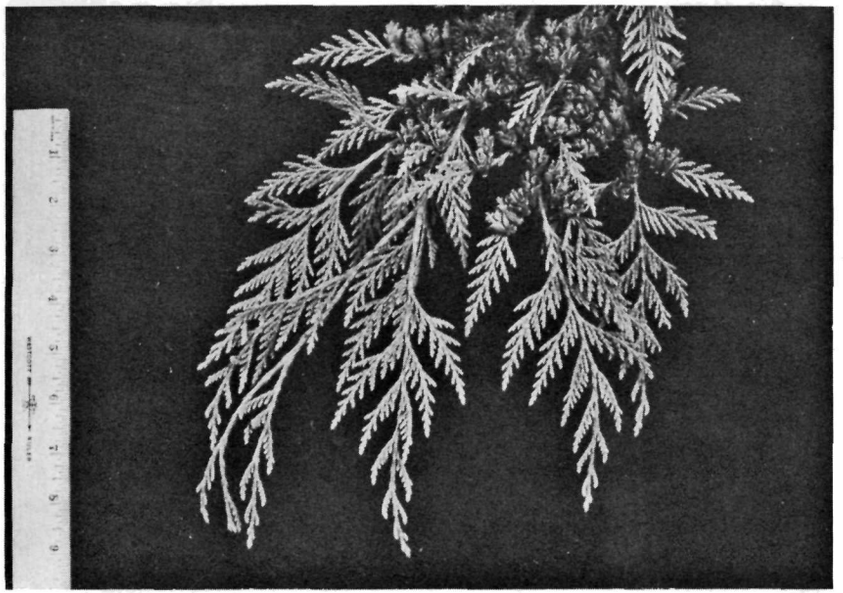
DOUGLAS-FIR (*Pseudotsuga taxifolia*).—The tree that gives principal distinction to the Northwest forests. Growing from sea level to 5,000 feet elevation, it is the most abundant and widespread tree on the Olympic Peninsula. Average mature trees in the virgin forests of the lowlands are 180 to 250 feet in height and 4 to 6 feet in diameter. Many are considerably larger in girth, the largest on record being 17 feet 8 inches. This tree 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 forests of the Western Hemisphere.

Large Douglas-fir trees 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 Life Zone wherever conditions are favorable for its growth. Large trees in the forest average 150 to 175 feet in height and

WESTERN REDCEDAR.





WESTERN REDCEDAR. CONES ARE ABUNDANT ON SOME TREES.

3 to 8 feet in diameter. The largest western redcedar on record is in the park, near the road, on the north side of Lake Quinault. It is 20 feet in diameter.

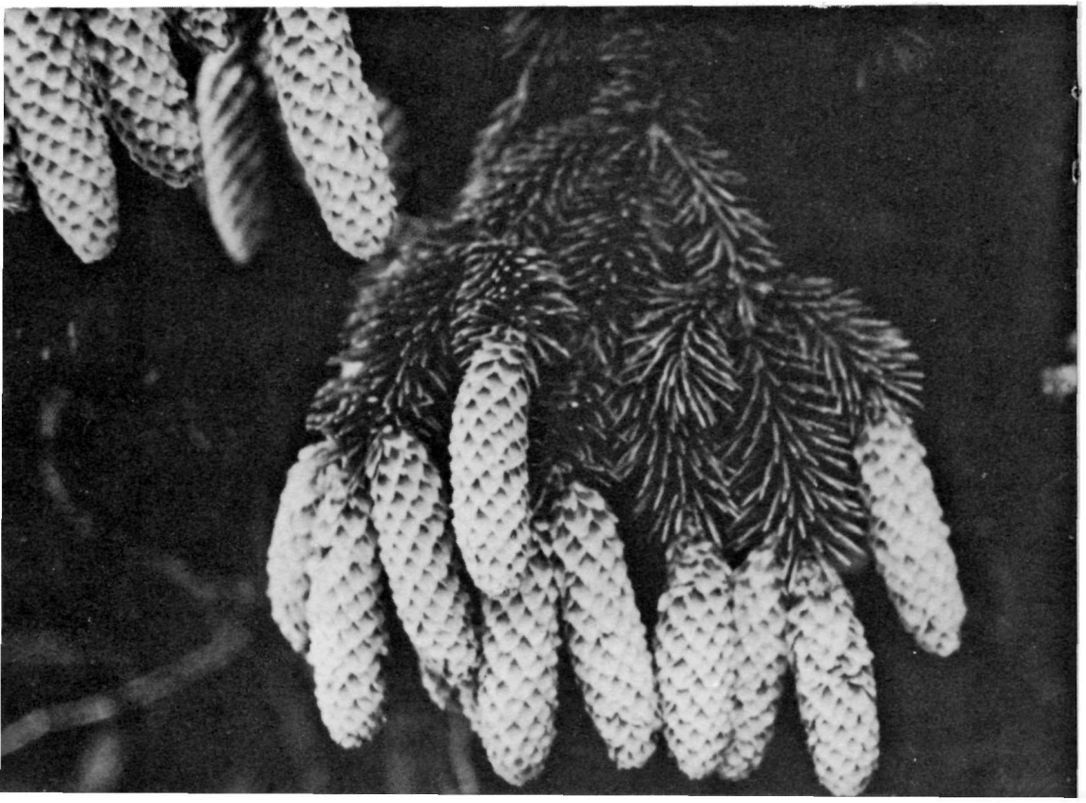
The trunk of the western redcedar commonly tapers rapidly from a swollen and sometimes fluted base. Its bark is thin, fibrous, and stringy. The foliage hangs in long, lacy sprays. It is the only tree of the lowland forests which has leaves that are tiny, overlapping scales.

WESTERN HEMLOCK (*Tsuga heterophylla*).—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 is 9 feet in diameter and is located above Enchanted Valley in the park. Western hemlock can be identified by its foliage and cones. The needles vary in length from one-fourth to nearly an 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. This is the identifying characteristic if the top of the tree can be seen. The cones, about three-fourths of an inch long, are usually abundant near the ends of the branches.

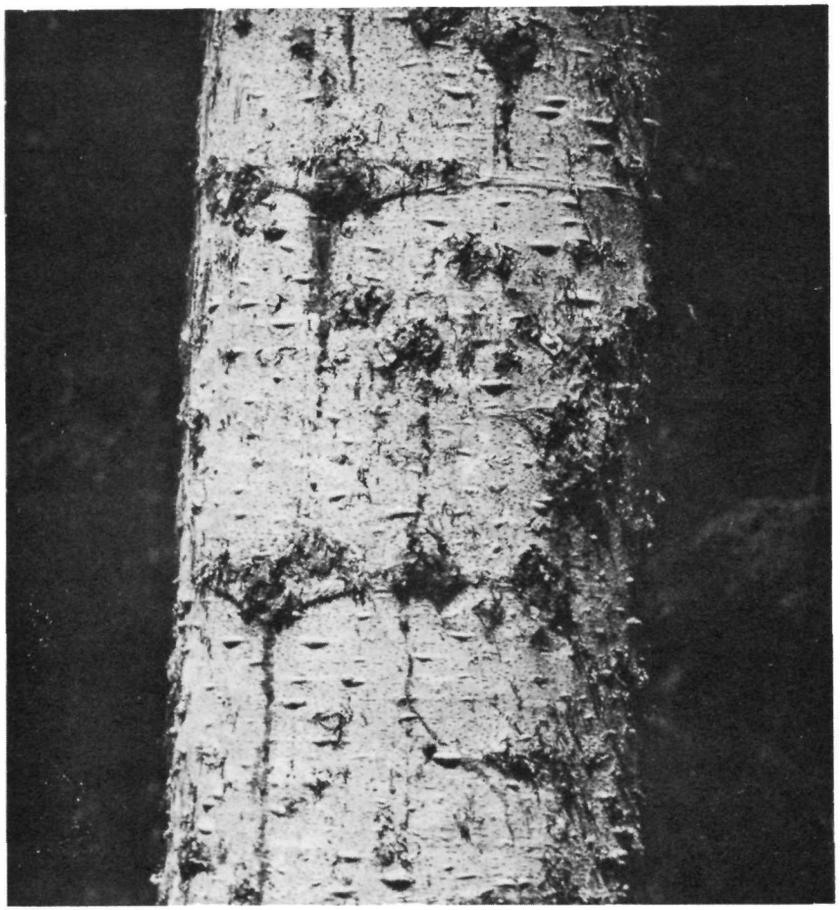
SITKA SPRUCE (*Picea sitchensis*).—A coastwise tree from Alaska to California. In the park it is common only in the rain forest on the west side. There, large trees are 125 to 225 feet in height and 3 to 8

