WHC Nomination Documentation

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SITE NAME ("TITLE") Olympic National Park

DATE OF INSCRIPTION ("SUBJECT") 30/10/1981

STATE PARTY ("AUTHOR") UNITED STATES OF AMERICA

CRITERIA ("KEY WORDS") C (ii)(iii)

DECISION OF THE WORLD HERITAGE COMMITTEE:
5th Session
NB The Committee urged the competent authorities of the United States of America to take steps to include in this World Heritage site the coastal strip, which is owned by the State of Washington.

BRIEF DESCRIPTION:
Located in the northwest corner of Washington state, Olympic National Park is dominated by Mount Olympus (2,428 metres high), which gave the park its name. A great variety of landscapes and ecosystems can be found there, with a great wealth of marine life along its rocky coast, forests of giant conifers in the valleys where huge herds of wapiti roam, and craggy peaks overhanging some sixty active glaciers.

1.b. State, province or region: U.S.A., State of Washington

1.d Exact location: Long. 123°7' – 124°42' W ; Lat. 47°29' – 48°11' N

Date received : 9.12.8
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Convention Concerning the Protection of
the World Cultural and Natural Heritage

WORLD HERITAGE LIST NOMINATION

OLYMPIC NATIONAL PARK

by

The United States of America

1980

WORLD HERITAGE LIST
Nominating Paper
OLYMPIC NATIONAL PARK

I. LOCATION:

A. Country: United States of America

B. State: Washington

C. Name of Property: Olympic National Park

D. Exact location on map and geographical coordinates: Olympic National Park lies in the extreme northwestern part of Washington State. It is divided into two segments: a mountainous core of 3350 km^2 making up most of the park's area, and a separate coastal strip 80 km long and up to 6 km wide. The park is between latitudes N 47° 29' and 48° 11' and longitudes W 123° 7' and 124° 42'.

II. JURISDICTION:

A. Owner: United States Department of the Interior, Washington, D.C.

B. Legal Status: In 1938, the United States Congress passed "An Act to establish Olympic National Park...(52 Stat. 1241)" which created Olympic National Park, thereby, providing protection for an area comprising 275,000 ha. In 1953, legislation was passed (Public Law 85-455) adding the Queets River Corridor and a 80 km ocean strip to the park. In addition, small acreages were added through other legislation. The present size of Olympic National Park is 362,848.7 ha, of which 99.6% is federally owned. The remaining 0.4% is privately owned.

C. Responsible Administration: Olympic National Park is administered for the National Park Service, United States Department of the Interior by: Superintendent, Olympic National Park, 600 East Park Avenue, Port Angeles, Washington 98362.

III. IDENTIFICATION:

A. Description and Inventory of Natural Heritage

Olympic National Park lies on the Olympic Peninsula, at the most northwestern corner of the contiguous United States. The Peninsula is surrounded by salt-water on three sides: the Pacific Ocean to the west, the Strait of Juan de Fuca to the north and the Puget Sound to the east. Although the waters separating the Peninsula from Canada to the north and the mainland to the east

are not more than 30 or 40 km wide, the area is effectively isolated. As a result, the park contains several species of flora and fauna endemic to the Olympics; and several mammalian species are missing that are found in neighboring ranges.

The element most responsible for shaping the current geological and biological features of Olympic National Park is water. Prevailing winds from the southwest bring in moisture-laden clouds off the Pacific Ocean. As the land begins to rise steeply to the mountain peaks, the clouds dump over four meters of orographic precipitation per year on the western side of the Peninsula, producing glaciers and abundant forests. The eastern side of the Olympics experiences a rain shadow effect, with as little as 30 cm falling annually on the northeastern sector of the Peninsula.

There are eleven major river drainages radiating from the core of the Olympics. Four of these, the Hoh, Soleduck, Dosewallips and Duckabush, represent the best, free-flowing, relatively undeveloped streams in this region. Although they are relatively short in distance (100 km maximum), they carry tremendous loads of glacial silt to the ocean.

The Olympic mountains were formed by the collision of continental plates which were transported towards each other by convection currents within the mantle of the Earth. The oceanic plate was subducted under the North American continent until the convection currents stopped, possibly because undersea volcanoes were blocked by the continental plate as they attempted to dip beneath the continent.

The lighter shales, sandstones and basalt, which had been violently sheared and squeezed during this tectonic movement, bobbed up like a cork, forming a dome some 95 km in diameter. Meanwhile, erosion was carving the deep valleys and canyons and jagged peaks that characterize the Olympic Mountains today.

The oldest rocks in the area are the sea cliffs at Point of Arches in the northeastern corner of the Peninsula. They are old gabbro, basalt and sandstone at least 144 million years old -- possibly remnants of the old continent.

The rocks of the mountainous core of the Peninsula are layers of sandstone and shale spanning a period of from 15 to 50 million years, thus making the Olympics geologically young mountains.

The ice advance from the north and the concurrent alpine glaciers sculpted the deep valleys, craggy peaks and beautiful cirques that we see today in the Olympics. Presently there are about 60 active alpine glaciers in the Olympics. The largest system is on the Mt. Olympus massif at the very center of the range. The largest of these glaciers is the Blue, about 4.8 km long and up to 300 meters thick. For the past 25 years, research teams have lived on the ice during the summer, carrying out long-term studies which have contributed to the international

scientific community's knowledge of geology in general, and glaciology in particular. The area is unique in that it is the lowest latitude in the world in which glaciers begin at an elevation lower than 2000 meters and exist below 1000 meters.

The coastal strip of Olympic National Park is an 80 km stretch of wilderness beach, characterized by rocky headlands, log-strewn beaches and a wealth of intertidal life. Rocky islets called sea stacks are found before the mainland, the remnants of a continuously receding, changing coastline. Arches, caves and buttresses are also the result of the relentless battering of the waves.

Marine life is abundant. Tidepools are filled with hundreds of species of invertebrate life. Seals, sea lions, sea otters and whales are often seen in the waves and on the offshore islands. Vegetation above the high tide zone is characteristic of the temperate rainforest,which is described below.

Park lands extend to the mean high tide line. Intertidal lands are administered by the State of Washington Parks and Recreation Commission, and the offshore islands and stacks are under the jurisdiction of the United States Fish and Wildlife Service. The three jurisdictions are operated cooperatively to help ensure the protection of the area's significant features.

The vegetative zones found in Olympic National Park are complex and varied. There is some disagreement among the experts regarding their classification.

There is a general consensus on the major forest communities, which are differentiated by elevation. They are the lowland forests of sitka spruce (Picea sitchensis) and western hemlock (Tsuga heterophylla); the montane forests of Pacific silver fir (Abies amabilis), western hemlock (Tsuga heterophylla), and Douglas-fir (Pseudotsuga menziesii); the subalpine forests of mountain hemlock (Tsuga mertensiana), and subalpine fir (Abies lasiocarpa); and the alpine zone of meadows which is located above tree line.

Environmental regimes are highly varied within the Olympics. Within a distance of 65 km, one can go from the wettest location in the continental United States (500+cm/yr) to the driest location on the West Coast outside of southern California. Subsequently, there is tremendous local variation within the major community types.

The most outstanding habitat within the park is the Picea sitchensis zone, commonly called the Olympic rainforest. This coniferous forest grows only in the Pacific Northwest and reaches maximum development in the four western-facing valleys of the park. Mild winters, cool summers, and an average rainfall of 356-445 cm per annum have created a forest of colossal trees and dense undergrowth. Olympic National Park contains the greatest living standing biomass of any place in the world, with the possible exception of Redwood National Park and eucalyptus groves in Australia. Besides the dominant sitka spruce (Picea sitchensis), other trees found in this zone are the western hemlock (Tsuga heterophylla); Douglas-fir (Pseudotsuga menziesii); western red cedar (Thuja plicata) big leaf maple (Acer macrophyllum), and red alder (Alnus

rubra). All of the coniferous species are prime commercial trees and nearly all of the original forest outside the park has been harvested. Areas inside the park boundaries are the last preserve of a once vast expanse of primeval forest. Trees of record size averaging 2-4 meters in diameter and 67-90 meters in height are found in the old-growth forest. Olympic National Park is the optimal site in the world for northern latitude, wet coniferous mixed forest, as evidenced by the presence of world-record species, including Alaska cedar, grand fir, Pacific silver fir, western hemlock, Douglas-fir, subalpine fir, and western red cedar.

In addition to the giant trees, one of the most notable features is the epiphytic vegetation -- plants that cover the trunks and branches of the maples and alder, deriving support and most of their water and nutrients from the air. These plants are mostly mosses, lichens and liverworts and give the rainforest a unique atmosphere.

Beneath the tree canopy, more than 300 plant species are found. There are 15 species of shrubs, the most common being red huckleberry (Vaccinium parvifolium); 28 species of grasses, sedges and rushes; 5 species of ferns with western sword fern (Polystichium munitum), the most common. Over 100 bryophytes, 70 lichens and 75 other herbaceous plants are also found in the rainforest.

The dominance of Picea sitchensis in the lowland forest ends as one moves out of the western-facing valleys. Tsuga heterophylla becomes the dominant tree, in close association with Pseudotsuga menziesii and Thuja plicata. This lowland zone extends in the western side of the Olympics up to 550 meters; and up to 1100 meters on the eastern side of the mountains.

At about the 550 meter level, the lowland forest merges with the montane coniferous forest. This zone is highly complex, with various species dominating local areas as a result of particular local environmental factors. Tsuga heterophylla is found in dry to wet sites, but is most abundant in moist areas. Pacific silver fir (Abies amabilis) is widespread within the montane zone, and is probably the climax species, depending on local conditions.

Pseudotsuga menziesii is the most important seral species in the montane zone and is most abundant on dry and very dry sites. Pure stands exist in areas which were disturbed by fire as long as 300 years ago.

The subalpine zone ranges from 1100-1800 meters. Cold temperatures, wind, late snowmelt and a short growing season limit the number and size of tree species. Mountain hemlock (Tsuga mertensiana) replaces western hemlock (Tsuga heterophylla). In the lower subalpine zone, Abies amabilis is a prevalent species on wet slopes However, on the higher, colder, drier slopes, the hardier subalpine fir (Abies lasiocarpa) dominates the tree profile. Alaska cedar (Chamaecyparis nootkatensis is seen, but is sparsely distributed.

During the summer in the subalpine/alpine zones, fields of wildflowers are abundant in the meadows in fire-caused and other forest openings, and above treeline. These extensive herbaceous plant communities provide ample food for numerous species of wildlife. Of the 90 low-growing alpine plant species found in the park, six species and six varieties of flowering plants are endemic to the Olympic mountains. Two of these, Cotton's milk-vatch (Astragalus cottonii) and Olympic butterweed (Senecio neowebster), are candidates for notice of review to be put on the U.S. Federal Register of rare/endangered plant species.

The six species and six varieties of flowering plants include:

Cotton's milk-vetch	Astragalus cottonii
Piper's bellflower	Campanula piperi
Piper's bellflower (white form)	Campanula piperi var. soveregniana
Magenta paintbrush	Gastilleja parviflora var. olympica
Olympic mountain daisy	Erigeron flettii
Wallflower	Erysimum arenicola var. arenicola
White coiled-beak lousewort	Pedicularis bracteosa var. atrosanguinea
Rockmat	Petrophytum hendersonii
Olympic butterweed	Senecio neowebsteri
Kittentails	Synthris pinnatifida var. lanuginosa
Flett's violet	Viola flettii
Olympic rockress	Ababiss furcata var. olympica

There is one species and four subspecies of endemic mammals, and two species of endemic fish. They are:

Olympic marmot	Marmota olympus
Olympic mole	Scapanus Townsendi ssp. olympicus
short-tailed weasel	Mustela erminea ssp. olympicus

Olympic chipmunk	Eutamias amoenus ssp. caurinus
Olympic mazama pocket gopher	Thomonys mazama ssp. melanopes
Beardslee trout	Salmo gairdneri beardsleei
Crescenti trout	Salmo clarkii crescentis

Four mammals have unique pelages. The black bear (Ursus americanus) has a jet black coat in the Olympics. Elsewhere, its fur varies from black to dark brown to white. The varying or snowshoe hare (Lepus americanus ssp. washingtonii) and the short-tailed weasel (Mustela erminea ssp. olympicus) maintain a brown pelage year around, instead of turning white in winter.

The Olympic marmot (Marmota olympus) molts to a black color in preparation for winter -- no other marmots are known to do this. Of interest from an ecological standpoint is the fact that eleven mammals are conspicuously missing because of the isolation of the Olympic Peninsula. Although resident in the nearby Cascade Mountains, there is no evidence that the following ever lived on the Peninsula:

grizzly bear	Ursus horribilis
red fox	Vulpes fulva cascadensis
pika	Ochotona princeps
wolverine	Gulo lusceus
golden mantled ground squirrel	Callospermophilus saturatus
badger	Taxidea taxus
lynx	Lynx canadensis
mountain sheep	Ovis canadensis
porcupine	Erithizon
water vole	Microtus
bog lemming mice	Synaptomys

Although the mountain goat (Oreamnos americanus) is not native to Olympic Mountains, it was introduced in the 1920's as a game animal before the park was established. Since wildlife is protected within the park, the goat population has increased from only a dozen sixty years ago, to several hundred at the present time. There are approximately thirty-five to forty species of Olympic flora which are presently on the revised working list of rare, endangered and threatened vascular plants in the State of Washington, in mountain goat habitat. Studies are ongoing to determine the effect goats have on endemic plants.

Protection of the Roosevelt elk (Cervus canadensis ssp. roosevelti) is one of the reasons why the park was originally created. Elk National Monument, later Mt. Olympus N.M. was established at the beginning of the 20th century to stop the slaughter of this magnificent animal. The large unmanipulated herds of elk add to the uniqueness of the rainforest valleys.

Other animal species found within Olympic National Park are:

cougar	Felis concolor
bobcat	Lynx rufus
coyote	Canus latrans
mountain beaver	Aplodontia rufa
raccoon	Procyon lotor
spotted skunk	Spilogale putorius
striped skunk	Mephitis mephitis
mink	Mustela vison
beaver	Castor canadensis
marten	Martes americana
fisher	Mates pennanti
river otter	Lutra canadensis
mule deer	Odocoileus hemionus ssp. columbianus

Three endangered animal species, the fisher (Martis pennanti), peregrine falcon (Falco peregrinus), and the spotted owl (Strix occidentalis) are found within the park.

Olympic National Park was established to preserve, protect, and interpret the finest examples of Pacific Northwest rainforest, seacoast, and mountain scenery. It has maintained a wilderness aura because the mountainous core is impenetrable to humans for much of the year. The major management objective is to protect and preserve the resource, while providing for some forms of recreational use. Except for maintenance of the trail system, no development is planned for the interior of the park.

The only areas where development has occurred is along the road corridors which penetrate the outer areas of the park and coastal strip. Essential to the visiting public are campgrounds, overnight accommodations and restaurants. These are, and will continue to be, managed in such a way that disturbances to the natural resource base will be kept to a minimum.

Visitors are encouraged to experience the preserve by backpacking, hiking, and skiing. Only two backcountry areas have limits on numbers of visitors because of overuse. However, it is possible that more of the park will require tighter use restrictions to protect the natural integrity of ecosystems. Presently, there is a limit of twelve persons per hiking party, and wood fires are prohibited in subalpine areas.

Many visitors to Olympic National Park do not have the time or desire to hike or backpack. An extensive and varied interpretive program is offered through visitor displays, audiovisual presentations, publications, and live programs and activities which explain the park's diverse features and their interrelationships.

Olympic is an ideal park for carrying out scientific research that requires relatively pristine ecosystems. The park is a part of the Man and Biosphere Reserve Program and consequently will play an important role in worldwide monitoring of human impact on the Earth's Biosphere. The area was established as a Biosphere Reserve to utilize for research and education the largest intact assemblage of montane system wet mixed coniferous forest and lowland glaciers remaining in the northern temperate latitudes.

B. Maps

Attached are the following maps:

1. Vicinity Map, Olympic National Park.

2. Olympic National Park -- a map showing topographic features, trails, and visitor services within the park.
GPO 1980 - 311 - 336/32

C. Photographic Documentation

The following photographs from Olympic National Park are included:

1. Portion of 80 km stretch of wilderness beach.
Source: U.S. National Park Service Photo Library.

2. Sea Stacks on coastal strip.
Source: U.S. National Park Service Photo Library.

3. Hall of Mosses Nature Trail, Olympic rainforest.
Source: U.S. National Park Service Photo Library.

4. Hoh Valley from High Divide.
Source: U.S. National Park Service Photo Library.

1. Vicinity Map, Olympic National Park

5. Round Lake in the Seven Lakes Basin.
   Source: U.S. National Park Service Photo Library

6. Meadows in the Alpine Zone
   Source: U.S. National Park Service Photo Library

7. Hoh Glacier on Mount Olympus.
   Source: U.S. National Park Service Photo Library

8. A trail system is maintained for backpacking.
   Source: U.S. National Park Service Photo Library

D. History

The Olympic Peninsula was first inhabited by humans that crossed the Bering Sea from Asia to North America and migrated southward 25,000 years ago. The northwest coastal people split into many nations, but their way of life was similar, as the environment is ecologically similar from southeastern Alaska to Oregon.

The natives of the Olympic Peninsula found all they needed for a bountiful life on or near the coast and rarely, if ever, ventured into the mountainous interior.

The first Europeans to visit the area were the Spanish in the 1650's. They explored the Pacific Coastal area, naming the Strait of Juan de Fuca to the north. A settlement was established for a short time, on the northwestern tip of the Peninsula.

But it wasn't until British Captain George Vancouver entered the straits in 1792 to sail into Puget Sound that exploration began in earnest. It was Vancouver who discovered that the Strait and the Sound were not the fabled passage to the Atlantic, but were a great inland waterway that nearly surrounded a region of mountains and great forests.

In 1824, Hudson's Bay Company established several posts in the Olympic Peninsula and by the 1840's, there was considerable development. Logging was a principle activity in the coastal areas, but the mountainous interior remained untouched. In an effort to protect the Roosevelt elk, whose numbers were rapidly declining due to hunting pressures, 246,000 ha of the area was established as a National Monument under the new Antiquities Act in the early 1900's.

E. Bibliography

Arno, Steve: Northwest Trees, Mountaineers, Seattle 1977.

Danner, Wilbert R.; Geology of Olympic National Park. University of Washington Press, Seattle; 1955.

Wood, Robert L.; Men, Mules and Mountains, Lt. O'Neill's Olympic Expeditions, The Mountaineers, Seattle, WA.; 1976.