WESTERN HEMLOCK, WHICH COMBINES WITH DOUGLAS-FIR TO COMPOSE THE SOMBER CANADIAN LIFE ZONE FOREST.

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



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



PACIFIC SILVER FIR.

feet in diameter. Many are 10 feet or more in diameter. The largest specimen recorded is 16 feet 3 inches in diameter and 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. It is of interest that the largest recorded specimen of each of these four kinds of trees is located within the park.

Sitka spruce can be identified by its stiff and very sharp-pointed needles. They are ½ to 1¼ 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.

PACIFIC SILVER FIR (*Abies amabilis*).—A tree of middle elevations, or the Canadian Life Zone. In favorable growing sites, it attains a height of 140 to 160 feet and a diameter of 2 to 4 feet. 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*).—The spirelike tree of the highest life zone, the Hudsonian. Under favorable growing 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.

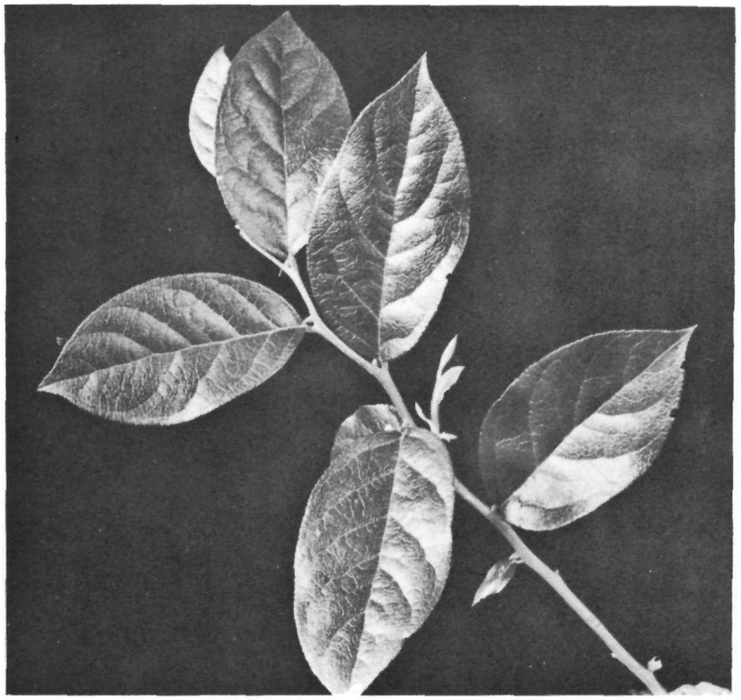
ALASKA YELLOW-CEDAR (*Chamaecyparis nootkatensis*).—This Hudsonian Life Zone tree can easily be identified by its foliage. The slender, drooping branches and flat, weeping sprays appear to be wilted.

ALPINE FIR GROWS NEAR TIMBERLINE AND CAN BE DISTINGUISHED BY ITS SPIRELIKE SHAPE.

The leaves are of tiny, overlapping scales. This tree could be confused with the western redcedar, but as the two grow at different elevations identification should be easy.

PACIFIC MADRONE (*Arbutus menziesii*).—Tree of the lower elevations, which can be distinguished from all others 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.

PACIFIC MADRONE.



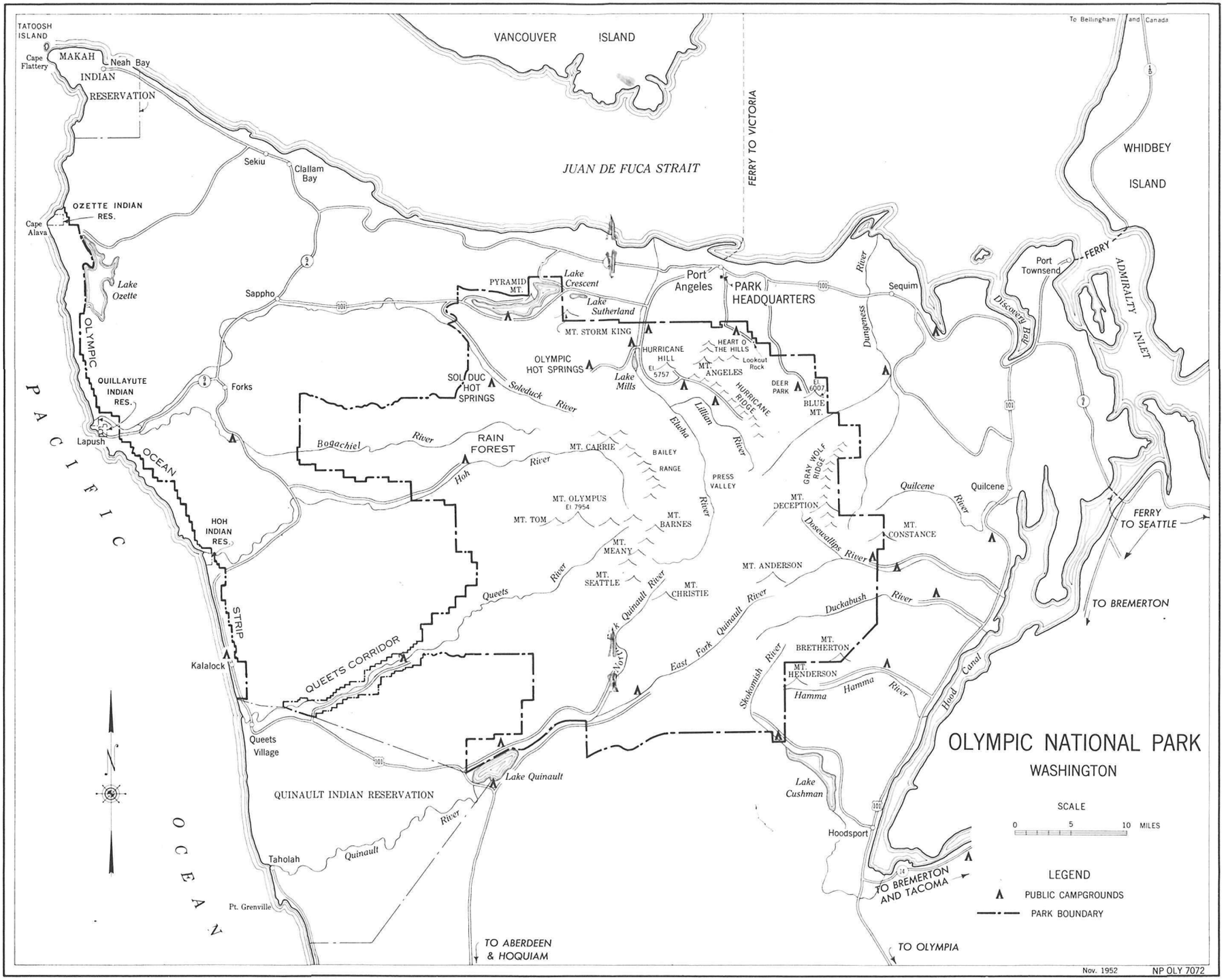
SALAL.

SHRUBS

SALAL (*Gaultheria shallon*).—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 flowers, white to pink in color, in 1-sided racemes become black, edible berries later in the summer. These berries were gathered by coast Indian tribes for making into syrup or thick, dried cakes.

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

CREAMBUSH ROCKSPIREA (*Holodiscus discolor*).—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.

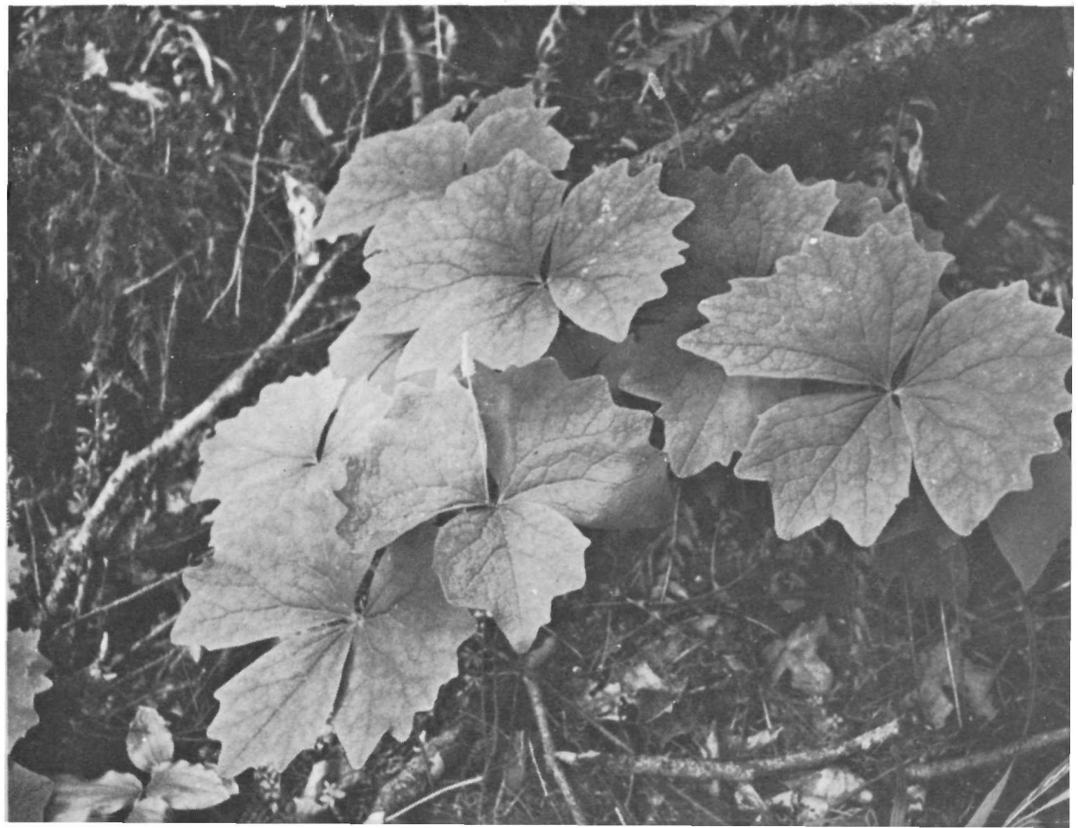

OLYMPIC NATIONAL PARK
WASHINGTON
SCALE
0 5 10 MILES
LEGEND
PUBLIC CAMPGROUNDS
PARK BOUNDARY
VANCOUVER ISLAND
JUAN DE FUCA STRAIT
FERRY TO VICTORIA
WHIDBEY ISLAND
ADMIRALTY INLET
FERRY
Port Townsend
Discovery Bay
To Bellingham and Canada
TATOOSH ISLAND
Cape Flattery
MAKAH INDIAN RESERVATION
Neah Bay
Sekiu
Clallam Bay
OZETTE INDIAN RES.
Cape Alava
Lake Ozette
OLYMPIC
QUILLAYUTE INDIAN RES.
Lapush
Sappho
Forks
PACIFIC OCEAN
HOH INDIAN RES.
STRIP
Kalalock
Queets Village
QUEETS CORRIDOR
QUINAULT INDIAN RESERVATION
Taholah
Pt. Grenville
Lake Quinault
Quinault River
Queets River
Hoh River
Bogachiel River
Soleduck River
SOL DUC HOT SPRINGS
OLYMPIC HOT SPRINGS
PYRAMID MT.
Lake Crescent
Lake Sutherland
MT. STORM KING
HURRICANE HILL
El 5757
Lake Mills
Port Angeles
PARK HEADQUARTERS
HEART O THE HILLS
Lookout Rock
MT. ANGELES
HURRICANE RIDGE
DEER PARK
El 6007
BLUE MT.
Elwha River
Lillian River
RAIN FOREST
MT. CARRIE
BAILEY RANGE
PRESS VALLEY
MT. OLYMPUS
El 7954
MT. TOM
MT. BARNES
MT. MEANY
MT. SEATTLE
MT. CHRISTIE
North Fork Quinault River
East Fork Quinault River
GRAY WOLF RIDGE
MT. DECEPTION
Dosewallips River
MT. ANDERSON
MT. CONSTANCE
Duckabush River
MT. BRETHERTON
MT. HENDERSON
Hamma Hamma River
Skokomish River
Lake Cushman
Hoodsport
Hood Canal
Dungeness River
Sequim
Quilcene
Quilcene River
FERRY TO SEATTLE
TO BREMERTON
TO BREMERTON AND TACOMA
TO OLYMPIA
TO ABERDEEN & HOQUIAM
Nov. 1952
NP OLY 7072

PACIFIC RED ELDER.

FIREWEED.

WESTERN SWORDFERN.

DEERFOOT VANILLALEAF.



NONWOODY PLANTS

FIREWEED (*Epilobium angustifolium*).—The rose-colored, spirelike, flowered tops of this tall plant attract attention wherever it is found. The name fireweed has been given because it comes up quickly in areas that have been burned. 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 as 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 variety 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 finely toothed edges, and are attached to the stem of the frond by means of a short stalk.

DEERFOOT VANILLALEAF (*Achlys triphylla*).—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 for it is wood sorrel.

QUEENCUP BEADLILY (*Clintonia uniflora*).—The hiker will find this attractive plant in flower at middle elevations, mostly in the Canadian Life Zone. Each plant has two or three prominent, narrowly oblong,

OREGON OXALIS.

QUEENCUP BEADLILY.

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 bracteata*).—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 the plant and spread out to form a rosette. They are glossy green on top. From the center of this rosette a reddish flower stalk arises, 8 to 16 inches tall, that bears pink to reddish, waxy flowers that are 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 drier, rocky soil at higher elevations, mostly above timberline in the Arctic-Alpine Life Zone. Its smaller, but typically lupine, leaves are hairy and spread out to form a rosette. The blue flowers are in many short, compact spikes that usually are spread in rosette manner.

SUBALPINE LUPINE.

AVALANCHE FAWNLILY (*Erythronium montanum*).—White lily, with a yellow center, abundant in early summer on the mountain meadows and in the woods near timberline.

LAMBSTONGUE FAWNLILY (*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 the lambstongue fawnlilies have two basal leaves.