Nationwide Rivers Inventory: A Report on Natural and Free Flowing Rivers in the NW United States, Heritage Conservation and Recreation Service, August 1980.

IV. STATE OF PRESERVATION/CONSERVATION

A. Diagnosis

Most of Olympic National Park has maintained the same character that existed before humans entered the mountains. Ecosystems within the park have been relatively undisturbed, with the notable exceptions of the addition of mountain goats 60 years ago, the extermination of wolves by the 1930's, and the introduction of exotic plant species.

Most human impact is seen and felt along the borders of the park where visitor use and external threats are concentrated.

There are several situations that are considered by ecologists to pose current and future threats to the integrity of Olympic.

Although air quality is currently a low-level problem associated with slash burning, and lumber, pulp and paper mills outside the park, a proposed oil superport and related refineries could have a significant impact on the park's atmosphere. This oil port, tank farm and pipeline terminus would be located in Port Angeles harbor, 4.6 km from the park. Air pollution and acid precipitation could affect the park's visual quality and pose a threat to fish and vegetation.

Logging operations occur on the borders of the park. At times trees in the park are blown down at the edge of clearcuts. The network of external logging roads provides easier access to remote boundaries with increased potential for poaching.

Exotic flora and fauna pose an internal threat to the park. Research is underway to determine the extent of damage of mountain goats to rare and unique plant species by trampling and browsing. Other native plants are being crowded by hardier non-native species.

As the Puget Sound metropolitan area population increases, human impact will likely put more pressure on wilderness ecosystems. Trampling of vegetation, soil erosion, contamination of surface water, and crowding of animal populations will likely result. Water quality in coastal areas is also threatened by large scale applications of herbicides in timber producing areas adjacent to the park.

B. Agent Responsible for Preservation/Conservation

Superintendent
Olympic National Park
600 East Park Avenue
Port Angeles, Washington 98362

C. History of Preservation/Conservation Activities

In the early 1900's, the Roosevelt elk (Cervus canadensis ssp roosevelti) were being slaughtered for their teeth, which were subsequently made into the fashionable watchfob. Conservationists became alarmed, and President Theodore Roosevelt established a National Monument in 1909 under the new Antiquities Act in an effort to protect the elk.

A violent reaction against the proclamation was led by mining, timber and industrial interests.

In 1915, these interests convenced President Woodrow Wilson to cut the Monument to half its size of 246,000 ha to allow exploration for manganese, a metal much in demand during World War I.

In 1933, President Franklin D. Roosevelt transferred all national monuments to the jurisdiction of the National Park Service, and interest in establishing a park on the Olymplic Peninsula grew again. Of primary concern was the virgin forest which was quickly vanishing under increasing logging pressure. Conservationists envisioned the establishment of a national park as a last chance to save a unique forest containing some of of the largest trees in the world, and essential habitat for the Roosevelt elk.

Timber interests saw the last remaining stands of Douglas fir, fir, spruce, hemlock, and cedar as an opportunity to stave off the threatening timber shortage.

In 1938, preservationists found victory at hand, when a sympathetic Franklin Roosevelt signed the legislation letting aside 275,000 ha to be preserved for the American people as a park. In 1953, President Harry S. Truman signed a bill adding the Queets River corridor and the 80 km ocean strip. With other smaller additions added during the 1940's and a section of northern ocean strip added in 1976, the final size of Olympic National Park was established at 362,848.7 ha.

D. Means for Preservation/Conservation

The Act establishing the National Park Service on August 25, 1916; and the Act creating Olympic National Park, June 29, 1938, designated the park as a conservation unit to be managed in such a way that it be preserved in its natural state. Other specific policies and regulations provide further protection of the park.

In addition, various plans provide important guidelines for the management of the park (see following section).

Many studies are in progess within Olympic to help management make long range decisions for preserving the park. Several public agencies and scientists to carry out their research.

The following are examples of ongoing studies:

MOUNTAIN GOATS -- in 1977, three studies were begun to research the effects of the goats on vegetation and soils, and to document the population trend, behavior and biology of this introduced species. This project should be completed by 1981, and will result in a comprehensive goat management plan.

GLACIER STUDIES -- two long-term projects are studying the many aspects of glaciology. The primary areas being used in the study is the Blue Glacier on Mt. Olympus.

AIR POLLUTION MONITORING -- Olympic National Park is considered to have one of the cleanest airsheds on earth. Thus it is ideal as a long-term reference site for monitoring pollution throughout the world. This project is being carried out in conjunction with the Federal Environmental Projection Agency.

EFFECTS OF FIRE -- this project is studying the ecological effects of a 400 ha fire that occurred in the Hoh rainforest -- the largest fire in the park's recent history. This study will be important in the development of a fire management strategy.

Other research projects include baseline surveys of vegetation, elk and small mammals; landcover mapping and serial mapping; development of models simulating ecological changes in forest and subalpine areas, for use in management strategies; elk and deer habitat relationships; and various studies in plant ecology in different biological zones.

The budget for managing the park is approximately U.S. $3,000,000 for 1980. The amount is considered adequate for fulfilling the mandate for which the park was established.

E. Management Plans

MASTER PLAN, OLYMPIC NATIONAL PARK -- This document describes the park, the region in which it lies and provides a framework for directing management of the park consistent with its purpose of existence.

FINAL ENVIRONMENTAL STATEMENT ON THE WILDERNESS DESIGNATION, 1974 -- Details the environmental and social impacts of and alternatives to the wilderness designation.

WILDERNESS RECOMMENDATION, 1974 -- This document proposes that 96% of Olympic National Park become part of the National Wilderness Preservation System. This designation would require the strictest adherence to preservationist management. This designation is still pending in the U.S. Congress.

BACKCOUNTRY MANAGEMENT PLAN, 1976, revised January 1980 -- This plan provides a guideline for allowing optimum wilderness experience for visitors while still maintaining the integrity of natural ecological processes.

LAND ACQUISITION PLAN, March 1980 -- This document procides guidelines for the use and accupancy of privately-owned lands, within Olympic National Park.

Other plans in the process of being researched and formulated are goat management, fire management, and resource management plans.

Justification for Inclusion on the World Heritage List

Olympic National Park is considered to be of outstanding universal value and is nominated to the World Heritage list under Natural Criterion (ii) as an "outstanding example representing significant ongoing biological evolution"; and under Natural Criterion (iii) as a property which contains superlative national phenomena, formations or features or areas of exceptional natural beauty.

With respect to Criterion (ii), Olympic National Park contains the largest and best example in the western hemisphere of virgin temperate rainforest. It is a complete ecosystem that has hundreds of species, many endemic to the area, that are continuing to evolve in a relatively natural state. The ecosystem is intact, the area is of sufficient size to include the components necessary to assure its continuing natural exsistence, and protection of its integrity is afforded by its management as a national park by the United States National Park Service under Federal statutes.

With respect to Criterion (iii), Olympic National Park is an area of exceptional natural beauty and the largest protected area in the temperate region of the world that includes in one assemblage a combination of ecosystems from ocean edge, through wet mixed coniferous forests to glacial peaks. The area contains 60 glaciers, 80 km of roadless ocean coastline, and one of North America's largest areas of subalpine meadows. It contains the largest intact stand of mixed coniferous forest in the conterminous United States including most of the world record size specimens of major coniferous species.

The Park contains 500 taxa of vascular plants, 180 species of birds, and 50 species of mammals, of which at least thirteen taxa of plants and seven taxa of animals are endemic. With ten major watersheds and over 200 streams and anadromous as well as resident population of seven salmonoid species, it may contain the largest intact assemblage of habitat and native gene stocks of salmonoid species in the conterminous United States.

Signed (on behalf of State Party) David A Hales

Full Name David F. Hales

Title Deputy Assistant Secretary for Fish and Wildlife and Parks

Date December 2, 1980

AN ENVIRONMENTAL ASSESSMENT

ON THE

MANAGEMENT OF INTRODUCED MOUNTAIN GOATS

IN

OLYMPIC NATIONAL PARK

Prepared by
Olympic National Park
600 East Park Avenue
Port Angeles, Washington 98362

February, 1981

PUBLIC RESPONSE FORM

GOAT MANAGEMENT ASSESSMENT
OLYMPIC NATIONAL PARK

Please respond to each of the following statements:

	Strongly Favor	Favor	No Opinion	Oppose	Strongly Oppose
1. No action should be taken to manage the mountain goats.	☐	☐	☐	☐	☐
Comments:					
2. Goats should be controlled to protect the natural ecosystem.	☐	☐	☐	☐	☐
Comments:					
3. All goats should be removed from the Park.	☐	☐	☐	☐	☐
Comments:					
4. The Park should begin an experimental management program to control goats and their impacts on Klahhane Ridge.	☐	☐	☐	☐	☐
Comments:					

We welcome your additional comments (use reverse).

Please sign and return this form by March 20, 1980, to:

Superintendent
Olympic National Park
600 East Park Avenue
Port Angeles, WA 98362

Name (please sign and print)

Address

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I. PURPOSE AND NEED FOR ACTION

A. The problem

The mountain goat, *Oreamnos americanus*, is a large, introduced herbivore that is changing the alpine ecosystem of Olympic National Park. Although native to the Cascade Mountains in central Washington, there is no evidence of goats in the Olympic Mountains of northwestern Washington before 1925 (Webster 1925; Moorhead and Stevens, in press).

The impact of animals released by man into ecosystems where they have not occurred before is documented throughout the world. (See Section VII, References.) Large herbivores can profoundly alter native plant and soil communities by grazing and physical disturbance. Some plant species preferred as food, or intolerant to disturbance, may decline and even disappear, while those avoided by the introduced grazer tend to flourish (Coblentz 1978). Soil erosion due to foraging and trampling may increase (Koehler 1974). Native wildlife may experience increasing competition for limited resources (Potter and Berger 1977; Wauer 1978). Eventually, a new equilibrium occurs. However, in a relatively short time such changes may severely modify ecosystems which have evolved over thousands of years.

In 50 years mountain goats have dispersed widely and increased throughout the higher elevations of the Olympic Mountains (Figure 1). They now inhabit over 450,000 acres and are estimated to number between 500 and 700 (Moorhead and Stevens, in press; and Stevens, in prep.) Most of their preferred habitat is within Olympic National Park where, like all wildlife, they have been protected from hunting. As goats increase, disturbance to vegetation and soil from their foraging and trampling is also increasingly evident (Pfitsch 1980, Pike 1981).

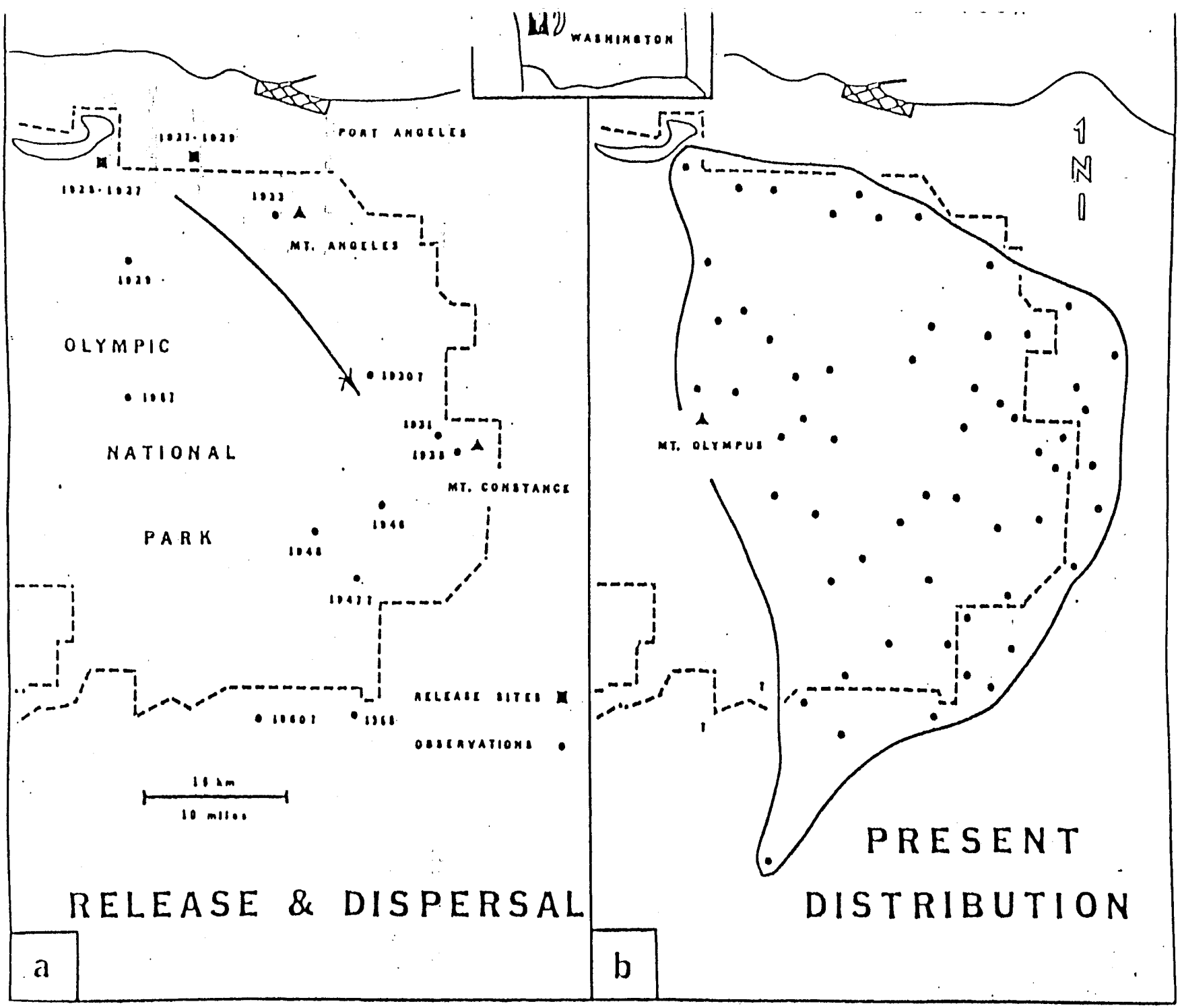

Figure 1. Distribution of mountain goats in Olympic National Park, Washington: (a) release and

National parks are established to protect outstanding natural ecosystems. Olympic National Park is a prime example. It contains the largest relatively undisturbed array of plant and animal communities remaining in the Pacific Northwest, and its scientific and recreational importance is now recognized internationally. In 1978, for example, Olympic was designated a Biosphere Reserve in UNESCO's "Man and the Biosphere" program: an international system of natural areas representing the major biomes of the world. They are intended for preservation of native gene stocks, environmental research and monitoring, and education. Olympic has also been nominated recently as a "World Heritage Park" by UNESCO, providing additional global recognition of its scientific and cultural importance.

Prevention and control of damaging activities by man to natural ecosystems has evolved as a cornerstone of National Park Service policies. In the past, some of these activities have occurred when well-intentioned but ecologically misguided attempts were made to protect "good" animals (like deer and elk) by controlling "bad" animals (like predators). Such emphasis of one over another native species, or by misplaced compassion allowing a non-native species to flourish, results all the same in unbalancing the naturally functioning ecosystem. Therefore, a stated policy is to control or remove, where feasible, exotic species that are a threat to native plants, animals and their associated communities (USDI 1978).

B. Introduction and Impact of Mountain Goats

There is no historical evidence of mountain goats in the Olympic Mountains prior to 1925 (Webster 1925; Moorhead and Stevens, in press). Local

officials and citizens considered the habitat ideal for goats and collaborated in releasing four goats from British Columbia at Mount Storm King near Lake Crescent on January 1, 1925. A few years later, several more goats were released. The record is vague, but a total of 11 or 12 goats were introduced between 1925 and 1929. The population grew and expanded its range. Within 35 years, goats had populated the Olympic Peninsula to the southernmost edges of the mountains. By the 1970's goats roamed throughout the eastern half of Olympic National Park and on adjacent lands. By 1980, they occurred in about 700 square miles, including most of the Park's alpine and subalpine communities (Figure 1).

By far the largest concentration of goats is now found in the northern Olympics on Klahhane Ridge, adjoining Mount Angeles, where the population has doubled in the last ten years. The 1980 census here indicated 180 from an earlier estimate of over 200. Goats are dispersing from Klahhane Ridge to less-populated areas (Figure 2). The actual rate of Parkwide population increase is not clear yet, but available data indicate a potential doubling period of 8.7 years (Driver, Taber, and Stevens 1979; V. Stevens, in prep.).

Plant communities in the Olympic Mountains have evolved without goats. In relative isolation on the Peninsula, several unique plant species have developed. Eleven of these endemic plants are found in those parts of the mountains where goats now occur. Another 43 plants where goats occur are not endemic, but are considered rare and endangered species by the Washington National Heritage Program (Pike 1981).