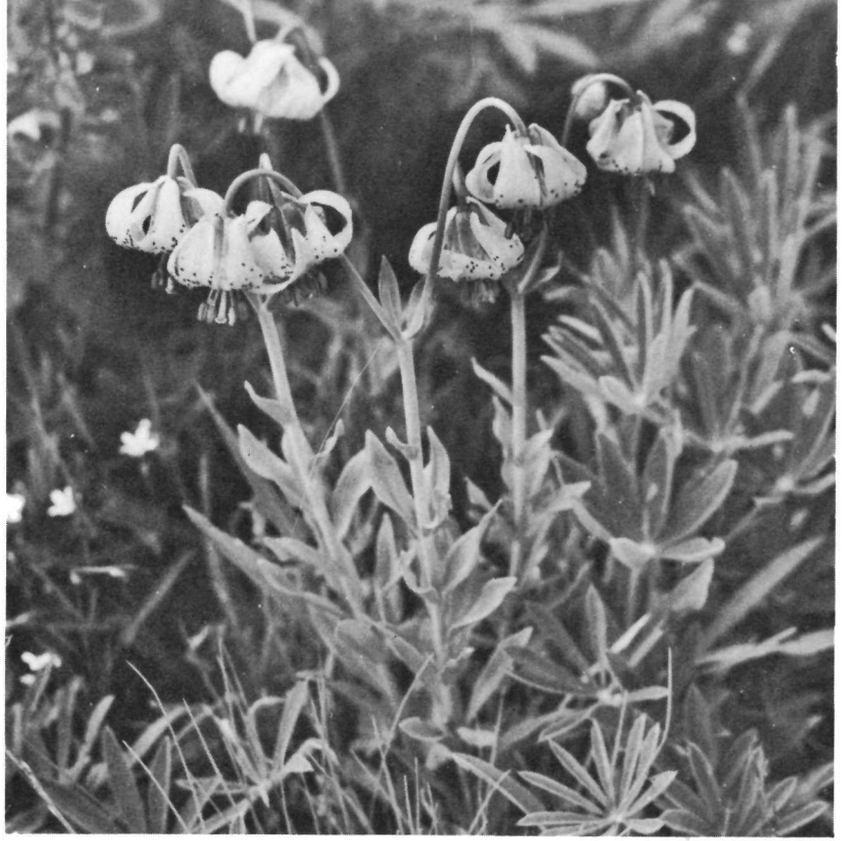
SCARLET PAINTEDCUP (*Castilleja miniata*).—The brilliant color of this plant is not in its flowers, which are hidden, but in the leafy bracts that surround them. Indian paintbrush is another name for it. One can imagine that the "flowers" are brushes dipped in scarlet paint and then turned upward.

MAGENTA PAINTEDCUP (*Castilleja oreopola*).—Similar to the scarlet paintedcup, except in color.

OWL CLOVER (*Orthocarpus imbricatus*).—A relative of the paintedcups; may be incorrectly identified as one of them. The "flower" is magenta-colored, but it differs from the paintedcup in being compact and nearly

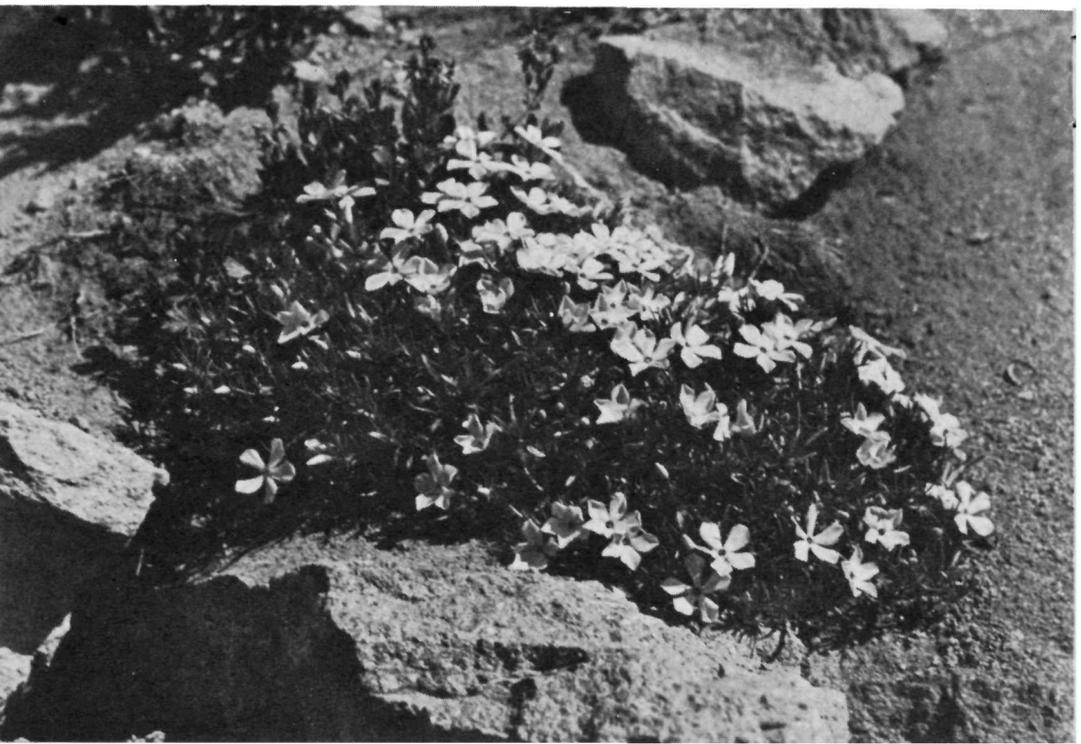
AVALANCHE FAWNLILY.

MAGENTA PAINTEDCUP.



COLUMBIA LILY.

SPREADING PHLOX. THIS CUSHION PLANT EXTENDS FROM THE DRIER, OPEN SITES OF THE HUDSONIAN ON INTO THE HIGHER ARCTIC-ALPINE LIFE ZONE.



ball-like. Each plant has only one flower stalk, while paintedcup usually has more than one.

The paintedcup and owl clover bloom in the mountain meadows in midsummer.

COLUMBIA LILY (*Lilium columbianum*).—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 Life Zone they do not bloom until July.

AMERICAN BISTORT (*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 the 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. Mountain buckwheat is another common name for it.

SPREADING PHLOX (*Phlox diffusa*).—A prickly, mosslike plant that forms cushions or mats on the 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. It can be recognized easily by its pale blue, nodding bell-like flowers that are about three-quarters of an inch long.

Wildlife

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.[2] 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

[2] Murray L. Johnson and Sherry Johnson, *Check List of Mammals of the Olympic Peninsula.*

mountains, the animals left. When the ice retreated, the animals returned. Not all animal types were able to survive. Thus, 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, red fox, and pine marten. 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. 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.