Studies show that the present goat population on Klahhane Ridge is high enough to significantly affect plant communities (Pfitsch 1980). Preferred forage

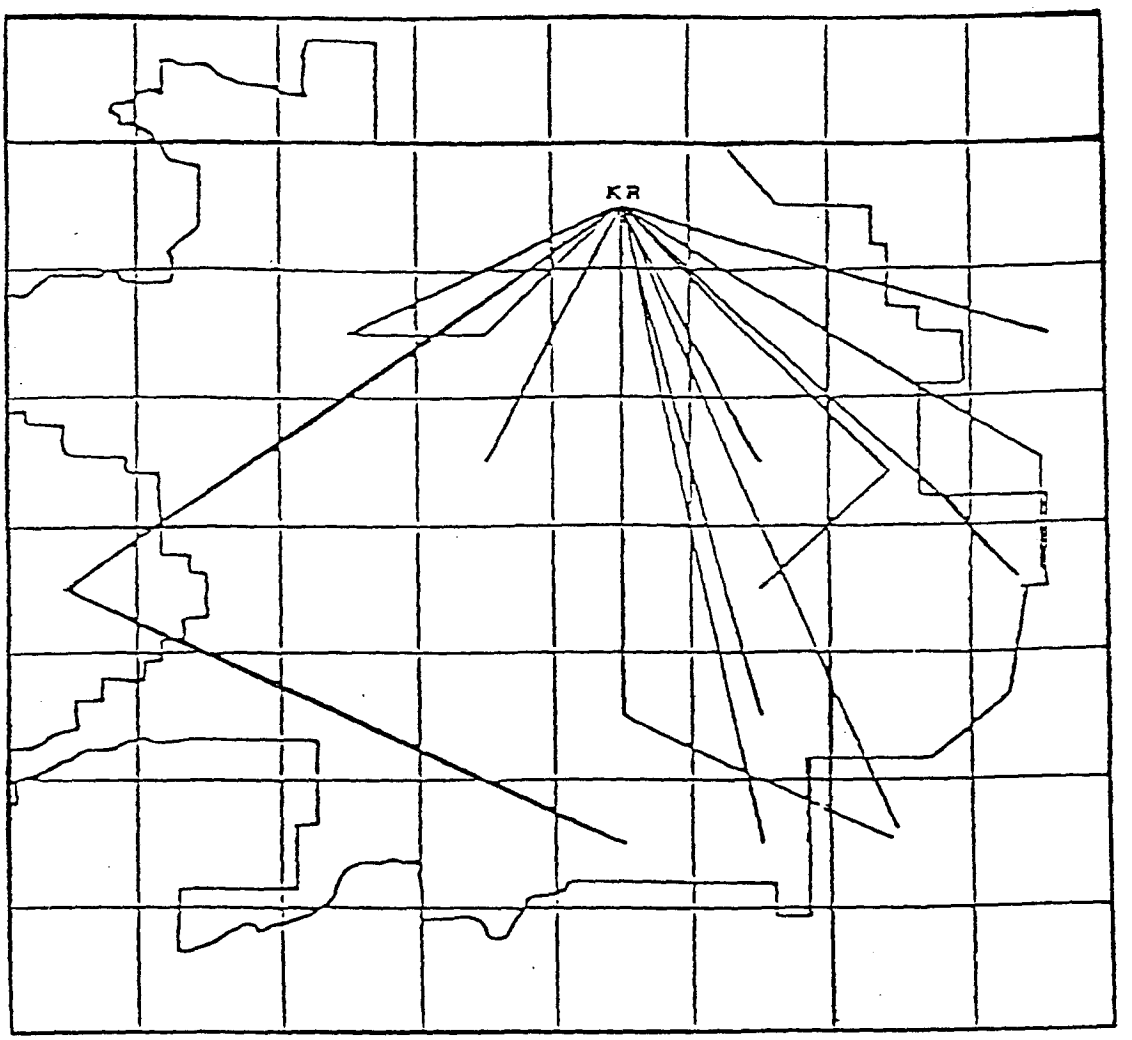

Figure 2. Movement by marked goats from Klahhane Ridge (KR) to other locations in and around Olympic National Park (from Driver, Taber and Stevens 1979). Grid scale is 10 kms (6 miles).

species have been reduced in abundance. Endemic plants are intensively grazed and show signs of disturbance (Pike 1981). Trampling has eliminated mosses and lichens as a soil stabilizing surface in many areas. Where goats paw the soil to create resting places or to dust bathe, wallows from 3 to 30 feet in diameter have been formed. Seventy wallows have been counted in one meadow alone, with soil in places eroded to a depth of three feet (Pfitsch 1980). The severity of these and other unknown consequences may be presumed to continue wherever goats concentrate.

C. Purpose of Olympic National Park

Olympic National Park was established by the 7th U.S. Congress in 1938. In report No. 2247 which accompanied H.R. 10024 creating the Park, the purpose was stated:

> ". . . to preserve for the benefit, use and enjoyment of the people, the finest sample of primeval forests of Sitka Spruce, western hemlock, Douglas-fir, and western redcedar in the entire United States; to provide suitable winter range and permanent protection for the herds of native Roosevelt elk and other wildlife indigenous to the area: to conserve and render available to the people, for recreational use, this outstanding mountainous country, containing numerous glaciers and perpetual snow fields, and a poriton of the surrounding verdant forests together with a narrow strip along the beautiful Washington coast."

D. Policies and Influences Upon Management

The following laws apply to management of natural resources in Olympic National Park. They both direct and limit the actions of the National Park Service:

> Organic Act of 1916 established the National Park Service ". . . to conserve the scenery and the natural and historical objects and the wildlife therein, and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."
>
> The Endangered Species Act of 1973 requires all Federal agencies to consult with the Secretary of the Interior on all projects and programs having potential impact on endangered flora and fauna. The legislation also requires agencies to take ". . . such action necessary to ensure that actions authorized, funded, or carried out by them do not jeopardize the continued existence of such endangered species and threatened species or result in the destruction or modification of habitat of such species which is determined . . . to be critical."
>
> Executive Order 11987 of 1977 states that "executive agencies shall, to the extent permitted by law, restrict the introduction of exotic species into the natural ecosystems on lands and waters which they own, lease, or hold for the purpose of

> administration; and, shall encourage the states, local governments, and private citizens to prevent the introduction of exotic species into natural ecosystems of the United States."

Management policies for the National Park System (USDI 1978) guide the planning activities and administration of Olympic National Park. The objective of natural resources management in national parks is to perpetuate the integrity of native ecosystems. The following policy statement applies:

> Management of park lands possessing significant natural features and values is concerned with ecological processes and the impact of people upon these processes and resources. The concept of a perpetuation of a total natural environment or ecosystem, as compared with the protection of individual features or species, is a distinguishing aspect of the Service's management of natural lands. (Chap. IV. Nat. Resource Mgt., p. 1.)

Definitions for exotic, or non-native species, and their introduction in national parks are given as follows:

> Exotic species are those that occur in a given place, area, or region as the result of direct or indirect, deliberate or accidental introduction of the species by humans.
>
> The native species are those which presently occur, or once did occur prior to some human influence, in a given place, area, or region as the result of ecological processes that operate and have operated without significant direct or indirect, deliberate or accidental alteration by humans.
>
> Direct or indirect, deliberate or accidental introductions by humans are ones that have permitted species to cross natural barriers to their dispersal capabilities thus giving those species opportunities to become established in areas previously inaccessible to them because of natural forces (IV, p. 11).

Management policy for exotic species states that:

> Manipulation of population numbers of exotic plant and animal species, up to and including total eradication, will be undertaken whenever such species threaten protection or interpretation of resources being preserved in the Park.

> Examples include . . . threatening the perpetuation of natural features, native species (including especially those that are endangered, threatened, or otherwise unique), natural ecological communities, or natural ecological processes.
>
> Control programs will most likely be taken against exotic species which have a high impact on protected Park resources and where the program has a reasonable chance for successful control.
>
> The decision to initiate a control program will be based on existing and newly acquired, scientifically valid resource information that identifies exotic status of the species, demonstrates its impact on Park resources, and indicates alternative control methods and their probabilities of success.
>
> Development of a control plan and implementation of actions to protect the Park resources will be done according to established planning procedures and will include provisions for public review and comment (IV, pp. 11-12).

Wildlife management policies in the National Park System have been influenced importantly by recommendations in the so-called "Leopold Report," which was prepared by a group of noted scientists and wildlife managers who were appointed by the Secretary of the Interior to recommend wildlife policies for national parks after evaluating the problems in various parks (Leopold et al 1963). It emphasizes clear wildlife management principles, with an overall goal of managing parks as "vignettes of primitive America" as first viewed by European visitors. Recommendations in this report, including the control of exotic species, have been adopted largely as management policy.

II. ALTERNATIVES

This section compares alternatives open to management:

A. No Action

B. Control the Goats to Limit their Impact

C. Remove the Goats to Restore the Native Environment

A key issue is whether goats and the changes they cause to the natural ecosystem are acceptable in the Park. Alternative A accepts goats. Alternatives B and C, in contrast, offer partial or total elimination of goats from the Park.

These are the basic choices available. Table 1 compares their general features. Information on the specific consequences of each is provided in Section IV. Management costs are compared in Appendix B.

No single alternative is preferred. However, an experimental management program on Klahhane Ridge is a recommended action at this time, as described under the control alternative. This three year program would test the feasibility of applying either control or removal alternatives parkwide.

Enhancing the goat population was also considered. Enhancement of introduced species, however, runs directly counter to management policies in national parks. For this reason it is not a viable alternative and has not been examined in detail.

A. No Action

Under the no action alternative, goats would continue to live in the Park and would be regarded as the wildlife species most recently added to the

Table 1. Features of the management alternatives being considered for introduced mountain goats in Olympic National Park.

FEATURES	ALTERNATIVES		
	A. No Action	B. Control	C. Remove
1. Reduce Adverse Impact:			
Vegetation and soil	no	some	yes
Native wildlife	no	some	yes
2. Maintain Recreational Opportunities:			
Goat-viewing	yes	some	no
Hunting (around Park)	yes	some	maybe
3. Administrative Involvement:			
Complexity	no	most	moderate
Cost	no	most	moderate

ecosystem. They would not be given special protection from established species, nor would the habitats they occupy be protected from them. This alternative would avoid potentially controversial and costly programs to control or remove them. Adoption of this alternative would also cause the ecosystem to change in response to goat activity. Many native plants and animals could be displaced, reduced, or eliminated in alpine areas. The goat population would continue to increase and disperse for several decades at the minimum.

B. Control Goats to Limit their Impact

The control alternative would reduce the number of goats, but would not eliminate them. Their effect on the ecosystem would be lessened, while the public would still have some opportunity to see them. A control strategy calls for reducing both the distribution and total number of goats. At first, an experimental management program combined with monitoring and research would be necessary to define appropriate population limits and to develop effective control procedures.

This alternative is a partial solution to the problem. It provides some protection for native plants and animals, and it may reduce visible impact of goats upon the landscape. However, since some goats would remain within and around the Park, this protection could be assured only as the population limits were effectively maintained. Control, therefore, requires commitment to a costly and long-term management program.

An initial experimental management effort would involve:

1. Selecting one area with a known high-density of goats and a scientific

data base, such as Klahhane Ridge on Mount Angeles, as an experimental management zone.

2. Reducing this subpopulation experimentally for three years by up to 50-70 goats each year.

3. Closely monitoring goat population and ecosystem responses to these reductions Parkwide; determining minimum control levels required.

4. Developing predictive models which relate goat population levels and behavior to ecosystem and visitor responses; defining sustainable numbers in the experimental area and elsewhere.

5. Based on these results, re-evaluating the practicality of limiting goat numbers on Klahhane Ridge and bringing the overall population under control by stages to prescribed levels throughout the Park.

Reduction of the goat population in the experimental area would be achieved by live-capture and release of goats elsewhere, outside the Park, in cooperation with the Washington Department of Game, U.S. Forest Service, other state, federal and private land managers and land owners.

Live-capture of goats would be accomplished by the following methods in order of preference: drop-netting, leg-snaring with ropes, or darting with immobilizing drugs. Goats would be restrained and examined by experienced wildlife biologists and rangers, advised by veterinarians who specialize in wild animals. Animals would be crated temporarily for helicopter transport to a waiting truck. Within 24 hours of capture, they would be released into a suitable new home.

Up to 10 goats per year may need to be collected for research purposes to analyze their physical condition, parasites, and reproductive status. They

will be obtained if accidents occur during trapping that necessitate destroying some animals, or they will be collected directly by Park biologists.

Release sites will be selected and approved by the Washington Department of Game using the following criteria:

1. Habitat presently or formerly occupied by mountain goats.
2. Habitat suitable for supporting a population of mountain goats.
3. Goats released to establish a new population will not be hunted until numbers have increased sufficiently to withstand hunting.
4. Zoos, game farms, or other confined circumstances will demonstrate suitable facilities and staff qualifications for proper care of mountain goats prior to consignment.

Released goats will be monitored by the Washington Department of Game or other receiving agencies to evaluate the success of the transplant.

C. Remove Goats to Restore the Native Environment

The remove alternative would eliminate goats from the Park. Total removal would be the most effective action to stop accelerating environmental changes due to goats. It is the only alternative that would potentially allow full restoration of the native ecosystem. It would be difficult, if not impossible, to carry out this alternative if goats were not also removed around the Park to prevent re-entry.

Goats would be removed in a live-capture program in cooperation with other agencies and institutions. Removal by live-capture would be performed to the maximum possible numbers. Remaining goats would be shot by park rangers, if other capture methods are unsuccessful.

As in the control alternative, live-capture and removal of goats would be accomplished by experienced wildlife biologists and rangers, advised by wildlife veterinarians. Operations to remove goats would be planned as carefully as possible to ensure public safety and to minimize disturbance to the native ecosystem and the visiting public. Some carcasses might have to be left in place, where terrain and remoteness would make it impractical or unsafe to remove them. A scientist would accompany field teams to obtain information about destroyed animals.

The removal program would be followed by site rehabilitation efforts to stabilize slope erosion and restore native plant communities to the extent possible. On-site actions would include transplanting and reseeding native plant communities in prominent goat wallows and trails.

III. AFFECTED ENVIRONMENT

A. Natural Environment

1. Climate and Geology

The Olympic Mountains form the center of the 5,000 square-mile Olympic Peninsula in northwest Washington. Olympic National Park (1,400 square-miles) includes the major portion of the mountains. The highest peak, Mount Olympus (7,965) is 35 miles inland from the Pacific Ocean.

The climate is dominated by the maritime influence of the nearby ocean. Winters are mild and wet, summers cool and dry. The mountains form a steep barrier to moist, westerly winds off the ocean, causing a pronounced decrease in precipitation from west to east. Average annual precipitation ranges from 160 to 200 inches (13 to 17 feet) along windward slopes to only 17 inches in the leeward, northeastern parts of the Peninsula. In winter, snow occurs above 4,600 feet elevation in amounts which can range from 300 to 500 inches (25 to 40 feet) annually.

The Olympic Mountains were uplifted by plate tectonic processes during the late Pliocene-early Pleistocene. Oceanic sediments make up sandstones, siltstones and shales that dominate the central mountains. The peripheral Crescent Formation is a horseshoe of mountains formed when basaltic rock of the sea floor was sheared off and piled up as the oceanic plate moved under the continental plate. The steep ridges and cliffs of this formation are preferred goat habitat in many places, including Klahhane Ridge.

Glaciers and stream erosion have been important in shaping the Olympic landscape. Four major glacial periods have occurred, filling the adjacent

Puget Sound with at least six different continental ice sheets. The periods of continental and alpine glaciation have been staggered so that some land has been free from ice in the higher mountains at all times (Figure 3). Plants most unique to the Olympics occur in these undisturbed "refugia." Such areas include Klahhane Ridge, Tyler Peak, Royal Basin and Mount Constance.

2. Vegetation and Soils

Olympic National Park is noted for its massive forests, which include the largest examples of many Pacific Northwest tree species. Among these are Douglas-fir (*Pseudotsuga menziesii*), Sitka spruce (*Picea sitchensis*), western hemlock (*Tsuga heterophylla*), and Pacific silver fir (*Abies amabilis*).

Mountain goats, however, prefer herbaceous, alpine or subalpine plant communities, which comprise about 25 percent of the Park. These communities begin near the upper elevational limit of forest. Plant cover here is diverse and ranges from lush meadows on deeper soils to loose, scree slopes with little soil and very few plants. Stability of rock or soil substrates and the time of release each year from winter snow cover are primary factors shaping the distribution of these plant communities. Other influences include slope steepness and aspect, soil depth and moisture, competition with other plants, and the frequency and intensity of disturbances such as fire and grazing.

Large grazing animals exert two primary pressures on plants in a community: removal of plant parts through grazing, and the physical disturbance of trampling, pawing and digging. Plant species differ in their ability to

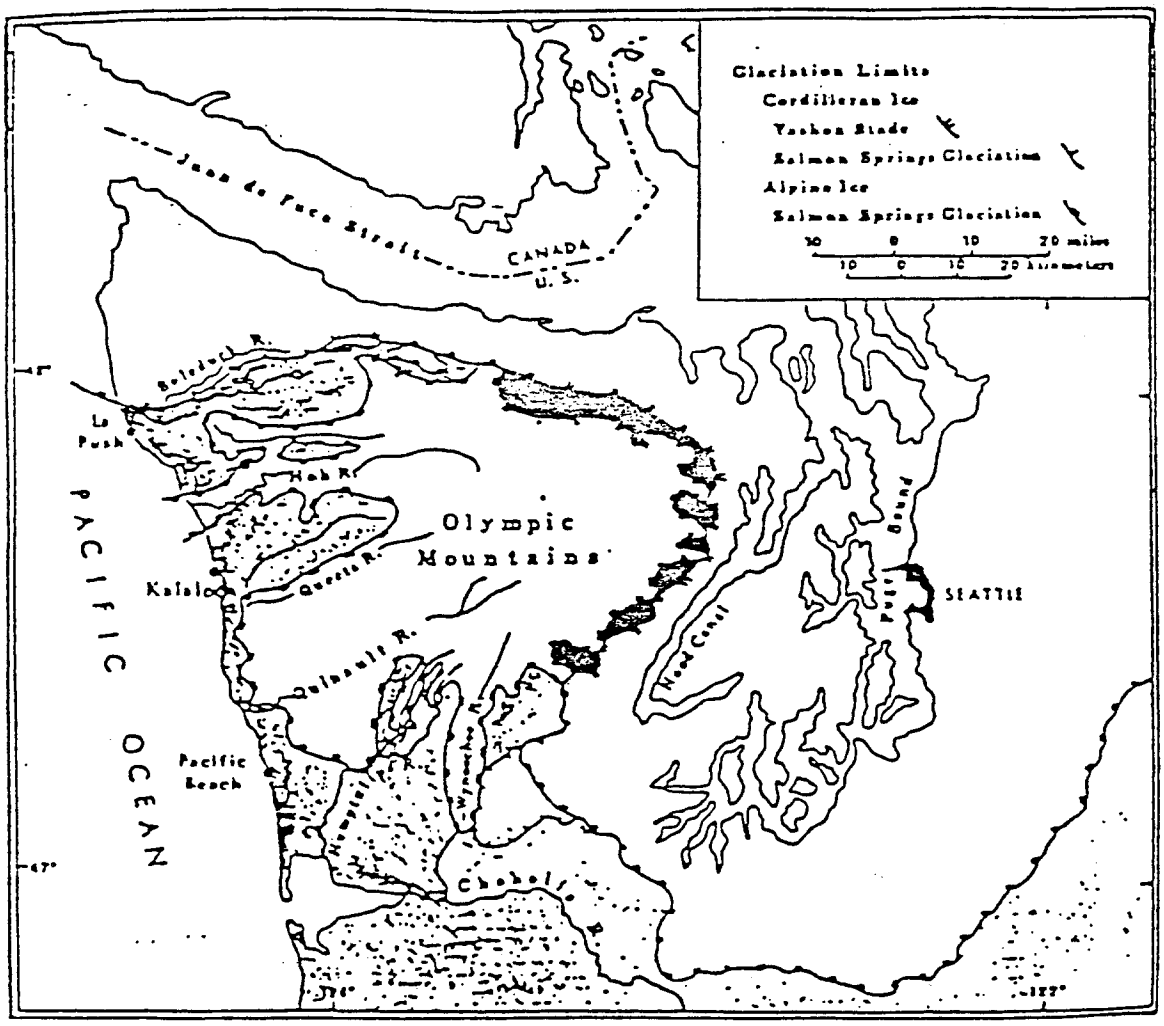

Figure 3. Extent of continental and alpine glaciers on the Olympic Peninsula, showing ice-free "refugia" (shaded) in the eastern Olympic Mountains (Pike 1981 from Heusser 1972 and others).

withstand these disturbances. Some can tolerate grazing or trampling that is harmful to others. Resistance is often influenced by a plant's growth rate and whether its parts are low and protected, or upright and exposed; other species are simply not palatable. Some species which evolved with heavy grazing may function more efficiently if they are grazed than if not. Plants not so adapted may respond to this pressure adversely.