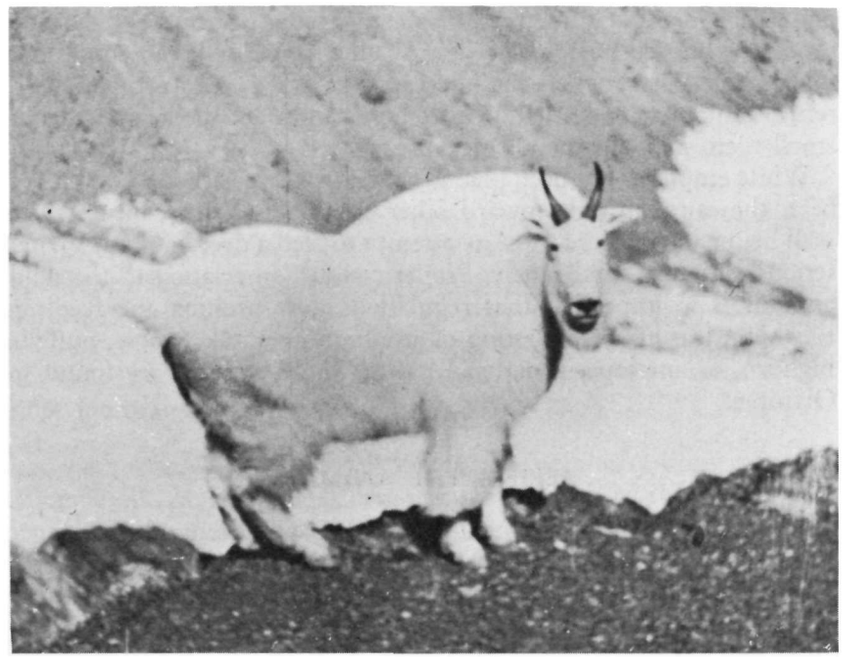
The coyote, renowned for his ability to survive civilization, has invaded the Olympic Peninsula during the present century. To some extent this animal fills the ecologic niche left vacant by the disappearance of the Olympic wolf.

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



AT HOME AWAY FROM HOME. MOUNTAIN GOATS WERE INTRODUCED INTO THE OLYMPIC MOUNTAINS BEFORE THE PARK WAS ESTABLISHED.

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 delinquent and 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 those 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. Garbage, 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, if in remote campsites, 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 serious and even fatal injury. Proper conduct in relation to the wild animals is so important that regulations now prohibit the feeding, touching, teasing, or molesting of any bear, deer, elk, moose, buffalo, bighorn, or antelope in national parks. The first three are found in Olympic.

SEEING THE ANIMALS

As long as the animals remain completely wild there is little danger from them. The majority of animal kinds are small, rare, secretive, or nocturnal, and for these or some 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. Therefore, it is necessary to study their habits and to meet them on their own terms if one is to see them.

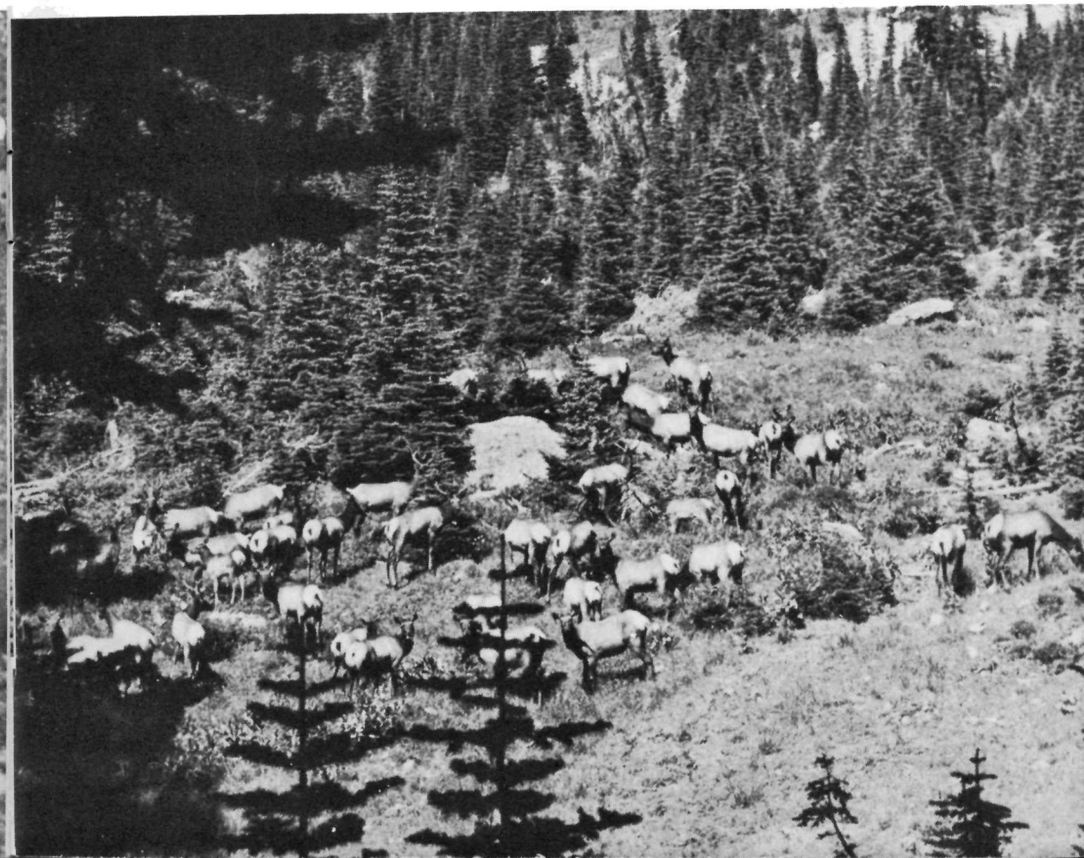
There is no scarcity of animals in Olympic; but the conditions for seeing even the larger ones, such as elk, deer, and bear, are not as favorable as in Yellowstone National Park, for instance. Olympic has less open country where unobstructed views may be enjoyed, especially in the lowlands. Even in the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

These difficulties should not discourage you from trying to see the animals. The following suggestions may help you to see some of the more interesting ones:

ROOSEVELT ELK.—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.

ROOSEVELT ELK. THE BULLS GROW NEW ANTLERS EACH YEAR.—*Photo by Wm. Everett.*

ROOSEVELT ELK ON SUMMER RANGE IN A HUDSONIAN MEADOW.
—*Photo by A. L. Thompson.*



COLUMBIAN BLACK-TAIL BUCK.

DEER FAWNS ARE COMMONLY LEFT ALONE WHILE THE MOTHER FEEDS. THEY SHOULD NOT BE MOVED OR OTHERWISE MOLESTED.—*Photo by Floyd Dickinson.*

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.

Generally, the elk spend the winters in the lowland forests and the summers in the higher mountain meadows. Some 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 their presence is audible. In May and June when the calves are born the cows sometimes bugle, and more frequently the calves give a high-pitched squeal.

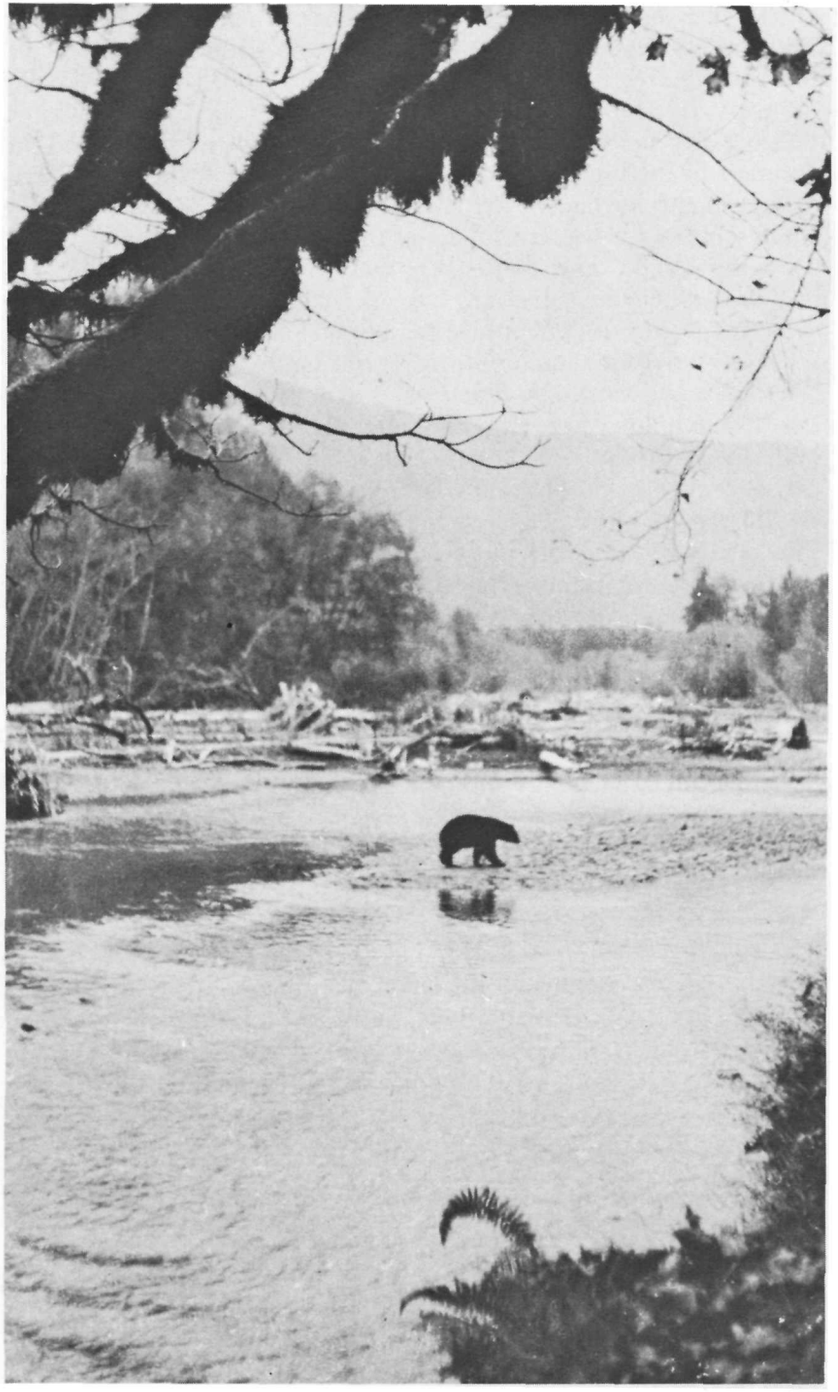
Elk are polygamous and during the rutting season a bull will gather a harem, consisting of a few to a dozen or more cows, which he attempts to hold against all other bulls. There is much bugling by the bulls then—thrilling wilderness calls. You will probably recognize the source of this call the first 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 during the months of July, August, and September. Cows, calves, and yearlings gather and remain in large herds until split up by the bulls when the mating season begins in the fall. During the summer the bulls remain apart from the cows, either in small groups or alone. The rutting period lasts from early September to mid-October and tapers off for another month after that.

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.

COLUMBIAN BLACK-TAILED DEER.—The black-tailed deer is one of the most frequently observed of the 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 the highways in western Washington at night is likely to see a deer suddenly bound out of the forest onto the highway. It may be so near as to present the danger of being struck by the car. Where highways pass through localities having large deer populations, State highway signs warn motorists of this danger.

Both Hurricane Ridge and Deer Park are favorite summering grounds for deer. They prefer the Upper Hudsonian Life Zone in summer where forest and meadow mingle to provide the deer both nutritious food and nearby secluded shelter. A visit to either of these areas at deer mealtime is likely to be rewarding.



BLACK BEAR ON THE HOH RIVER—AN UNSPOILED ANIMAL IN ITS NATIVE WILDERNESS.
—Photo by Floyd Dickinson.

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, are particularly dangerous.

BLACK BEAR.—Bears may be seen from sea level to alpine meadows during the summer and early fall. 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 the ridgetop the sleek, black forms may be seen against the green in 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 while gorging on the delectable fruits that they may be stalked from down wind. 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 the late fall, 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. Apparently, 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.

OLYMPIC MARMOT.—These animals of the rock slides and boulder piles are easily seen at Deer Park. Marmots come out of hibernation sometime in May and remain active until early September. Usually they can be expected to come out in the middle of the afternoon when the weather is pleasant and to remain outdoors until evening. They do not wander far from their dens to feed, play, or to lie sunning on a log or rock.

Although marmots may best be seen and photographed at Deer Park, these animals occur also on Hurricane Ridge and in other high-country localities. The marmot blends well with his surroundings. You may not be aware of his presence until you hear his shrill alarm whistle. At first you may mistake this for a human whistle. But it is so frequently heard in marmot territory that the name "Whistler" has been given the animal.

THE OLYMPIC MARMOT, OR WHISTLER, LIVES IN BURROWS AND ROCKPILES NEAR TIMBERLINE.—*Photo by Floyd Dickinson.*

The Olympic marmot is related to other marmots and woodchucks, but it is a distinct species that is known only from the Olympic Mountains. It is generally buff to rusty-brown in color during the summer. Toward fall, it develops a dark-brown to blackish coat that apparently begins at the head and progresses toward the tail.

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 varieties of birds on the Olympic Peninsula. The following list includes birds which may be 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

1. ROSY FINCH. A rose-colored, sparrowlike bird, tame and easily observed. Feeds characteristically on or near open rocky slopes and snowbanks.

Birds of the Mountain Meadows and Timberline

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

2. 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. Numerous on the ridges during grasshopper season.

3. SOOTY GROUSE. A dark, hen-shaped bird commonly seen feeding on the ground in meadows and woodland.

4. OREGON JAY OR CAMP ROBBER. 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.

5. RAVEN. Distinguished from the crow by its greater size and coarse guttural croaks. Seen on the meadows when grasshoppers are abundant.

6. MOUNTAIN BLUEBIRD. ". . . a flash of azure blue—a crumb from the blue sky above!"[3]

7. OREGON JUNCO. Size of a sparrow, with black head, rusty-brown upper parts and white under parts. The blackish tail has white outer tail feathers.

8. RUFOUS HUMMINGBIRD. The smallest bird; can be identified by the rapid, darting, humming flight.

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

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

[3] E. A. Kitchin. *Birds of the Olympic Peninsula.*

Birds of the Forest

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

1. ROBIN.

2. OREGON JUNCO. (Described in *Birds of the Mountain Meadows and Timberline.*)

3. 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 at passers-by with staccato, rasping notes.

4. RUFFED GROUSE. Similar to the sooty grouse, but reddish-brown, with broad, blackish band toward tip of the tail.

5. WESTERN PILEATED 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. Found in the deep forest, particularly where there are many dead trees and snags.

6. OREGON JAY. (Described in *Birds of the Mountain Meadows and Timberline.*)

7. STELLER JAY. A harsh-voiced blue bird with black head and conspicuous black crest.

8. 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." [4]

9. NORTHWESTERN FLICKER. A stoutly built woodpecker with a black bib across the breast and a white rump. Orange under wings can be seen when bird is in flight, which is markedly undulating.

10. HAIRY WOODPECKER. A medium-sized, black and white woodpecker. Distinguished from the downy woodpecker by its slightly larger size and the lack of black bars on the white outer tail feathers.

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

12. RUSSET-BACKED 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.

[4] Ralph Hoffman. *Birds of the Pacific States.*

13. RUFOUS HUMMINGBIRD. (Described in *Birds of the Mountain Meadows and Timberline.*) Abundant in the spruce forests along the coast during nesting time.

Birds Along the Streams

1. DIPPER. A chunky, dark slate-colored bird, with a short wrenlike 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.