Nine types of subalpine plant communities are available to goats on Klahhane Ridge (Table 2, Figure 4). Goats are somewhat selective in their choice of food plants, although few species show no grazing evidence. The majority of plants on Klahhane Ridge show signs of occasional grazing. Preferred forage species which are grazed a high portion of the time, and another group which is rarely taken, are listed in Table 3. The most obviously preferred species are grasses such as Idaho fescue, *Festuca idahoensis*. The least preferred species are large herbs such as thistle, *Cirsium edule*. Table 4 is an estimate of annual production by subalpine plant communities on Klahhane Ridge and the amount of forage removed annually by goats.

Forty-three species, or varieties, of plants in the Olympic Mountains are considered rare or endangered by the Washington Natural Heritage Program (Table 5). Eleven plants are considered unique, or endemic, to the Olympic Mountains (Table 6). The effect of goats on three endemic species (*Aster paucicapitatus*, *Campanula piperi* and *Senecio neowebsteri*) have been studied on Klahhane Ridge (many goats) and Tyler Peak (few goats) (Pike 1981). All three plants are intensively grazed in summer by goats on Klahhane Ridge. Fewer individual plants and flowers are evident on Klahhane than on Tyler Peak, although the local population of each plant species was not declining during

Table 2. Subalpine plant community types on Klahhane Ridge, Olympic National Park (after Pfitsch 1980).

Community Type	Species
1. Phlox-fescue meadow	*Phlox diffusa* *Festuca idahoensis* *Arenaria capillaris*
2. Unstable herb meadows	*Eriophyllum lanatum* *Artemesia ludoviciana* *Achillea millefolium*
3. Scree (moving steep slopes)	*Phacelia heterophylla* *Delphinium glareosum* *Senecio neowebsteri*
4. Heather	*Cassiope mertensiana* *Phyllodoce empetriformis* *Luetkea pectinata* *Carex spectabilis*
5. Late snow dwarf sedge	*Carex nigricans* *C. spectabilis* *Antennaria lanata*
6. Lupine-sedge meadow	*Lupinus latifolius* *C. spectabilis*
7. Luetkea drainage	*Luetkea pectinata* *C. nigricans* *C. spectabilis*
8. Tall sedge, grass and herb meadow	*C. spectabilis* *Bromus sitchensis* *Deschampsia caespitosa*
9. Ridge top fellfield	*Juniperus communis* *Phlox diffusa* *Oxytropis campestris*

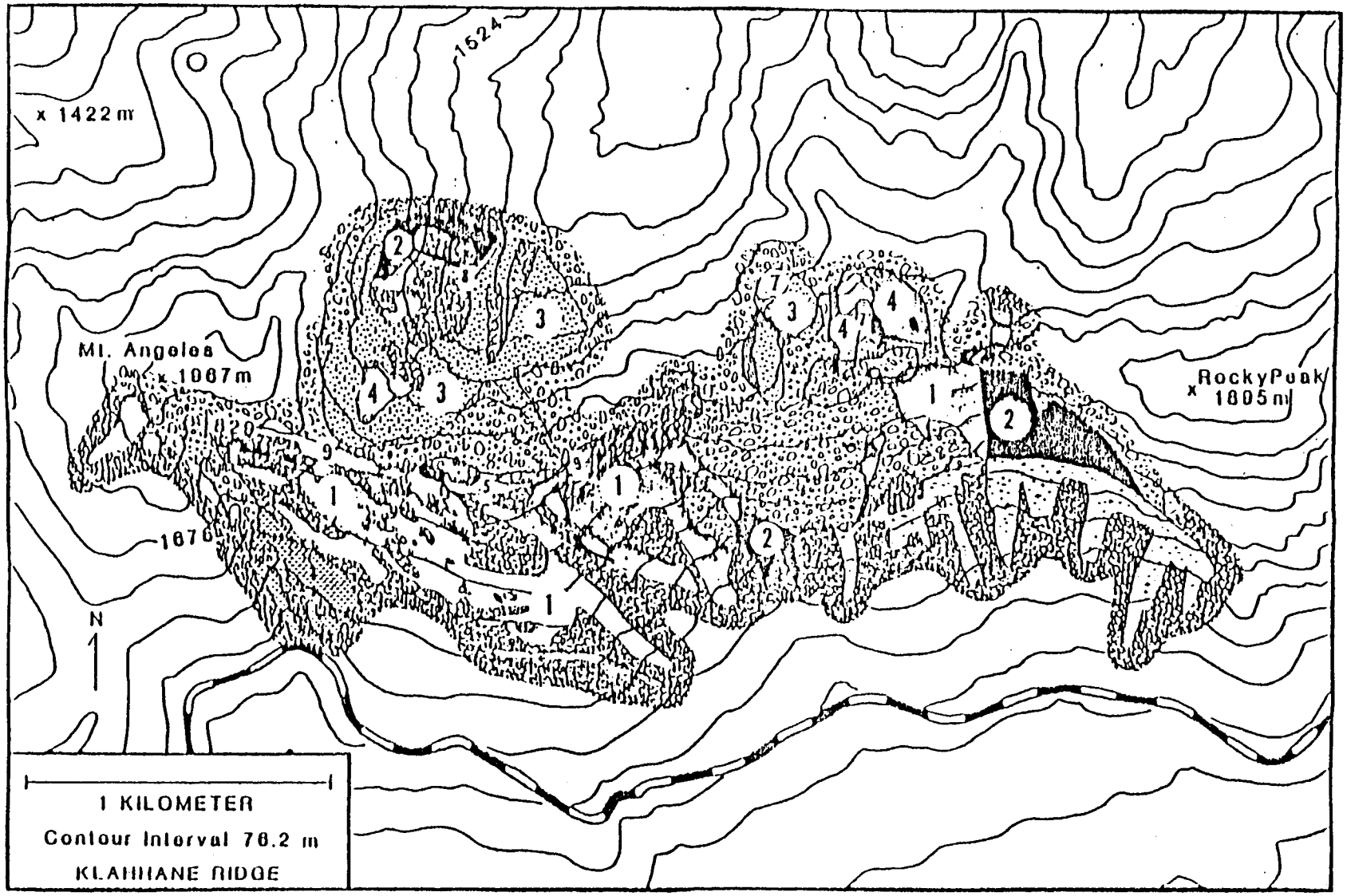

Figure 4. Map of plant communities available to grazing by goats on Klahhane Ridge (from Pfitsch 1980). Numbers denote community types in Table 2.

Table 3. Plant species which are preferred mountain goat forage on Klahhane Ridge and species which are generally avoided (Pfitsch 1980).

Preferred forage species	Family
Festuca idahoensis	Graminae
Poa incurva	"
Elymus glaucus	"
Bromus sitchensis	"
Carex spectabilis	Cyperaceae
Artemesia ludoviciana	Compositae
Erigeron subtrinervis	"
Erigeron perigrinus	"
Eriophyllum lanatum	"
Aster paucicapitatus	"
Senecio neowebsteri	"
Silene parryi	Caryophyllaceae
Silene douglasia	"
Polygonum bistortoides	Polygonaceae
Campanula rotundifolia	Campanulaceae
Hedysarum occidentalis	Leguminosae
Oxytropis campestris	"
Avoided species	
Hydrophyllum fendleri	Hydrophyllaceae
Phacelia heterophylla	"
Cirsium edule	Compositae
Lupinus latifolius	Leguminosae
Cassiope mertensiana	Ericaceae
Phyllodoce empetriformis	"

Table 4. Plant production (in kilograms) on Klahhane Ridge, forage removed by goats, and percentage removed in different areas (after Pfitsch 1980).

Area	Total production (kg)	Forage removed (kg)	% of total removed
North side	30,610	8,929	29
South side	111,120	16,709	15
High south side	4,390	1,133	26
Low south side	8,870	1,153	13

Table 5. Plants considered rare or endangered by the Washington Natural Heritage Program which are found where goats occur in the Olympic Mountains (Pike 1981). Listed by families.

Polypodiaceae
Asplenium viride
Salicaceae
Salix arctica
S. nivalis v. nivalis
Polygonaceae
Polygonum viviparum
P. newberri v. glabrum
Portulacaceae
Lewisia columbiana v. rupicola
Montia diffusa
Ranunculaceae
Ranunculus cooleyae
Cruciferae
Draba incerta
D. lanceolata
Crassulaceae
Sedum lanceolatum v. rupicolum
Saxifragaceae
Saxifraga debilis
S. oppositifolia
Rosaceae
Sanguisorba menziesii
Leguminosae
Astragalus microcystis
Oxytropis viscida
Ericaceae
Arctostaphylos X media
Hemitomes congestum
Pleuriocospora fimbriolata
Primulaceae
Douglasia nivalis
Menyanthaceae
Nephrophyllidium crista-galli
Polemoniaceae
Collomia debilis v. larsonii
Phlox hendersonii
Scrophulariaceae
Orthocarpus imbricatus
Orobancaceae
Orobanche pinorum
Compositae
Arnica nevadensis
A. rydbergii
Aster paucicapitatus
Erigeron aliceae
E. compositus v. discoideus
Eriophyllum lanatum v. achillaeoides
Senecio flettii
S. lugens
Cyperaceae
Carex circinata
C. pluriflora
C. raynoldsii
C. saxatilis v. major
C. stylosa
C. subnigricans
Graminae
Poa grayana
P. suksdorfii
Puccinellia pauciflora v. pauciflora
Liliaceae
Lloydia serotina

Table 6. Plants where goats occur that are considered unique, or endemic to the Olympic Mountains by the Washington Natural Heritage Program (from Pike 1981). Listed by families.

Cruciferae
Arabis furcata olympica
Erysimum arenicola arenicola

Rosaceae
*Petrophytum hendersonii**

Leguminosae
*Astragalus cottonii**

Violaceae
*Viola flettii**

Scrophulariaceae
Pedicularis bracteosa atrosanguinea
*Synthyris pinnatifida lanuginosa**

Capanulaceae
*Campanula piperi**
C. piperi f. sovereigniana

Compositae
*Erigeron flettii**
E. peregrinus ssp. peregrinus var. thompsonii
*Senecio neowebsteri**

*Proposed also as candidates for the federal list of threatened and endangered species (Federal Register, December 15, 1980).

the brief study period. Goats also disturb these plants by trampling and wallowing, with a most visible effect on Klahhane Ridge (Pike 1981).

Soil disturbance studies indicate that trampling by goats on Klahhane Ridge has removed the lichen and moss cover that stabilizes bare soil surfaces in the absence of vascular plants. Mosses and lichens were found in only 33% of the study plots on Klahhane Ridge, in contrast to 86% of the plots on Tyler Peak. Goat wallows from 3 to 30 feet in diameter and up to 3 feet deep are common on Klahhane Ridge. Seventy were counted in one large meadow. Of these, 67% (47) showed an apparent change in plant community composition along the margins or below the open area (Pfitsch 1980).

3. Wildlife

Protection of Roosevelt elk was an important reason for establishing the Park. The large coastal form of the elk was first described in the Olympic Mountains and named after Theodore Roosevelt. These animals were threatened seriously by over-hunting around the turn of the century and required protection. A secure population of 4,000 to 5,000 animals now inhabits the Park. Other common larger mammals include the blacktail deer, black bear and cougar. The native wolf was eliminated during the 1920's.

As with plants, the isolation of the Olympic Mountains has led to the development of distinctive animal forms (Table 7). It has also prevented a number of species in the Cascade Mountains of central Washington from colonizing the Olympics (Table 8). Such patterns of distribution for other species adds further support to the absence of goats historically from this part of the state as well (Moorhead and Stevens, in press).

Table 7. Fauna endemic or unique to the Olympic Mountains, Washington

Olympic marmot	*Marmota olympus*
Chipmunk	*Eutamius amoenus caurinus*
Snow mole	*Scapanus townsendii olympicus*
Pocket gopher	*Thomomys mazama melanops*
Butterfly	*Oeneis chryxus valerata*
Carabid beetle	*Pterostichus brunneus*
Different forms of:	
Gray jay	*Perisoreus canadensis*
Stellar's jay	*Cyanoetta stelleri*

Table 8. Some mammals native to the Cascade Mountains, Washington, but absent historically from the Olympic Mountains.

Mountain goat	*Oreamnos americanus*
Bighorn sheep	*Ovis canadensis californiana*
Cascade red fox	*Vulpes fulva cascadensis*
Pika	*Ochotona princeps*
Golden-mantled ground squirrel	*Spermophilus lateralis*
Grizzly bear	*Ursus arctos*
Wolverine	*Gulo luscus*
Lynx	*Lynx canadensis*

B. Human Environment

Total public visits to the Park each year is about 2.5 million. The backcountry receives about 100,000 use-nights annually, with perhaps double that number of day-hikers. Although people visit Olympic National Park from all over the world, 65 percent of the visitors are from the Olympic Peninsula and the nearby Puget Sound urban area, including Seattle. Nearly 200 miles of roadway in the Park, including 14 spur roads, provide access to parts of a 600-mile trail system.

Klahhane Ridge has become a popular site for Park visitors to closely observe goats, which are uniquely tame in the Olympics. On weekends in mid-summer 50 to 100 visitors have been recorded as day-hikers on Klahhane Ridge. Many of them come expressly to view and photograph goats at close quarters. No serious accidents have occurred, but might be reasonably expected if large numbers of goats and people continue in this area. Throughout the Park more and more reports are received of goats visiting backcountry campsites, which they have learned to associate as a salt source from human urine deposits.

A special-permit bow hunt for goats has been in effect annually since 1967 on lands adjoining the Park in Olympic National Forest. Between 1971 and 1978, 47 goats were killed by hunters with an average of six goats each year.

No sites on, or eligible for, the National Register of Historic Places will be affected by any of the management alternatives being considered.

IV. ENVIRONMENTAL CONSEQUENCES

A. Alternative A - No Action

1. Natural Environment

If no action is taken, goats will probably continue to increase throughout the Park, at least in the near future. Five of the nine goat subpopulations studied in 1979-1980 were increasing. Based on present rates of increase, the population could potentially double in less than ten years (Driver, Taber and Stevens 1979; V. Stevens in prep.). Limiting factors will eventually exert a "ceiling" to further increase, probably through the combined influence of dwindling food supply and severe winters.

As goats increase, the effects of grazing, trampling and wallowing would also increase. On Klahhane Ridge, goat disturbance is clearly affecting the composition and productivity of subalpine plant communities, especially those preferred as forage (Pfitsch 1980) (Table 4). Most endemic plant species on Klahhane Ridge show evidence of disturbance by goats and some are intensively grazed and trampled (Pike 1981). Erosion wherever goats concentrate on Klahhane Ridge could be expected to continue and locally increase, so long as a high density of animals occurs there.

Disturbance to native animals by goats is less conclusive. Roosevelt elk prefer forests and meadows and are not commonly observed in the steep, rocky habitats preferred by goats. Blacktailed deer presently occur in low numbers (perhaps 6 to 10) on Klahhane Ridge. Avoidance of goats by deer has been observed. Where salt has been temporarily placed to capture goats, deer also attracted defer readily to goats. Whether the large number of goats on

Klahhane Ridge has displaced deer from Klahhane Ridge is not documented, but may well have happened. A preliminary survey of small mammals on Klahhane Ridge suggested that a decline in field mice (*Microtus spp.*) may have occurred in plant communities disturbed by goats (Dragavon and Weisbrod 1978). Deer mice (*Peromyscus maniculatus*), a more adaptable animal to disturbance, were relatively abundant.

The no action alternative would cause a new equilibrium to be established. Mountain goat foraging, trampling and wallowing would eventually alter alpine and subalpine areas throughout the Park. Goats are already changing areas where they occur, most notably on Klahhane Ridge.

2. Human Environment

If no action is taken, Park visitors would continue to experience abundant opportunities to view mountain goats. In the short term, goats would be seen more frequently in more areas. Not all visitors enjoy the semi-domestic habits of the goats. Some people are likely to be hurt as contacts with goats increase. So far, no visitor has reported being horned by a goat, but rangers have reported disturbing and even hazardous encounters. Increasing numbers of people viewing goats on Klahhane Ridge and elsewhere will probably increase sanitation and erosion problems locally, as more human urine on-site intensifies pawing and trampling by goats in search of salt.

Recreational hunting on U.S. Forest Service lands adjoining the Park would continue through the special-permit bow hunting program. The ability of adjoining lands to sustain recreational hunting for goats may be dependent on

the status of the goat population within the Park. If the Park population increases, more goats could be found outside the Park.

B. Control the Goat Population

1. Natural Environment

The control alternative would reduce and limit the environmental consequences of goats without eliminating them. The most direct and immediate effects of the alternative would occur on Klahhane Ridge, where the concentration of a large number of goats would be lowered experimentally over a two or three year period. Hypotheses predicting the response of individual plant communities and soils to changing levels of goat disturbance would be tested, following procedures in Pfitsch (1980). Present disturbance trends, as described under the no action alternative, could be expected to decrease. How other parts of the Park would be affected by reductions on Klahhane Ridge is not known. Changes would be monitored in selected areas of the Park to derive "acceptable" population levels. There would be no irretrievable commitments of resources or irreversible long-term effects of this alternative. The net effect would be fewer goats and less impact on the natural environment.

2. Human Environment

The control alternative would have little effect on the human environment. Visitors used to seeing large numbers of goats might find fewer animals on Klahhane Ridge a displeasure. Some visitors could be inconvenienced temporarily while goats are being captured and transported, since it might be necessary to close part of a trail or a helicopter landing site for safety purposes.

Reduction of the population within the Park might tend to decrease hunting opportunities on adjoining U.S. Forest Service lands. Goats released elsewhere in Washington or other states would be used to augment or restore their native distribution and provide added opportunity for viewing and hunting them.

There are no irretrievable commitments of resources or irreversible long-term effects upon the human environment.

C. Remove the Goat Population

1. Natural Environment

By totally removing goats from the Park, the affected plant communities would eventually recover to a reasonable facsimile of their distribution and abundance before goats were released. There is no scientific evidence thus far of irreversible changes in plant communities. Nor is there evidence that rare or endemic plant species are on the verge of extinction, although they are clearly being disturbed by goats. Soil studies are not completed and the significance of these changes cannot be stated yet.

There would be no apparent adverse environmental effects within the Park if goats were eliminated from the ecosystem. No comparable disturbance by native animals would be expected to occur. As discussed in the control alternative, the impact of goats transported from the Park and released elsewhere would be considered prior to any release action by the responsible agency.

Removal of goats from Olympic National Park would not significantly affect their status or abundance in North America. They number at least 100,000

animals over a large area in the northwestern Un
(Johnson p. 3, in Samuel and Macgregor 1977; Fig
Mount Rushmore National Memorial in South Dakota
Service area where they have been introduced.

2. Human Environment

If all goats are removed, visitors w
view and experience them in the Park. Goats are
in Washington, including Mount Rainier and North
where they are native. There are no irreversibl
nor any irretrievable commitments of resources.

It may be unavoidable to kill some goats, given
and the rugged, remote terrain of the Olympic Mo
consider this an adverse effect on the human env
visitors would see or hear any disturbance. By
before and after the primary summer visitor season,
disturbances would be lessened.

If all goats are removed from the Park, adjoining
support a recreational hunting program. However,
elsewhere in the state. Of 1,622 goats killed by
between 1973 and 1978, only 38 (2%) were from the

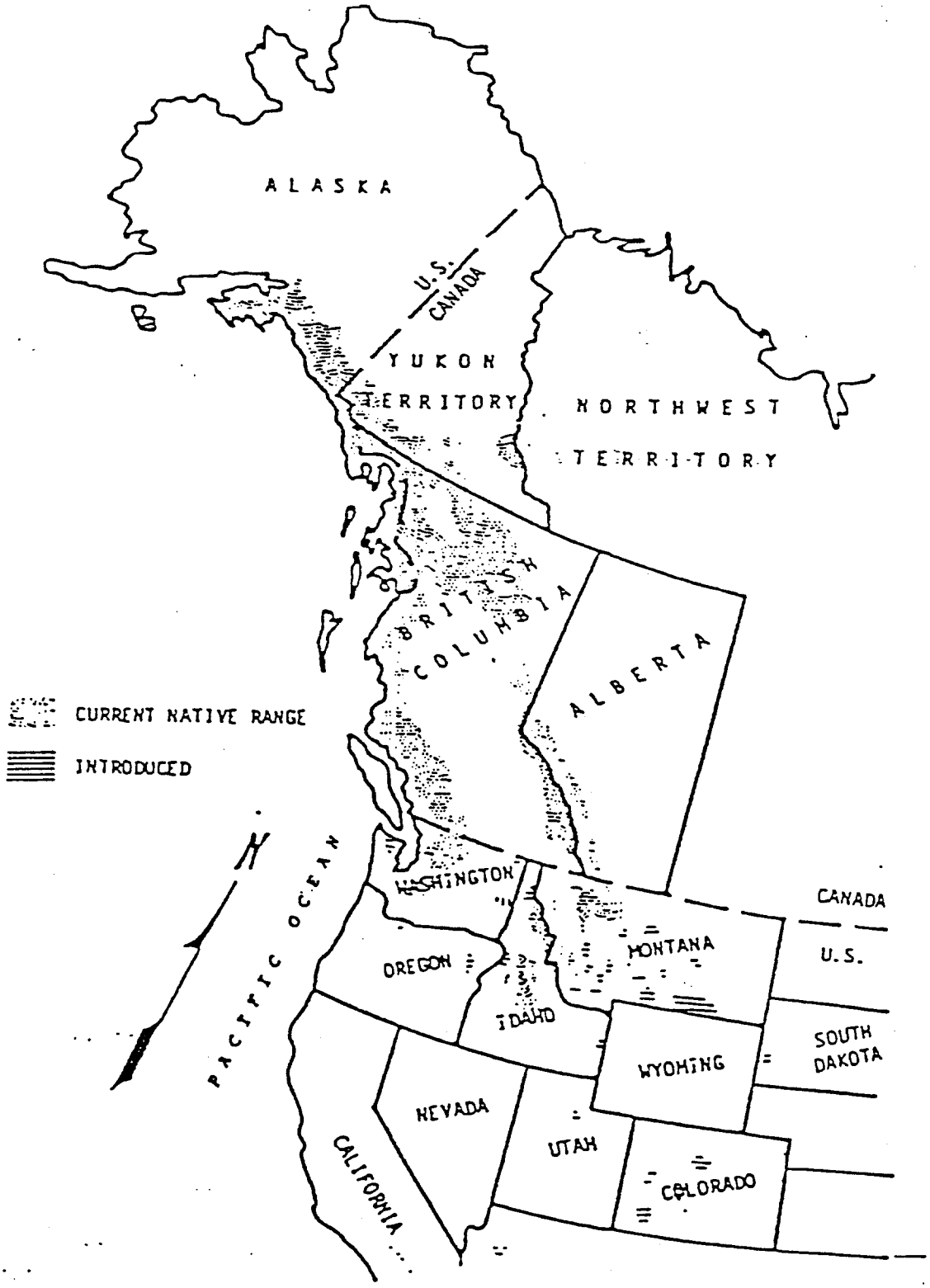

Figure 5. Distribution of mountain goats in North America. From Johnson, R. 1977. Distribution, abundance, and management status of mountain goats, p. 1. In Samuel and Macgregor (eds.). Proc. 1st Inter. Mt. Goat Sympos. Prov. Br. Columbia, Fish & Wildlife Br., Victoria, B.C.

V. PREPARERS

This assessment was prepared by the Science and Technology Group, Olympic National Park. Bruce B. Moorhead, Research Biologist, is the primary author. Other staff contributors included: John Aho, Paul Crawford, Douglas Houston, Richard Olson, and Edward Schreiner.

VI: APPENDIXES

A. Consultation and Coordination

1. Consultation

The following agencies, organizations and individuals have provided information or consultation in preparing this assessment:

a. U.S. Forest Service, Olympic National Forest (USFS)

William Brown
Jan Henderson, Ph.D.

b. Washington Department of Game (WDG)

Donald Bakker
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Lowell Parsons
Richard Poelker
Allen Rasmussen
Jack Smith

c. University of Washington, Seattle

College of Forest Resources

Victoria Stevens
Douglas Pike
Charles Driver, Ph.D.
Richard Taber, Ph.D.

Department of Botany

William Pfitsch
John Harter
Lawrence Bliss, Ph.D., Chairman

Department of Psychology

Michael Hutchins

d. Washington State University, Pullman

College of Veterinary Microbiology and Pathology

William Foreyt, Ph.D.

e. Distribution of Assessment

Copies of this assessment have been sent to interested individuals and to the following agencies and organizations:

FEDERAL:

Olympic National Forest
Olympia, Washington
U.S. Fish & Wildlife Service
Olympia, Washington
Portland, Oregon
U.S. Department of Interior
Portland, Oregon
U.S. Forest Service
Portland, Oregon
U.S. House of Representatives
Congressman Don Bonker

STATES:

Washington State Department of Ecology-Olympia
Washington State Department of Natural Resources-Forks
Washington State Department of Game-Port Angeles, Aberdeen, Tenino, Sequim, Olympia
Washington State Parks & Recreation Commission-Olympia
Montana State Department of Fish & Game
Idaho State Department of Fish & Game
Alaska State Department of Fish & Game
Oregon State Department of Fish & Wildlife

CANADIAN:

Ministry of Recreation & Conservation-Victoria, British Columbia

ORGANIZATIONS (Washington):

Port Angeles:
Friends of Lake Crescent
Olympia Outdoor Sportsmen's Association
Nor'wester Rotary
Oil Port Task Force
The Daily News
Chamber of Commerce
Clallam County Commissioners
City Council
Mayor
Station KAPY
Station KONP
Superintendent of Schools
Port Angeles Savings & Loan
Clallam County Humane Society

All Animal Veterinary Hospital
Olympic Veterinary Clinic
Blue Cross Veterinary Hospital

Sequim:
Dungeness National Wild Life Refuge
Audubon Society

Seattle:
The Nature Conservancy
Friends of the Earth
Audubon Society
Environmental Law Committee
Olympic Park Associates
Woodland Park Zoo
North Cascades Conservation Council
The Sierra Club
Izaak Walton League
The Mountaineers
Station KING-TV, Channel 5
Station KJR
Station KAYO
Station KVI
Station KOMO-TV, Channel 4
Station KIRO-TV, Channel 7

Tacoma:
Washington Environmental Council
Tahoma Audubon Society
Izaak Walton League
The Mountaineers
The News Tribune
Station KMO
Station KTNT
Station KTAC
Station KSTW-TV, Channel 11

Other Washington cities:
Washington State Sportsmen's Council-Clear Lake, Forks, Shelton, Bellevue
Washington Big Game Council-Spokane
Washington Association of Conservation Districts-Tumwater
Washington National Heritage Program-Olympia
Friends of the Earth-Skamania
Animal Rights Committee-Kirkland
The Daily World-Aberdeen
The Signpost Magazine-Lynwood

Other areas:
The Wilderness Society-Portland, Oregon
Izaak Walton League of America-Arlington, Virginia
Station KATU-Portland, Oregon
Washington, D.C.
National Wildlife Federation
National Parks & Conservation Association
Defenders of Wildlife

UNIVERSITIES/COLLEGES:
Oregon State University
Department of Geography
School of Forestry

University of Washington
Department of Botany
College of Forest Resources
Department of Psychology
Office of Environmental Mediation

Peninsula College
Port Angeles, Washington

2. Meetings and presentations

April 25, 1977 -Olympic National Park headquarters, Port Angeles, Washington - NPS and WDG staff.

October 3, 1977 -Olympic National Forest headquarters, Olympia, Washington - NPS, USFS and WDG staff.

October 5, 1979 -Washington Chapter meeting of The Wildlife Society at Olympic National Park headquarters, Port Angeles, Washington - professional wildlife biologists and managers organization - NPS, USFS, USFWS and WDG personnel.

April, 1980 -Rotary Club, Port Angeles, Washington - V. Stevens, speaker.

October 28, 1980 -WDG regional office, Aberdeen, Washington - NPS and WDG staff.

December 10, 1980 -Olympic Peninsula Sportsmen's Club meeting, Port Angeles, Washington - NPS staff and Club members.

December 17, 1980 -Hoodsport Ranger Station (USFS/NPS), Hoodsport, Washington - NPS, USFS and WDG staff.

January 12, 1981 -University of Washington Forestry Class - 35 students.

January 12, 1981 -Audubon Society - 11 Board members.

January 13, 1981 -U.S. Forest Service - Joint USFS/NPS office, Hoodsport, Washington - 45 employees.

January 14, 1981 -University of Washington Silviculture Seminar - 60 students and professors.

January 15, 1981 -NPS Pacific Northwest Regional Office - 40 employees.

January 16, 1981 -Izaak Walton League, Puget Sound Chapter - 35 to 40 members and visiting students.

January 16, 1981 -Kalaloch Lodge - NPS employees, concessions - 25 lodge employees, guests and NPS staff.

January 21, 1981 -Peninsula College, Port Angeles, Washington - NPS staff and students.

January 22, 1981 -Kiwanis Club, Port Angeles, Washington - NPS staff and Club members.

January 29, 1981 -Rotary Nor'wester, Port Angeles - NPS staff and Club members.

January 29, 1981 -Native Plant Society of Washington - 35 guests.

February 4, 1981 -Recreational Equipment, Inc., Seattle, Washington - 85 guests.

3. Field Trips to Klahhane Ridge, Olympic National Park

August, 1978 -NPS Regional Director Russell Dickenson, Park Superintendent, staff and researchers.

October 6, 1979 -Washington Chapter, The Wildlife Society, including NPS staff, WDG and USFS personnel.

July 30, 1980 -Trail hike - Park Superintendent, NPS employees and WDG representative - 50 persons.

4. Newspaper articles:

July 27, 1980	-The Daily News, Port Angeles, Washington
August 7, 1980	-
January 21, 1981	-
September 18, 1980	-The Daily Olympian, Olympia, Washington
June 21, 1980	-The Daily World, Aberdeen, Washington
July 25, 1980	-
September 13, 1980	-The Everett Herald, Everett, Washington
June 15, 1980	-The Seattle Times, Seattle, Washington
September 19, 1980	-
September 6, 1979	-Shelton-Mason County Journal, Shelton, Washington
November 23, 1980	-University of Washington Daily, Seattle, Washington

5. Television presentation:

June 24, 1980 -KING 5 - a five minute feature story by Science News editor, Jeff Renner.

6. Public involvement:

A public meeting to review and discuss alternatives is scheduled for February 25, 1981, 7 p.m. at the Little Theater, Peninsula College, Port Angeles, Washington. The selected plan of action will be based on public response, ecological and administrative considerations.

B. Management Costs of Alternatives

Estimated operating costs to carry out each alternative are:

	Annual	5 Year Total
1. No Action	no financial costs	-
2. Control	$40,000	$200,000
3. Remove	$50,000	$250,000

The control alternative would require a long-term program, although annual costs might decrease after five years. About half the costs for both control and remove are helicopter costs for live-removal of goats. In most circumstances, no other transport would be feasible or practical. The remove alternative would require at least five years, but possibly no further significant costs after that.

VII. REFERENCES

Atkinson, I.A.E. 1964. Relations between feral goats and vegetation in New Zealand. Proc. N.Z. Ecol. Soc. 11:39-44.

Bratton, S.P. 1974. The effect of the European wild boar on the high elevation vernal flora in Great Smoky Mountains National Park. Bull. Torrey 101(4):198-206.

Challies, C.N. 1975. Feral pigs (Sus scrofa) of Auckland Island: status and effects on vegetation and nesting sea birds. New Zealand Jour. Zool. 2(4):479-490.

Coblentz, Bruce E. 1978. The effects of feral goats (Capra hircus) on island ecosystems. Biol. Cons. 13:279-286.

Courtenay, Walter R. 1978. The introduction of exotic organisms. Pages 237-252 In H.P. Brokaw, ed. Wildlife and America. Council on Environmental Quality, U.S.G.P.O., Washington, D.C. 20402.

Dragavon, J., and A. Weisbrod. 1978. A preliminary study of small animals on the south slope of Klahhane Ridge, Olympic National Park, Washington. (Coop. Park Studies Unit, Univ. Washington). Unpub. report on file, Olympic National Park.

Driver, C., V. Stevens and I. Olmsted. 1977. Mountain goat population and habitat studies. Unpub. annual progress report (NPS CX-9000-7-0065). College of Forest Resources, Univ. of Washington, Seattle.

Driver, C., V. Stevens and D. Pike. 1978. Mountain goat population and habitat studies. Unpub. annual progress report (NPS CX-9500-7-0065). College of Forest Resources, Univ. of Washington, Seattle.

Driver, C., R. Taber and V. Stevens. 1979. Mountain goat population studies. Unpub. annual progress report (NPS CX-9000-7-0065). College of Forest Resources, University of Washington, Seattle.

Driver, C., L.L. Bliss, D. Pike and W.A. Pfitsch. 1979. Mountain goat habitat studies. Unpub. annual progress report (NPS CX-9000-0-0087). College of Forest Resources, University of Washington, Seattle.

Fisher, J.C., Jr. 1975. Impact of feral burros on community structure in the Acamptopappus-Greyia plant community of the Panamint Mountains of Death Valley National Monument. Unpub. report to NPS, Death Valley Nat. Mon.

Heusser, C.J. 1972. Late Pleistocene refugia. Quat. Res. 2:189-201.

Hutchins, M., and V. Stevens. 1981. Olympic mountain goats. Nat. Hist. 90(1):58-69.

Koehler, D.A. 1974. The ecological impact of feral burros on Bandelier National Monument. M.S. Thesis. University of New Mexico, Albuquerque.

Leopold, A., S. Cain, C. Cottam, I. Gabrielson, and T. Kimball. 1963. Wildlife management in the national parks. Trans. N. Amer. Wildlife Conf. 24:28-45.

Moorhead, B., and V. Stevens. In press. Introduction and dispersal of mountain goats in Olympic National Park. In Ecological research in national parks of the Pacific Northwest. USDA Forest Service Gen. Tech. Rept. PNW.

Mueller-Dombois, D., and G. Spatz. 1975. The influence of feral goats on the lowland vegetation in Hawaii Volcanoes National Park, U.S.A. Phytocoenolgia 3(1):1-29.

Pfitsch, W.A. 1980. The effect of mountain goats on the subalpine plant communities of Klahhane Ridge, Olympic National Park, Washington. M.S. Thesis. University of Washington, Seattle.

Pickard, J. 1976. The effect of feral goats (Capra hircus) on the vegetation of Lord Howe Island. Australian Jour. Ecol. 1(2):103-113.

Pike, D.K. 1981. Effects of mountain goats on three plant species unique to the Olympic Mountains, Washington. M.S. Thesis. University of Washington, Seattle.

Potter, L.D., and S. Berger. 1977. Deer-burro utilization and competition study, Bandelier National Monument. Final Report, Department of Biology, University of New Mexico.

Samuel, W., and W. Macgregor (eds.). 1977. Proceedings of the First International Mountain Goat Symposium (Kalispell, MT., Feb. 19, 1977). Prov. of Brit. Columbia, Ministry of Recr. and Conserv., Fish and Wildlife Branch, Victoria, B.C.

Stevens, V. 1979. Mountain goat habitat utilization in Olympic National Park. M.S. Thesis. University of Washington, Seattle.

Sykes, W.R. 1969. The effect of goats on vegetation of the Kermadec Islands. Proc. New Zeal. Ecol. Soc. 16:13-16.

U. S. Department of the Interior. 1978. National Park Service. Management Policies, Chapter IV (Natural Resource Management).

Wauer, R.H. 1978. Impacts of feral burros upon breeding and avifauna at Bandelier National Monument, New Mexico. Typewritten report to NPS, Southwest Regional Office, Santa Fe, NM.

Webster, E.B. 1925. Status of mountain goats introduced into the Olympic Mountains, Washington. Murrelet 6:10.

Wodzicki, K.A. 1950. Introduced mammals of New Zealand. N.Z. Dept. Sci. Ind. Res. Bull. No. 98.