2. BELTED KINGFISHER. A grayish-blue bird with white under parts and a blue band across the breast. The female has a reddish sash. Distinguished by its large head, stout bill, and loud rattling call. It dives from a tree into the water for fish.

3. WESTERN 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.

4. 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.

5. 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

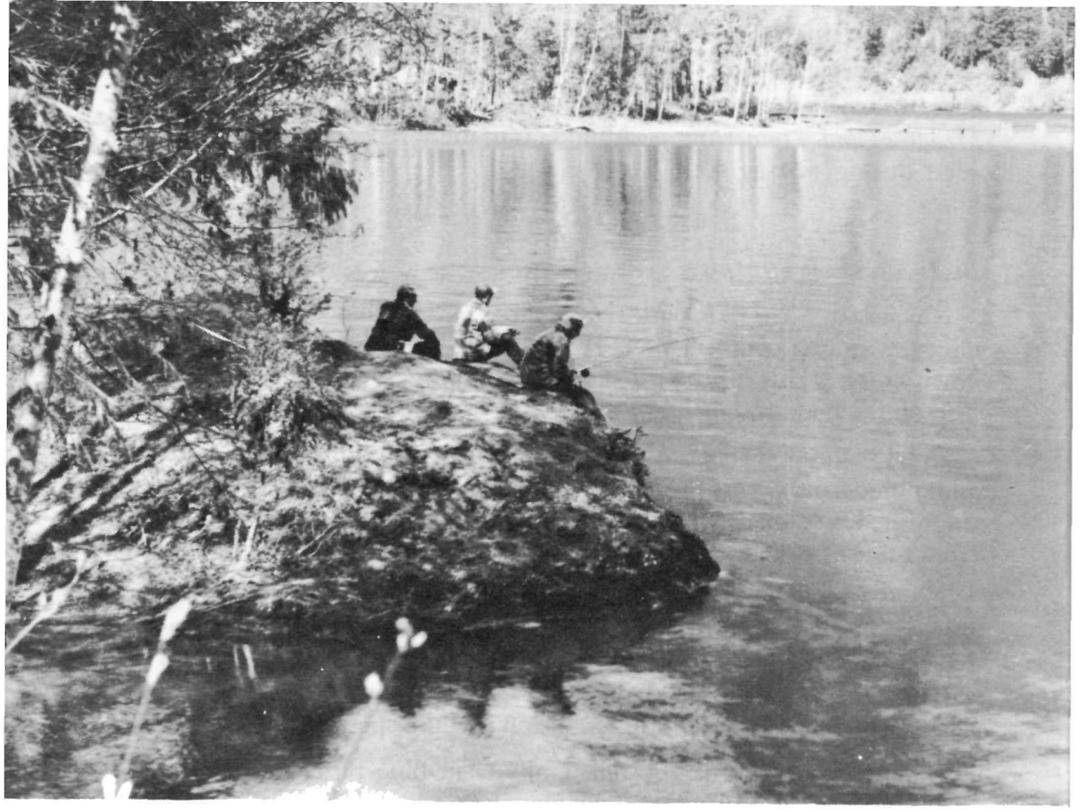
1. GLAUCOUS-WINGED GULL. Common along the shores even in summer.

2. GREAT BLUE HERON. (Described in *Birds Along the Streams.*)

3. BALD EAGLE. (Described in *Birds Along the Streams.*) Common along the roadless stretches of the Olympic Ocean Strip where it nests in trees near the shore.

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

5. CORMORANT. Large, slender, black bird with a slender hooked bill; often seen with body nearly erect on a rock in the water, particularly along the seacoast.



FISHING IN LAKE CRESCENT.

6. CROW. Occurs in flocks; caws, rather than uttering croaks like the raven.

7. RAVEN. (Described in *Birds of the Mountain Meadows and Timberline.*) Is much larger than a crow and occurs chiefly in pairs, singly, or in small groups; not in flocks.

FISH

The extensive mileage of beautiful streams is one of the distinguishing characteristics of the Olympic Peninsula. 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, Eastern brook, Dolly Varden, and steelhead. The steelhead spends the greater part of its life in the ocean, but enters the fresh-water streams to reproduce. After spawning it returns to salt water. During its life span it may make several springtime trips up the fresh-water streams for

the purpose of spawning. The life of some cutthroat follows the same pattern.

In the fall or spring, salmon of several species swim up the streams, driving hard to reach the tributary where they were hatched. Their mission is to spawn. This is the grand and final act that ends their careers. Unlike the steelhead, they do not return to the sea after spawning, but die. Sport fishing for salmon is chiefly done 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, cutthroat, and Eastern brook trout. Lake Mills, which is impounded water, contains rainbow, Eastern 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 15 and 20 pounds. These varieties of trout probably no longer exist in the pure state. Recent studies indicate that present 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, except in the Queets Corridor, Ocean Strip, and Bogachiel Strip. 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 park ranger stations.

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 the 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 TREE TOAD.—This delicate, moist toad 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 which is 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.*

LAND 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.

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

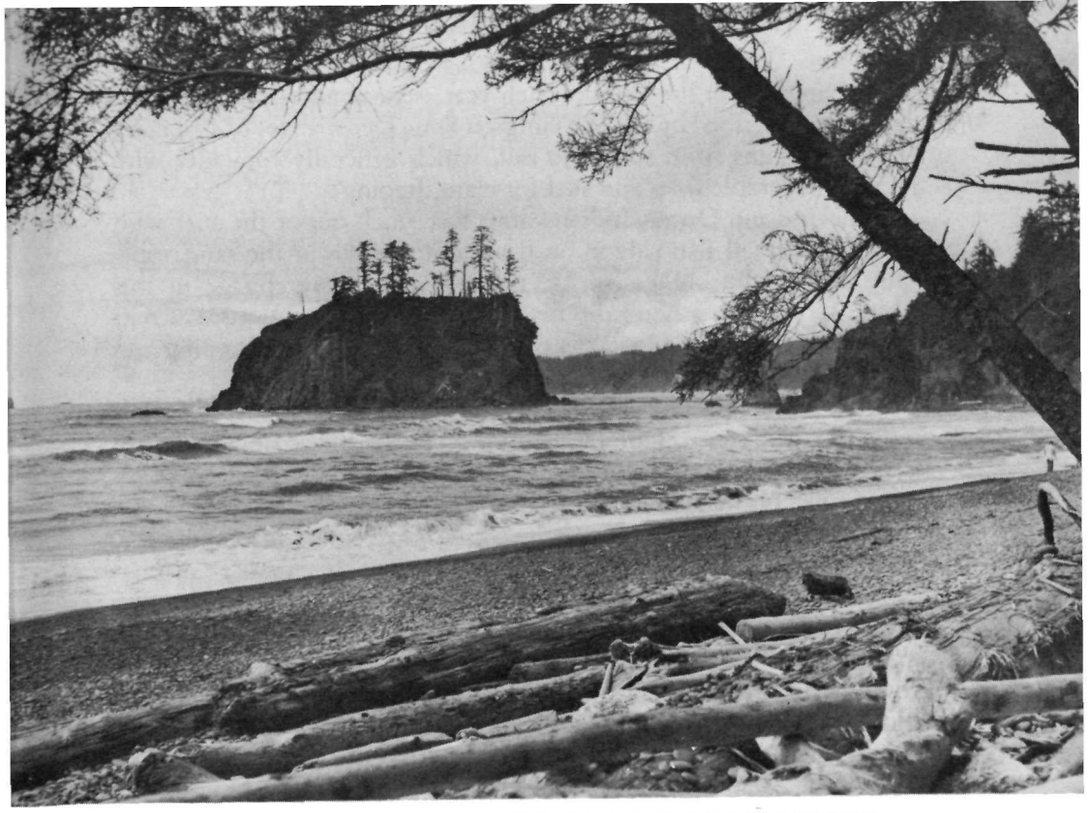
Olympic Ocean Strip

There is a narrow strip of land in the park that borders the ocean for 50 miles. The Olympic Highway runs through the southern 12 miles of it. The rest is roadless, except for the road to the village of LaPush. This strip protects a scenic coastline of unusual interest.