ORGANISATION DES NATIONS UNIES
POUR L'EDUCATION, LA SCIENCE
ET LA CULTURE

Date de réception : 9. 12. 1980
N° d'identification : 151
Original : anglais

Convention concernant la protection
du patrimoine mondial culturel et naturel

LISTE DU PATRIMOINE MONDIAL

Proposition d'inscription présentée par les Etats-Unis d'Amérique

Parc National Olympique

1. LOCALISATION PRECISE

a) Pays	Etats-Unis d'Amérique
b) Etat	Washington
c) Nom du bien	Parc National Olympique
d) Localisation exacte sur les cartes avec indication des coordonnées géographiques	Le Parc National Olympique est situé à l'extrémité nord-ouest de l'Etat de Washington. Il se compose de deux zones distinctes : une partie centrale montagneuse de 3 350 km2 qui constitue l'essentiel du parc, et une bande côtière distincte de 80 km de long, atteignant par endroits 6 km de large. Le Parc s'étend entre les latitudes de 47° 29' et 48° 11' nord et entre les longitudes de 123° 7' et 124° 42' ouest.

2. DONNEES JURIDIQUES

a) Propriétaire	Ministère de l'intérieur des Etats-Unis d'Amérique (United States Department of the Interior), Washington, D.C.
b) Statut juridique	Le Parc national a été créé en 1938 par une loi du Congrès américain (An Act to establish Olympic National Park ... 52 Stat. 1241), qui prévoyait la protection d'un secteur de 275 000 ha. En 1953, on l'agrandit en lui adjoignant, par une nouvelle loi (Public Law 85-455) le couloir de la rivière Queets ainsi qu'une bande côtière de 80 km le long du Pacifique. Puis vinrent s'ajouter, en vertu d'autres lois, plusieurs terrains de faible superficie. Le Parc s'étend actuellement sur 362 848,7 ha, dont 99,6% appartiennent à l'Etat fédéral ; le reste, soit 0,4% est propriété privée.
c) Administration responsable	Le Parc National Olympique est administré, au nom du Service des parcs nationaux du Ministère de l'intérieur des Etats-Unis, par un directeur, le : Superintendant, Olympic National Park, 600 East Park Avenue, Port Angeles, Washington 98362.

3. IDENTIFICATION

a) Description et inventaire	Patrimoine naturel Le Parc National Olympique est situé dans la péninsule des Olympiques (Olympic Peninsula) à l'extrémité nord-ouest des Etats-Unis. Cette péninsule, bordée à l'ouest par l'océan Pacifique, au nord par le détroit de Juan de Fuca et à l'est par le

Puget Sound, est entourée d'eau de mer sur trois côtés. Bien qu'elle ne soit séparée du Canada, au nord, et du continent, à l'est, que par une étendue d'eau ne dépassant pas 30 ou 40 km de large, la région est totalement isolée. En conséquence, le parc renferme plusieurs espèces végétales et animales endémiques de la région des monts olympiques ; on note en revanche l'absence de plusieurs espèces de mammifères présents dans les chaînes de montagnes avoisinantes.

C'est l'eau qui a contribué essentiellement à façonner le relief du Parc et lui a donné les traits géologiques et biologiques qui le caractérisent. Des vents dominants de sud-ouest amènent de l'océan Pacifique des nuages chargés d'humidité. Le relief s'élevant brusquement vers les pics montagneux, les nuages déversent sur le versant occidental de la péninsule plus de quatre mètres de précipitations orographiques par an, qui ont donné naissance à des glaciers et d'abondantes forêts. Sur le versant oriental des monts Olympiques, protégé par un effet d'ombre pluviométrique, les précipitations sont faibles, ne dépassant pas, par exemple, au nord-est de la péninsule 30 cm par an.

Les monts olympiques ont été formés par la collision de deux plates-formes continentales amenées l'une vers l'autre par des courants de convection circulant à l'intérieur du manteau terrestre. L'avance des glaces et la formation concomitante de glaciers alpins ont sculpté les profondes vallées, les pics déchiquetés et les magnifiques cirques que l'on peut admirer aujourd'hui. Les monts Olympiques comptent de nos jours une soixantaine de glaciers en activité. L'ensemble le plus important est situé dans le massif du mont Olympus, au coeur même de la chaîne. La présence de glaciers commençant à une altitude inférieure à 2000 m et descendant au-dessous de 1000 m, à une altitude aussi basse, en fait une région unique au monde.

La bande côtière du Parc National Olympique est une grève désertique de 80 km de long, caractérisée par des promontoires rocheux, des plages jonchées de bois mort, et une vie intertidale foisonnante. Des hauts îlots rocheux appelés "sea stacks" se dressent en avant du continent, vestiges d'une ligne côtière en régression et en transformation permanentes. Des arches, des grottes, des contreforts ont été taillés par l'assaut incessant des flots. Le milieu marin est extrêmement riche. Les flaques laissées par

le retrait des marais sont peuplées de centaines d'espèces invertébrées.

Le Parc National Olympique englobe des zones de végétation complexes et variées. Les experts sont quelque peu en désaccord sur leur classification.

En revanche, l'accord est général sur les principales communautés forestières, qui sont différenciées par l'altitude. On distingue : les forêts de plaine, composées d'épicéas de Sitka (Picea sitchensis) et de tsugas du Nouveau-Monde (Tsuga heterophylla) ; les forêts de montagne, composées de sapins gracieux (Abies amabilis), de tsugas du Nouveau-Monde (Tsuga heterophylla) et de sapins de Douglas (Pseudutsuga menziesii) ; les forêts subalpines, composées de tsugas de Mertens (Tsuga mertensiana) et de sapins à liège (Abies lasiocarpa) ; enfin, la zone de prairie alpine qui commence au-dessus de la limite des arbres.

On trouve également dans les Olympiques, des régimes de précipitations très variées. On passe, en 65 km, du point le plus arrosé des Etats-Unis (plus de 500 cm par an) au point le plus sec de la côte ouest en dehors du sud de la Californie. Par conséquent, les principales communautés d'espèces présentent de grandes variations locales.

La zone d'épicéas de Sitka (Picea sitchensis), communément appelée forêt pluviale des Olympiques (Olympic rainforest), constitue l'habitat le plus remarquable du parc. Cette forêt de conifères, qui ne pousse que dans la partie nord-ouest de la côte Pacifique, atteint son plein développement dans les quatre vallées du parc orientées à l'ouest. Les hivers tempérés, les étés frais et une pluviosité moyenne de 356 à 445 cm par an se sont conjugués pour produire cette forêt d'arbres énormes au sous-bois très dense. Le Parc National Olympique renferme la biomasse vivante la plus considérable qui existe dans le monde, à l'exception, peut-être, du Parc National des Redwoods en Californie et des peuplements d'eucalyptus géants d'Australie.

L'un des traits les plus remarquables du Parc, outre ces arbres géants, est la végétation épiphyte, plantes qui couvrent le tronc et les branches des érables et des aulnes mais tirent de l'atmosphère l'essentiel de l'eau et des éléments nutritifs et autres qui leur sont nécessaires. Ces plantes sont principalement des mousses, des lichens, et des

hépatiques, qui confèrent à la forêt pluviale son caractère unique.

Le désir de sauvegarder les wapitis (Cervus canadensis, ssp. Roosevelti) fut l'une des raisons qui présidèrent à la création du Parc national. Afin de mettre un terme au massacre de ce superbe animal, la zone fut déclarée au début du vingtième siècle "monument national des wapitis" (Elk National Monument), pour devenir plus tard "monument national du mont Olympus" (Mount Olympus National Monument). Les immenses troupeaux de wapitis sauvages ajoutent à la beauté sans pareille des vallées de la forêt pluviale.

Le Parc abrite encore trois espèces animales en voie de disparition : la martre du Pennant (Martis pennanti), la faucon pélerin (Falco peregrinus) et la chouette tachetée (Strix occidentalis). On y trouve également des cougars (Felix concolor), des coyottes (canus latrans) et une espèce de cervidés (Odocoileus hemionus ssp. Colombianus).

Le Parc National Olympique est le lieu idéal pour mener à bien des recherches scientifiques fondées sur l'étude d'écosystèmes ayant conservé autant que possible leur caractère originel. Le Parc national fait partie du réseau des réserves de la biosphère du Programme sur l'Homme et la Biosphère (MAB) et aura par conséquent un important rôle à jouer dans la surveillance mondiale permanente de l'incidence des activités humaines sur la biosphère terrestre.

b) Cartes et/ou plans — Voir annexe

c) Documentation photographique — Voir annexe

d) Historique

Il y a 25 000 ans, les premiers habitants de la péninsule des Olympiques vinrent d'Asie en Amérique du Nord à travers le détroit de Béring et migrèrent vers le sud. Les peuples qui habitaient la partie nord-ouest de la côte se scindèrent en plusieurs nations, mais l'environnement présentant les mêmes caractéristiques écologiques du sud-est de l'Alaska à l'Oregon, ils ont conservé un mode de vie similaire.

Les indigènes de la péninsule des Olympiques trouvaient en abondance de quoi subsister sur la côte ou à proximité et ne s'aventuraient que rarement, voire jamais, dans les montagnes de l'intérieur.

Les Espagnols furent les premiers Européens à

arriver dans la région, vers 1650. Ils explorèrent la côte du Pacifique et ce fut eux qui baptisèrent le détroit de Juan de Fuca, au nord. Ils établirent momentanément une colonie à l'extrémité nord-ouest de la péninsule. Mais les véritables explorations ne commencèrent qu'en 1792 quand le capitaine britannique Georges Vancouver s'engagea dans le détroit pour croiser dans le Puget Sound. Vancouver découvrit que le détroit et le Sound ne constituaient pas un passage mythique vers l'Atlantique mais une vaste voie de navigation intérieure entourant presque entièrement une région de montagnes et d'immenses forêts.

En 1824, la Compagnie de la baie d'Hudson établit plusieurs comptoirs dans la péninsule, et la région connut autour de 1840 une période d'expansion considérable. L'exploitation du bois constituait la principale activité des régions côtières, mais les montagnes de l'intérieur demeurèrent inexplorées. Afin de protéger les wapitis dont le nombre diminuait rapidement sous l'effet d'une chasse abusive, on accorda à une zone de 246 000 ha le statut de "monument national" en vertu d'une nouvelle loi sur la protection des monuments historiques (Antiquities Act) édictée au début du siècle.

e) Bibliographie — Voir annexe

4. ETAT DE PRESERVATION/DE CONSERVATION

a) Diagnostic

Le Parc National Olympique a conservé en grande partie l'aspect qu'il présentait avant l'arrivée des hommes dans les montagnes. Les écosystèmes compris dans son périmètre ont persisté à peu près sans modification depuis cette époque, avec quelques exceptions notables, qui sont l'addition de la chèvre des montagnes il y a une soixantaine d'années, l'extermination des loups dans les années trente et l'introduction d'espèces végétales exotiques.

L'influence de l'homme se remarque et se fait sentir surtout à la périphérie du parc où se concentre le mouvement des visiteurs et où pèsent davantage les menaces extérieures.

Les écologistes estiments que plusieurs problèmes se posent déjà à l'heure actuelle et menacent l'intégrité du parc pour l'avenir.

La qualité de l'air, déjà affectée par le brûlage des débris forestiers et la présence de scieries et d'usines de papier et de pâte

à papier en dehors du parc ne pose pour le moment qu'un problème ~~mineur.~~ Mais le projet de construction d'un port pour superpétroliers et d'installations annexes de raffinage qui est à l'étude pourrait avoir de graves répercussions sur l'atmosphère du parc. Ce terminal pétrolier avec ses réservoirs de stockage et l'aboutissement de l'oléoduc serait situé dans le port de Port Angeles, distant du parc de 4,6 km. La pollution atmosphérique et les précipitations acides pourraient altérer la qualité du parc sur le plan visuel et mettre en danger la faune aquatique ainsi que la végétation. Des opérations d'exploitation forestière se déroulent aux abords du parc et il arrive que des arbres du parc situé à la lisière des zones d'abattage soient déracinés par le vent. Le réseau de voies extérieures aménagé en vue de l'exploitation forestière permet d'accéder plus facilement à des coins reculés du parc, ce qui accroît les risques de braconnage.

La flore et la faune exotiques représentent pour le parc un danger interne. On a entrepris des recherches pour déterminer l'importance des dégradations que les chèvres des montagnes font subir à certaines espèces rares et uniques qu'elles piétinent et qu'elles broutent. D'autres plantes indigènes sont progressivement éliminées par des essences importées plus résistantes.

La population de la zone urbaine du Puget Sound ne cesse de croître et il est à prévoir que l'impact de l'homme sur les écosystèmes naturels sera de plus en plus marqué. Il se traduira inévitablement par le piétinement de la végétation, l'érosion du sol, la contamination des cours d'eau et l'élimination de certaines espèces animales. Il est également à craindre que l'usage généralisé d'herbicides dans les zones d'exploitation forestière situées à la périphérie du parc ne détériore la qualité de l'eau des régions côtières.

b) Agent responsable de la préservation/ou de la conservation

Superintendant
Olympic National Parc
600 East Park Avenue
Port Angeles, Washington 98362

c) Historique de la préservation ou de la conservation

Au début du siècle on massacrait les wapitis (Cervus canadensis ssp. roosevelti) uniquement pour leurs dents dont on faisait des breloques, alors très en vogue. Les partisans de leur conservation s'inquiétèrent et, en 1909, le Président Théodore Roosevelt, afin de les protéger, institua une réserve déclarée "Monument national", dans le cadre

de la nouvelle loi sur la protection des monuments historiques (Antiquities Act). Cette proclamation provoqua de violentes réactions de la part des compagnies d'exploitation forestière et minière et des groupes d'intérêts industriels.

En 1915, ces groupes d'intérêt convainquirent le Président Woodrow Wilson de réduire cette réserve ("monument") à la moitié de sa superficie, qui était de 246 000 ha, pour permettre la prospection du manganèse, métal très recherché pendant la première guerre mondiale.

En 1933, le Président Franklin D. Roosevelt plaça tous les monuments nationaux sous la juridiction du Service des parcs nationaux, ce qui suscita un regain d'intérêt pour l'idée de créer un parc national dans la péninsule des Olympic. Il devenait primordial de protéger la forêt vierge qui se réduisait rapidement sous l'effet d'un abattage de plus en plus abusif. Pour les partisans de la préservation, la création d'un parc national représentait la dernière chance de sauver cette forêt unique, qui renfermait quelques-uns des plus grands arbres du monde et qui constituait un habitat vital pour les wapitis.

Les compagnies d'exploitation forestière étaient prêtes à mettre à profit les derniers peuplements de sapins de Douglas, de pins, d'épicéas, de tsugas et de cèdres pour pallier la pénurie de bois d'oeuvre qui s'annonçait.

En 1938, les partisans de la préservation l'emportèrent en gagnant à leur cause Franklin Roosevelt, qui signa la loi par laquelle 275 000 ha de terres devaient être préservées, sous forme de parc, au profit du peuple américain. En 1953, le Président Harry S. Truman signa l'acte qui ajoutait au parc le couloir de la rivière Queets ainsi que les 80 km de la bande côtière. L'adjonction de différents terrains de moindre importance au cours des années quarante, puis de la partie nord de la bande côtière en 1976, allaient finalement porter la superficie totale du parc à 362 848,7 ha.

d) Moyens de préservation ou de conservation

Aux termes de la loi du 25 août 1916, instituant le Service des parcs nationaux (National Park Service) et de celle du 29 juin 1938, créant le Parc National Olympique, le parc était considéré comme une réserve et devait être géré de manière à conserver son intégrité naturelle. La protection du

Parc fut encore renforcée par des politiques et des règlements plus spécifiques.

En outre, plusieurs plans fournissent des directives importantes qui président à la gestion du Parc (cf. section suivante).

Des études se déroulent actuellement au sein du Parc dans le but d'aider l'administration à prendre des décisions garantissant sa préservation à long terme. Plusieurs organismes officiels ainsi que des scientifiques sont chargés de mener à bien ces recherches.

Le budget de gestion du Parc pour 1980 s'élève à 3 000 000 de dollars des Etats-Unis, ce qui est jugé suffisant pour atteindre les objectifs qui ont présidé à sa création.

e) Plans de gestion du Parc National Olympique

Ce document contient une description du Parc et de la région dans laquelle il est situé, et fixe les grandes lignes d'une gestion en accord avec la vocation du parc.

DECLARATION FINALE RELATIVE A L'ENVIRONNEMENT EN VUE DU CLASSEMENT DU PARC COMME ZONE DE NATURE SAUVAGE (WILDERNESS AREA) 1974

Ce document expose en détails les répercussions écologiques et sociales que pourrait avoir le classement du parc comme zone de nature sauvage, ainsi que les autres solutions possibles.

RECOMMANDATION TENDANT A CE QUE LE PARC SOIT CLASSE ZONE DE NATURE SAUVAGE, 1974

Ce document propose que 96% du parc soient intégrés au Système national de préservation de la nature sauvage (National Wilderness Preservation System), ce qui impliquerait, sur le plan de la gestion, un strict respect des règles de préservation. Le Congrès des Etats-Unis ne s'est pas encore prononcé à ce sujet.

PLAN DE GESTION DE LA ZONE NON-AMENAGEE DU PARC, 1976

Révisé en janvier 1980 : ce document présente les grandes lignes d'un plan qui permettrait aux visiteurs d'avoir le plus large contact possible avec la nature à l'état sauvage tout en préservant l'intégrité des processus écologiques naturels.

PLAN D'ACQUISITION DES TERRES, mars 1930.

Ce document fournit des directives concernant l'usage et l'occupation des terrains situés à l'intérieur du parc qui sont propriété privée.

Des recherches sont en cours et l'on s'efforce de mettre au point d'autres projets touchant au contrôle des chèvres des montagnes, au contrôle du feu et à la gestion des ressources.

5. JUSTIFICATION DE L'INSCRIPTION SUR LA LISTE DU PATRIMOINE MONDIAL

Une valeur universelle exceptionnelle est reconnue au Parc National Olympique et il est proposé à l'inscription sur la Liste du patrimoine mondial à titre de "bien naturel" répondant au critère (ii), en tant qu'"exemple éminemment représentatif d'une évolution biologique en cours ayant une grande signification". Il est proposé également à titre de bien naturel répondant au critère (iii), présentant des phénomènes, formations ou traits naturels éminemment remarquables de beauté exceptionnelle.

En ce qui concerne le critère (ii), le Parc National Olympique renferme le plus important et le plus bel exemple de forêt vierge ombrophile tempérée de l'hémisphère occidental. C'est un écosystème complet comprenant des centaines d'espèces dont beaucoup sont endémiques à la région et qui continuent d'évoluer dans un état à peu près naturel. L'écosystème est intact et il couvre une zone assez étendue pour renfermer les éléments nécessaires à la continuité de son existence naturelle. Le fait que cette zone soit gérée par le Service des parcs nationaux en tant que parc national conformément aux lois fédérales permet d'en préserver l'intégrité.