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 the 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 nudibranchiates, chitons, sea urchins, and anemones in pools also thrive where the shore of the sea 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



NUMEROUS SMALL ISLANDS AND ROCKS ADD TO THE SCENIC BEAUTY OF THE COAST ALONG THE OLYMPIC OCEAN STRIP. THIS IS ABBEY ISLAND.

HIKERS ENJOY THE WILD BEAUTY OF THE OLYMPIC OCEAN STRIP.

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 runs from spring to fall, which generally coincides with the most favorable tides and surf for clam digging.

Quillayute and Queets 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 joins 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 our island possessions of the Pacific.

Numerous birds nest on the off-shore islands. Many others make rest stops during migration, as the strip lies within a major migration flyway. Birds are always present along the shore, including gulls, crows, oyster catchers, cormorants, and many others. Usually several bald eagles may be seen during a hike along the shore. 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.—Starts at Lake Ozette and extends 3 miles to the Ozette village site at the beach. This trail 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.—About ½ mile long.

THIRD BEACH TRAIL.—About 1 mile long. These two latter trails start from the road near the village of LaPush and lead to attractive, clean, sandy beaches.

Man in Olympic

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.

SKUNKCABBAGE GROWS ALONG THE INDIAN VILLAGE TRAIL.

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 berry fruits 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 or 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 the summers it was a common practice of these people to migrate, either inland to gather berries and hunt, or along the water courses 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-time 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 cedar-plank communal houses are no longer built; and, as the climate is not conducive to preservation, the old ones have disappeared. The 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 stone, shell, or bone, which were used for blades in primitive tools.

Thrilling dug-out canoe trips on the Quinault River are available during the 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 business-

men 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."

Juan Francisco de Eliza, a Spanish captain, entered Juan de Fuca Strait in 1791 and named the harbor, where the 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 was virtually successful in excluding 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, thereby founding the oldest permanent white settlement on the Olympic Peninsula.

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 trap lines 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 Fourteenth Infantry. Starting at Port Angeles, the explorers cut a trail up and 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 ranges 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 the severest 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.

Conservation and Preservation

Olympic National Forest was established in 1897 by Executive order of President Cleveland. During the next 3 years, Messrs. Arthur Dodwell and Theodore Rixon surveyed this forest reserve. They produced the first accurate map and gave a detailed account of the forests.

Efforts to preserve the Olympic wilderness started in 1904. Representative Francis W. Cushman, of Tacoma, introduced a bill for the establishment of Elk National Park. The bill did not pass. In 1906 and 1908, Representative William E. Humphrey, of Seattle, introduced bills in Congress to create a game refuge on the Olympic Peninsula. These bills also failed. Representative Humphrey was genuinely interested in doing something to preserve the Roosevelt elk of the Olympics. 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, containing 615,000 acres, was established in 1909. President Wilson reduced this to approximately 328,000 acres in 1915.

The monument was within the boundaries of the Olympic National Forest. From 1909 to 1933, it was administered by the Forest Service, United States Department of Agriculture. By Executive order, President Franklin D. Roosevelt transferred the monument to the National Park Service, United States 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, of Everett, 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. Then, in 1938, Representative Wallgren's efforts began to bear fruit. The act of June 29, 1938, established Olympic National Park and abolished Mount Olympus National Monument. Additions to the park were made in 1940, 1943, and 1953, and it now contains 887,986.91 acres of Federal lands.

The park was formally dedicated on June 15, 1946.

How to Reach the Park

BY PRIVATE AUTOMOBILE

You may enter the Olympic Highway (U. S. 101) from Olympia or the Grays Harbor cities of Aberdeen and Hoquiam, without ferrying.

There is regularly scheduled ferry service to the Olympic Peninsula from Seattle and other cities on the east side of Puget Sound. A time schedule may be obtained by writing to Washington State Ferries, Colman Ferry Terminal, Seattle 4, Wash.

Ferry service is also available between Victoria, British Columbia, and Port Angeles. Time schedules may be obtained from Black Ball Line and from Canadian Pacific, both in Port Angeles, Wash.

BY BUS

Port Angeles is served by the Northwest Greyhound Bus Line, with transcontinental connections at Seattle.

The Gray Line Sightseeing Companies Associated, 10 North La Salle Street, Chicago 2, Ill., offers a 2-day, all-expense tour, with stopover privileges, around the Olympic Peninsula from Seattle.

Bremerton-Tacoma Stages provide bus service from Olympia to Lofall where connection is made with the Northwest Greyhound bus to Port Angeles.

BY RAILROAD

Passenger train service is not available on the Olympic Peninsula.

BY AIRPLANE

West Coast Airlines, Inc., offers round-trip flights daily between Seattle and Port Angeles.

Where to Stay

Resorts and cabin camps are available in several localities in the park, including the Olympic Ocean Strip. A schedule of approved rates for accommodations and services provided under Government contract may be obtained on request from the Superintendent, Olympic National Park, Port Angeles, Wash.

Free Government campgrounds are maintained near the ends of, or adjacent to, nearly all the entrance roads in the park. There are campgrounds outside the park also, especially in Olympic National Forest and in the State parks.

In addition, there are hotels, motor courts, and resorts in Port Angeles and elsewhere outside the park. Information regarding them may be obtained from the Olympic Peninsula Resort and Hotel Association, Colman Ferry Terminal, Seattle, Wash.

Bibliography

CAHALANE, V. H. *Meeting the Mammals.* The MacMillan Company, 1943.

DALQUEST, W. W. *Mammals of Washington.* University of Kansas, 1948.

FREEMAN, O. W. and MARTIN, H. H., editors. *The Pacific Northwest.* John Wiley & Sons, Inc., 1942.

GILKEY, H. M. *Handbock of Northwest Flowering Plants.* Oregon State College, 1947.

HASKIN, L. L. *Wildflowers of the Pacific Coast.* Binfords & Mort, 1934.

HAZARD, J. T. *Snow Sentinels of the Pacific Northwest,* pp. 37–63. Lowman & Hanford Co., 1932.

JAMES, HARLEAN. *Romance of the National Parks,* pp. 112–123. The MacMillan Co., 1939.

JOHNSON, MURRAY L. and JOHNSON, SHERRY. *Check List of Mammals of the Olympic Peninsula.* The Murrelet, Sept.–Dec. 1952.

JONES, G. N. *A Botanical Survey of the Olympic Peninsula, Washington.* University of Washington Press, 1936.

KITCHIN, E. A. *Birds of the Olympic Peninsula.* Olympic Stationers, Port Angeles, Wash., 1949.

PEATTIE, RODERICK, editor. *The Pacific Coast Ranges.* The Vanguard Press, 1946.

PETERSON, R. T. *A Field Guide to Western Birds.* Houghton Mifflin Co., 1941.

RICKETTS, E. F., and CALVIN, JACK. *Between Pacific Tides.* Stanford University Press, 1948.

SUDWORTH, G. B. *Forest Trees of the Pacific Slope.* Government Printing Office, 1908.

TILDEN, FREEMAN. *The National Parks and What They Mean to You and Me,* pp. 81–90. Alfred A. Knopf, 1951.

UNDERHILL, RUTH. *Indians of the Pacific Northwest.* Sherman Institute Press, 1945.

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