En ce qui concerne le critère(iii), le Parc National Olympique est une région d'une beauté naturelle exceptionnelle et c'est en outre le plus grand domaine protégé de la zone tempérée du globe qui présente ainsi rassemblés une telle combinaison d'écosystèmes, allant du rivage océanique à des pics glacés, en passant par des forêts humides de mélanges de conifères. La région contient 60 glaciers, 80 km de côte en bordure du Pacifique sans aucune route, ainsi que l'une des plus importantes zones de prairie subalpine de toute l'Amérique du Nord. Elle englobe la plus grande étendue de forêt de conifères mélangée encore intacte des Etats-Unis, comptant la plupart des spé-

cimens géants de conifères connus dans le monde.

On a dénombré dans le parc 500 classes de plantes vasculaires, 180 espèces d'oiseaux et 50 espèces de mammifères. Au moins treize de ces classes de plantes et sept de ces espèces d'animaux sont endémiques. Avec 10 bassins et plus de 200 cours d'eau habités par 7 espèces de salmonidés résidents et anadromes, il contient peut-être le plus grand ensemble intact d'habitants et de races indigènes de salmonidés des Etats-Unis.

Signature (au nom de l'état partie) : _____

Nom et prénom : David F. Hales

Titre : Deputy Assistant Secretary for Fish and Wildlife and Parks

Date : 2 Décembre 1980

Annexe

Documentation à l'appui de l'inscription du Parc National Olympique sur la Liste du patrimoine mondial :

Les photos et documents dont nous donnons la liste ci-dessous nous ont été adressés par les Etats-Unis d'Amérique à l'appui de la présente demande d'inscription. On peut les consulter à la Division des sciences écologiques de l'Unesco. Il sera également possible de les consulter lors des réunions du Bureau du Comité du patrimoine mondial et du Comité lui-même.

1. Documents photographiques (épreuves noir et blanc)

   1. Vue d'une partie des 80 km de plages sauvages.
   2. Des îlots rocheux (sea stacks) le long de la côte.
   3. Le sentier de randonnée du "couloir des mousses" (Hall of Mosses Nature Trail) dans la forêt pluviale des Olympic.
   4. Vue de la Vallée de la Hoh depuis High Divide.
   5. Le Round Lake dans le bassin des Sept Lacs.
   6. Les prairies de la zone alpine.
   7. Le glacier de la Hoh sur le mont Olympus.
   8. Un réseau de sentiers ouvert à la randonnée.

2. Cartes

   1. Carte des environs, Parc National Olympique.
   2. Parc National Olympique : topographie, sentiers de randonnée et installations mises à la disposition des visiteurs à l'intérieur du parc.-GPO 1980.

3. Bibliographie

   On trouvera au Secrétariat du Patrimoine mondial une liste de 20 références bibliographiques.

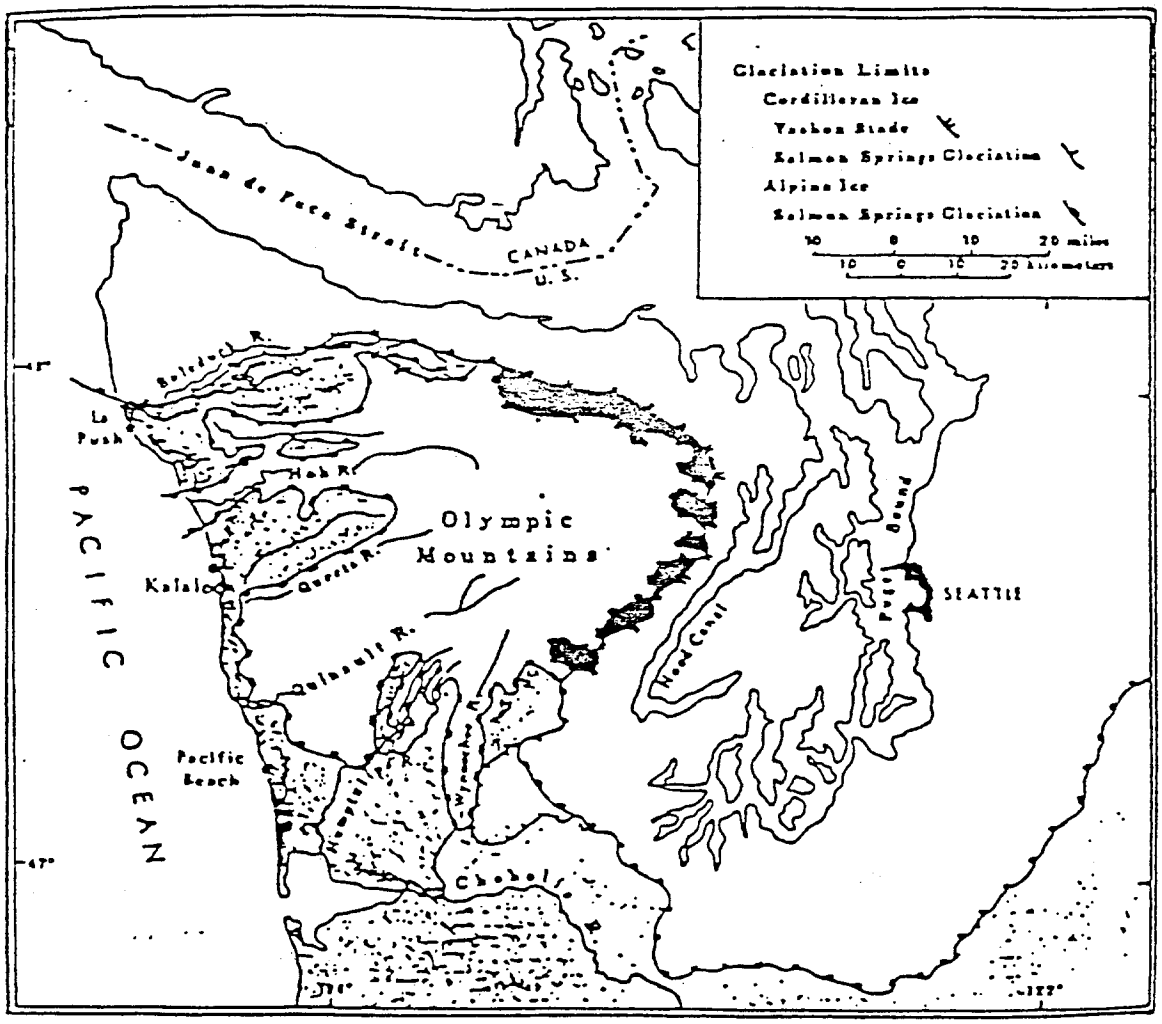


Figure 3. Extent of continental and alpine glaciers on the Olympic Peninsula, showing ice-free "refugia" (shaded) in the eastern Olympic Mountains (Pike 1981 from Heusser 1972 and others).

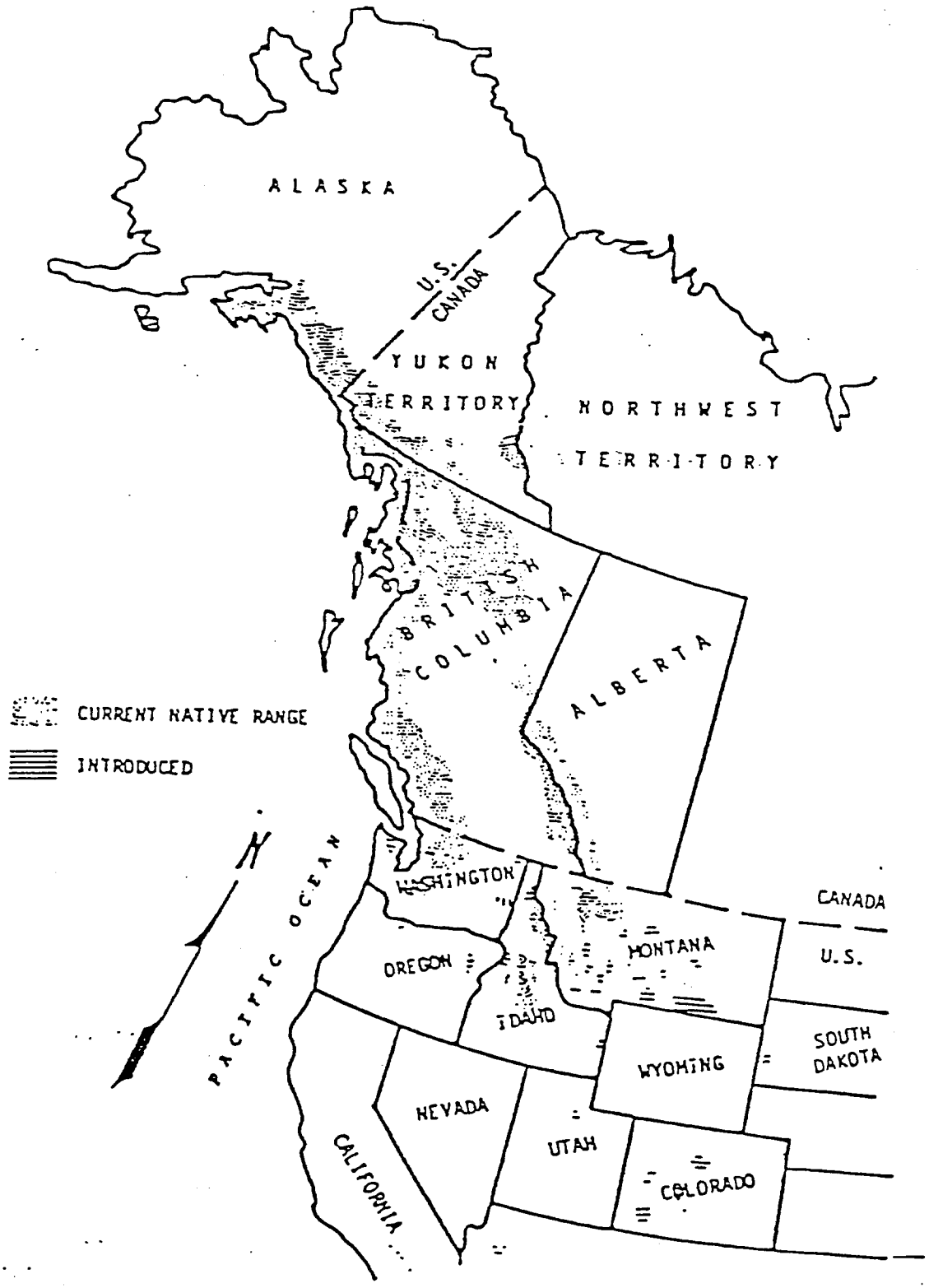
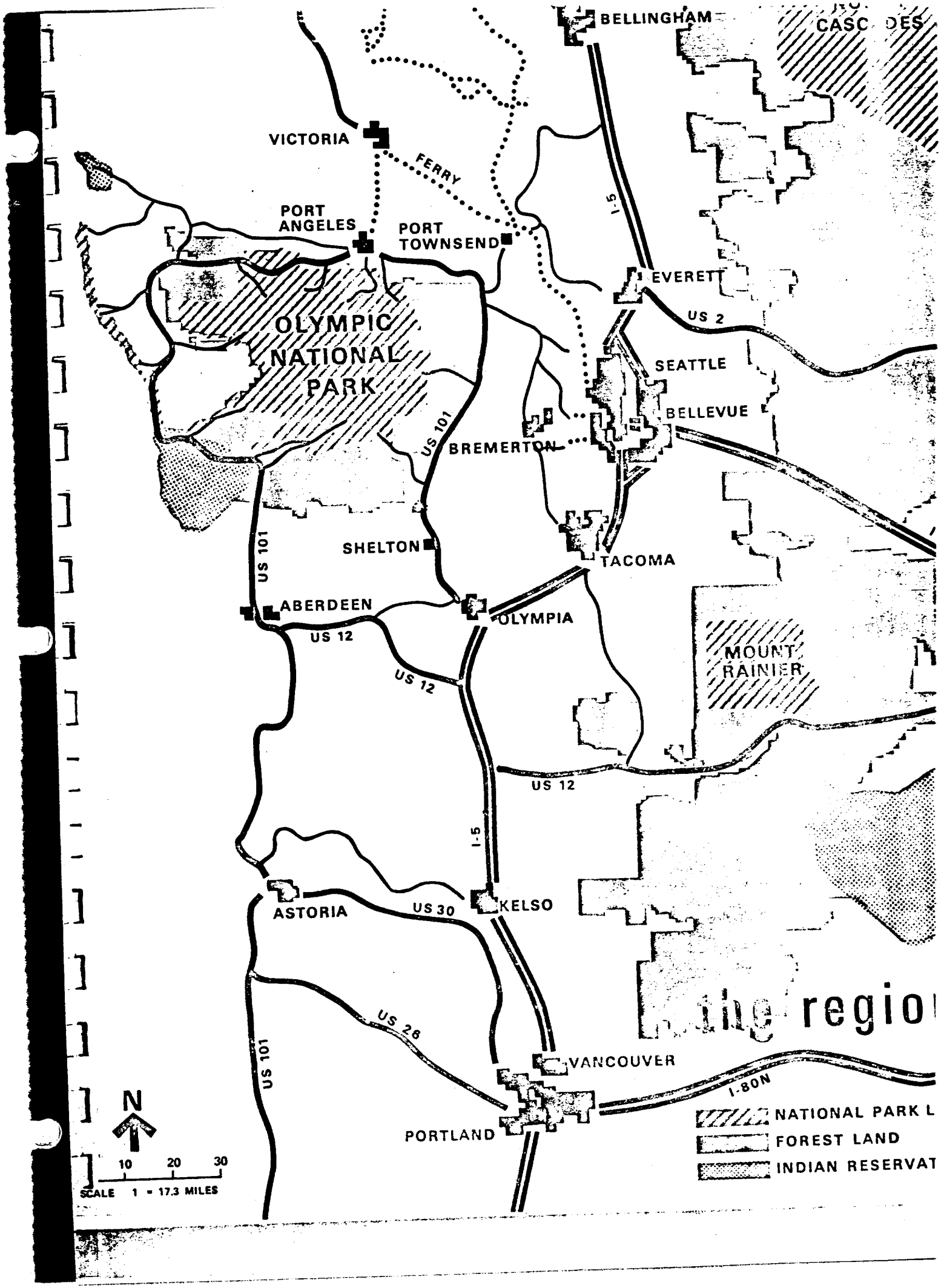


Figure 5. Distribution of mountain goats in North America. From Johnson, R. 1977. Distribution, abundance, and management status of mountain goats, p. 1. In Samuel and Macgregor (eds.). Proc. 1st Inter. Mt. Goat Sympos. Prov. Br. Columbia, Fish & Wildlife Br., Victoria, B.C.


BELLINGHAM
CASCADES
VICTORIA
FERRY
PORT ANGELES
PORT TOWNSEND
I-5
EVERETT
US 2
OLYMPIC NATIONAL PARK
SEATTLE
BELLEVUE
US 101
BREMERTON
SHELTON
TACOMA
ABERDEEN
OLYMPIA
US 12
MOUNT RAINIER
ASTORIA
US 30
KELSO
US 26
VANCOUVER
I-80N
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N
10 20 30
SCALE 1 = 17.3 MILES
NATIONAL PARK L
FOREST LAND
INDIAN RESERVAT

WORLD HERITAGE NOMINATION

IUCN TECHNICAL REVIEW

1. IDENTIFICATION NUMBER AND NAME 151 Olympic National Park

2. LOCATION: Northwestern Washington State, 47°50'N, 124°W

3. NOMINATED BY: National Park Service, Department of the Interior, Government of the United States of America

4. DOCUMENTATION:

(i) Nomination form, including maps and photos
(ii) Supplementary documentation (IUCN)

a) Olympic National Park Master Plan

b) Consultation: Harold K. Eidsvik, Senior Policy Advisor, Parks Canada

c) Dr. Jim Thorsell, Parks Planner

d) Hutchins, M. and Stevens, M. 1981. "Olympic Mountain Goats". Natural History. January

e) An Environmental Assessment on the Management of Introduced Mountain Goats in Olympic National Park. (February 1981).

5. BACKGROUND AND SUMMARY

Olympic National Park, comprising 3628 square kilometres, is isolated from other mountain ranges and surrounded by the waters of the Pacific Ocean and Puget Sound; this isolation has allowed the development of endemic wildlife, including the Olympic marmot, 4 subspecies of the other mammals, 2 subspecies of trout, and 12 species or varieties of plants. The area contains a great wealth of geological formations, affected by high rainfall (5000 mm) on the west and low rainfall (300 mm/year) on the east. The mountains contain about 60 active glaciers; the area is unique in that it is the lowest latitude in the world in which glaciers begin at an elevation lower than 2000 metres and exist below 1000 metres. The coastal strip of the site stretches along 80 kilometres of wilderness beach, characterized by rocky headlands, log-strewn beaches, and a wealth of intertidal life; rocky islets along the coast are remnants of a continuously receding, changing coastline, and the arches, caves, and buttresses are evidence of the continuous battering of the waves. Reflecting the varied topography (from seashore to glacier) and the varied rainfall (from the wettest location in the continental US, to the driest on the northwest coast), the vegetation zones in the site are complex and varied. The Olympic rainforest, which reaches its maximum development within the site is; sitka spruce, Douglas fir, western red cedar, and others reach a living standing biomass here which may be the highest of anywhere in the world.

6. INTEGRITY

The site is large enough to contain on-going geological processes (glaciation and changing coastline) and evolution of the many and varied forest types. Ideally, the site should include the national forest which separates the 80 kilometre-long coastal strip from the montane areas, but this is not considered feasible or vital to the integrity of the site as both the coastal

strip and the 3350 square kilometres of the Olympic Mountains can stand alone. The main danger to the integrity of the site is, oddly, one of its attractions: the mountain goat. Due to the isolation of the site, mountain goats never dispersed naturally to the Olympics, so their introduction in 1925-29 may be causing significant changes in the natural ecosystem. Research has suggested that the mountain goats have reduced plant cover, increased erosion, and shifted plant-community dominants toward more resistent or less palatable species; they have been recorded feeding on at least three of the endemic plants, and some concern has been expressed that these species may be endangered by the mountain goat. A mountain goat control programme aimed at removing 180 goats and establishing and expanding a goat-free alpine zone was begun on 15 April 1981).

7. COMPARISON WITH OTHER AREAS

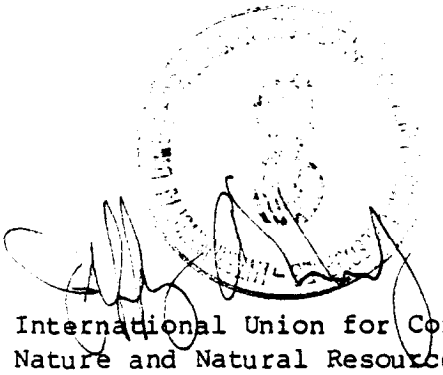
There is no comparable site in British Columbia or Alaska. Pacific Rim National Park in British Columbia does not yet have the extensive virgin forest; negotiations are underway, but even if successful they will not add alpine areas and glaciers to Pacific Rim. Other mountain parks such as Garibaldi (British Columbia) do not have the coastal representation. Once the northern end of Vancouver Island is passed, the forest composition changes; halfway up the British Columbia coast, the magnificent Douglas fir disappears, so the Alaskan sites are all quite different. Redwood National Park lacks the mountains and has much lower diversity of plants and geological features.

8. EVALUATION

It is apparent from the nomination form and other documentation that the Olympic National Park is the best natural area in the entire Pacific Northwest, with a spectacular coastline, scenic lakes, majestic mountains and glaciers, and magnificent temperate rainforest; these are outstanding examples of on-going evolution and superlative natural phenomena. It is unmatched in the world.

9. RECOMMENDATION

Olympic National Park meets natural criteria (ii) and (iii) and should be added to the World Heritage List. The Committee might wish to express concern about the introduced mountain goats and request a copy of the mountain goat management plan.



International Union for Conservation of Nature and Natural Resources

July 1981 (rev)

OLYMPIC NATIONAL PARK (USA)

Extending from the northwestern-most point of the contiguous United States like a small thumb from a large hand, the Olympic Peninsula is isolated by the Puget Sound from the other mountain ranges of the Pacific Northwest. This isolation has allowed the development of endemic wildlife, including the Olympic marmot, 4 subspecies of other mammals, 2 subspecies of trout, and 12 species or varieties of plants. Four species of mammal have unique fur colouration in the Olympics (black bear, snowshoe hare, short-tailed weasel, and Olympic marmot), another indication of a separate course of evolution.

The Olympic mountains were formed as a large portion of the Pacific Ocean floor collided with the North American continent and was forced under the continental plate. The lighter shales, sandstones, and basalts, which had been violently sheared and squeezed during this tectonic movement, bobbed up like a cork, forming a dome some 95 km in diameter. Deep valleys and canyons were eroded out of this dome and glaciers sculpted the craggy peaks and beautiful cirques to form the spectacular landscape which characterizes the modern Olympics.

The mountains of the 3,628 square kilometer site contain about 60 active glaciers, several existing below 1,000 meters elevation (the lowest latitude for such glaciers). The site also includes a coastal strip extending along 80 kilometers of wilderness beach, characterized by rocky headlands, log-strewn beaches, and a wealth of intertidal life; rocky islets along the coast are remnants of a continuously receding, changing coastline, and the arches, caves, and buttresses are evidence of the continuous battering of the waves. Tidepools are filled with hundreds of species of invertebrate life, and seals, sea lions, sea otters and several species of whales are often seen in the waves and around the offshore islands.

Reflecting the varied topography (from seashore to glacier) and the varied rainfall (from the wettest location in the contintental US, to the driest in the northwest), the vegetation zones contained in the site are complex and varied, providing habitats of unmatched diversity on the Pacific Coast. The coastal Olympic rainforest, comprised of Sitka spruce, Douglas fir, western red cedar, and others, is of particular interest, reaching its maximum development within Olympic National Park. It attains a living standing biomass which may be the highest of anywhere in the world; the world-record individuals of Alaska cedar, grand fir, Pacific silver fir, western hemlock Douglas fir, subalpine fir, and western red cedar are all found within the site. The coniferous forest of Olympic is of prime commercial interest and nearly all of the original forest outside the park has been harvested.

The Olympic National Park is the best natural area in the entire Pacific Northwest, with a spectacular coastline, scenic lakes, majestic mountains and glaciers, and magnificent temperate rainforest. These are outstanding examples of on-going evolution and superlative natural phenonmena.

Jeffrey A. McNeely
IUCN/CNPPA
19Feb82

U.S.A.

NAME Olympic National Park

MANAGEMENT CATEGORY II & IX (National Park and Biosphere Reserve)

World Heritage Site (Criteria: iii, iv)

BIOGEOGRAPHICAL PROVINCE 1.2.2 (Oregonian)

LEGAL PROTECTION Complete protection under Act of Congress of 29 June 1938. Fishing is permitted.

DATE ESTABLISHED 29 June 1938 as a National Park; the Pacific Coastal Area and Queets River Corridor were added 6 January 1953. Accepted as a Biosphere Reserve in June 1976, and a World Heritage Site in 1981.

GEOGRAPHICAL LOCATION In the northwestern corner of the United States bordering on Canada, on Olympic Peninsula, Washington state. 47°29'-48°11'N, 123°07'-124°42'W.

ALTITUDE Sea level to 2,428m

AREA National Park and World Heritage Site: 362,848.7ha; the Biosphere Reserve consists of 363,379ha in two units: 344,046ha including the Olympic Mountains and 19,333ha in the Pacific Coastal Area

LAND TENURE 99.6% Federal Government ownership, 0.4% privately owned

PHYSICAL FEATURES The park is divided into two segments: a mountainous core and a separate coastal strip. The rugged features of Olympic National Park are the result of the collision of drifting continental plates. When normal subduction processes, associated with continental drift, moved further westward out to sea, an upwelling of submarine sediments and volcanic material followed. A dome 95km in diameter was created consisting of contorted beds of shale, slate and sandstone with interspersed lavas. The Olympic Mountains are the highest in this coastal range bounding the Pacific ocean, and are the central topographic feature of the park. The action of 11 major rivers and many glaciers (60 of which remain) has carved the dome into a vast array of deep canyons and jagged peaks. Ancient 1,000m thick continental ice sheets transported non-native granite up to 200km from British Columbia, Canada. 4,300 ha of ice, luxuriant rain forests with 100m tall trees, and 90km of rugged wave-battered coastline combine to create a park of great physical and biological diversity. Climate is moderate and temperatures rarely drop below -7°C or rise above 27°C. Mean annual temperatures are 10°C at lower elevations with a yearly range from 1°C to 17°C. Storms account for 4,000mm of precipitation annually in western rain forest valleys and 5,000mm on Mount Olympus; only 53km to the northeast precipitation falls to 300mm, creating the greatest precipitation gradient per distance in the world at a temperate latitude.

VEGETATION The five major vegetation zones are:

1) Sitka spruce zone (36,284ha, 10%), containing temperate rain forest and characterized by Sitka spruce Picea sitchensis, western hemlock Tsuga heterophylla, western red cedar Thuja plicata, and bigleaf maple Acer macrophyllum along the coast and in valley bottoms.

2) Lowland forest zone (36,284ha, 10%), characterized by western hemlock Tsuga heterophylla, western red cedar Thuja plicata, grand fir Abies grandis and Douglas fir Pseudotsuga menziesii, an extensive fire sub-climax species upto 550m elevation.

3) Montane zone (181,425ha, 50%), characterized by western hemlock Tsuga heterophylla in lower and drier habitats, Pacific silver fir Abies amabilis in higher and more moist habitats and Douglas fir Pseudotsuga menziesii as an extensive sub-climax in eastern portions of the park (generally from 550-1,100m).

4) Subalpine zone (72,570ha, 20%), characterized by mountain hemlock Tsuga mertensiana in the western portion of the park and subalpine fir Abies lasiocarpa in the eastern portion, including extensive park-like meadows (generally from 1,100m to around 1,600m).

5) Alpine/glaciers region (36,284ha, 10%), characterized by red mountain heather Phyllodoce empetriformis, tall sedge Carex spectabilis, spreading phlox Phlox diffusa and large tracts of snow and ice (highest ridge and mountain tops).

The park contains 500 taxa of vascular plants, of which at least 13 are endemic. The endemic Olympic flora includes six species; Cotton's milk-vetch Astraglaus cottonii, Piper's bellflower Campanula piperi, Olympic mountain daisy Erigeron flettii, rockmat Petrophytum hendersonii, Olympic butterweed Senecio neowebsteri and Flett's violet Viola flettii; and seven varieties: Piper's bellflower white form Campanula piperi v. soveregniana, magenta paintbrush Castilleja parviflora v. olympica, wallflower Erysimum arenicola v. arenicola, white coiled-beak lousewort Pedicularis bracteosa v. astrosanguinea, kittentails Synthris pinnatifida v. lanuginosa and Olympic rockcress Arabis furcata v. olympica.

NOTEWORTHY FAUNA 180 species of birds and 50 species of mammals, with at least 7 endemic taxa. The native fauna is intact except for the local subspecies of wolf Canis lupus nubilus, which was extirpated by man before the park was established. The large coastal subspecies of elk Cervus elaphus roosevelti was first described in the Olympic Mountains and its protection was an important reason for establishing the park, with an estimated 3000-5000 animals in the area. The Rocky Mountain goat Oreamnos americanus was introduced by man before the park was created and is now fully established with an estimated population of 500-1000. The endemic Olympic fauna includes three species: Olympic marmot Marmota olympus, Beardslee trout Salmo gairdneri beardsleei and Crescenti trout Salmo clarkii crescentis, and four subspecies: olympicus: Olympic mole Scapanus townsendi, short-tailed weasel Mustela erminea, Olympic chipmunk Eutamias amoenus subsp. caurinus and Olympic mazama pocket gopher Thomomys mazama subsp. melanopes. Other noteworthy species are cougar Felis concolor, coyote Canus latrans, mule deer Odocoileus hemionus ssp columbianus, fisher Martes pennanti, snowshoe hare Lepus americanus subsp. washingtonii, cougar Felis concolor, peregrine falcon Falco peregrinus (V) and spotted owl Strix occidentalis. Over 50 species of smaller animals have been identified. Nearly 1,000km of streams and rivers in the park are inhabited by some 20 native fish species, including 7 species of salmon and trout that migrate to and from the ocean.

CULTURAL HERITAGE A few abandoned homestead clearings (0.5 to 5ha) are evident in certain lowland valleys, and several are designated as historical sites.

POPULATION Towns on the peninsula are small (Port Angeles has 16,500 inhabitants) but less than 80km to the east the Seattle-Tacona urban complex has a population of nearly 2 million.

ZONING 96% of the park is managed as a wilderness area and 4%, including all public facilities, is managed as a natural area.

CONSERVATION MANAGEMENT There are various management plans for the area. In April 1981 a goat control programme began, aimed at removing 180 goats and expanding a goat-free alpine zone.

DISTURBANCES OR DEFICIENCIES The core of the Olympic Mountains is still largely undisturbed mountain and forest. No timber harvesting is permitted in the park but there is some illegal felling, rapidly increasing around the boundaries. Introduced mountain goats Oreamnos americanus have had an impact on high elevation communities. 0.4% of the park, which is privately owned, is visually obtrusive. A proposed oil superport and related refineries to be located in Port Angeles harbour, 4.6km from the park could have an adverse effect on the park. Water quality in coastal areas is also threatened by large-scale applications of herbicides in timber-producing areas adjacent to the park. Tourists and other visitors have an adverse effect on the park.

TOURISM Over 2.5 million people visit the park annually but most stay near 267km of the road that enters the mountain valleys peripherally and skirts about 25% of the Pacific Ocean coastline. 1,000km of trails interconnect the mountainous interior for foot and horse passage. There are at least 125,000 overnight hikers each year, many along the ocean coastline. 9 ranger stations and 9 seasonal tourist facilities are located around the periphery of the park.

SCIENTIFIC RESEARCH Since 1971 management studies by the park staff have extensively investigated human recreational impact and its mitigation in back-country camping areas. Other management problems needing research attention include baseline surveys of all major biotic subsystems, terrestrial and aquatic, as benchmarks for sound management strategy, the ecological role and appropriate management of wildfire, population ecology and protection of Cervus elephus roosevelti and its role as consumer in forest communities; status and protective measures needed for native genetic stocks of anadromous fish species; and status and protection of alpine plant endemics with increasing recreational use. Distinctive plant communities have been described by Fonda and Bliss 1969, Kuramoto and Bliss 1970, and Fonda 1974. Research has suggested that the goats have reduced plant cover, increased erosion and shifted plant community dominants toward more resistant or less palatable species, and they have been recorded feeding on at least three of the endemic plant species.

SPECIAL SCIENTIFIC FACILITIES 5,000-specimen study collection and reference library

PRINCIPAL REFERENCE MATERIAL Numerous publications are available in the park library, Pioneer Memorial Visitor Centre, Port Angeles.

Fonda, R.W. and Bliss, L.C. (1969). Forest vegetation of the montane and subalpine zones, Olympic Mountains, Washington. Ecological monographs 39: 271-301.

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Hutchins, M. and Stevens, M. (1981). Olympic Mountain Goats. Natural History January.

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Tabor, R.W. (1975). Guide to the geology of Olympic National Park. University of Washington Press, Seattle.

Biosphere Reserve nomination submitted to Unesco.

STAFF 78 permanent, 28 permanent part-time and 107 seasonal employees

BUDGET US$3,400,000 in 1980

LOCAL PARK OR RESERVE ADMINISTRATION Superintendent, Olympic National Park, 600 E. Park Avenue, Port Angeles, Washington 98362

DATE August 1982

UNITED STATES OF AMERICA-Olympic National Park

UNITED STATES OF AMERICA - Washington

NAME Olympic National Park

MANAGEMENT CATEGORY II (National Park)
IX (Biosphere Reserve)
X (World Heritage Site - Criteria: iii, iv)

BIOGEOGRAPHICAL PROVINCE 1.02.02 (Oregonian)

GEOGRAPHICAL LOCATION In the northwestern corner of the **United States** bordering on Canada, on Olympic Peninsula, Washington state. 47°29'-48°11'N, 123°07'-124°42'W

DATE AND HISTORY OF ESTABLISHMENT 29 June 1938 as a national park; the Pacific Coastal Area and Queets River Corridor were added on 6 January 1953. Accepted as a biosphere reserve in June 1976, and as a World Heritage site in 1981.

AREA The biosphere reserve consists of 363,379ha in two units: 344,046ha including the Olympic Mountains and 19,333ha in the Pacific Coastal Area. National Park and World Heritage Site: 362,848.7ha.

LAND TENURE 99.6% Federal Government; 0.4% privately owned

ALTITUDE 0-2,428m

PHYSICAL FEATURES The park is divided into two segments: a mountainous core and a separate coastal strip. The rugged features of Olympic National Park are the result of the collision of drifting continental plates. When normal subduction processes, associated with continental drift, moved further westward out to sea, an upwelling of submarine sediments and volcanic material followed. A dome 95km in diameter was created consisting of contorted beds of shale, slate and sandstone with interspersed lavas. The Olympic Mountains are the highest in this coastal range bounding the Pacific ocean, and are the central topographic feature of the park. They are of sedimentary in origin and range from late Tertiary to Quaternary age. The action of 11 major rivers and many glaciers (60 of which remain) has carved the dome into a vast array of deep canyons and jagged peaks. Ancient 1,000m thick continental ice sheets transported non-native granite up to 200km from British Columbia, Canada. 4,300 ha of ice, luxuriant rain forests with 100m tall trees, and 90km of rugged wave-battered coastline combine to create a park of great physical and biological diversity.

CLIMATE Climate is moderate and temperatures rarely drop below -7°C or rise above 27°C. Mean annual temperatures are 10°C at lower elevations with a yearly range from 1°C to 17°C. Storms account for 4000mm of precipitation annually in western rain forest valleys and 5000mm on Mount Olympus; only 53km to the north-east precipitation falls to 300mm, creating the greatest precipitation gradient per distance in the world at a

temperate latitude.

VEGETATION The five major vegetation zones are: 1) Sitka spruce zone (36,284ha, 10%), containing temperate rain forest and characterised by Sitka spruce Picea sitchensis, western hemlock Tsuga heterophylla, western red cedar Thuja plicata, and bigleaf maple Acer macrophyllum along the coast and in valley bottoms. 2) Lowland forest zone (36,284ha, 10%), characterised by western hemlock Tsuga heterophylla, western red cedar Thuja plicata, grand fir Abies grandis and Douglas fir Pseudotsuga menziesii, an extensive fire
sub-climax species up to 550m elevation. 3) Montane zone (181,425ha, 50%), characterised by western hemlock Tsuga heterophylla in lower and drier habitats, Pacific silver fir Abies amabilis in higher and more moist habitats and Douglas fir Pseudotsuga menziesii as an extensive sub-climax in eastern portions of the park (generally from 550-1,100m). 4) Subalpine zone (72,570ha, 20%), characterised by mountain hemlock Tsuga mertensiana in the western portion of the park and subalpine fir Abies lasiocarpa in the eastern portion, including extensive park-like meadows (generally from 1,100m to around 1,600m). 5) Alpine/glaciers region (36,284ha, 10%), characterised by red mountain heather Phyllodoce empetriformis, tall sedge Carex spectabilis, spreading phlox Phlox diffusa and large tracts of snow and ice (highest ridge and mountain tops). The park contains 500 taxa of vascular plants, of which at least 13 are endemic. The endemic Olympic flora includes six species; Cotton's milk-vetch Astraglaus cottonii, Piper's bellflower Campanula piperi, Olympic mountain daisy Erigeron flettii, rockmat Petrophytum hendersonii, Olympic butterweed Senecio neowebsteri and Flett's violet Viola flettii; and seven varieties: Piper's bellflower white form Campanula piperi v. soveregniana, magenta paintbrush Castilleja parviflora v. olympica, wallflower Erysimum arenicola v. arenicola, white coiled-beak lousewort Pedicularis bracteosa v. astrosanguinea, kittentails Synthris pinnatifida v. lanuginosa and Olympic rockcress Arabis furcata v. olympica.

FAUNA 180 species of birds and 50 species of mammals, with at least seven endemic taxa. The native fauna is intact except for the local subspecies of wolf Canis lupus nubilus, which was extirpated by man before the park was established. The large coastal subspecies of elk Cervus elaphus roosevelti was first described in the Olympic Mountains and its protection was an important reason for establishing the park, with an estimated 3000-5000 animals in the area. Rocky Mountain goat Oreamnos americanus was introduced by man before the park was created and is now fully established with an estimated population of 500-1000. The endemic Olympic fauna includes three species: Olympic marmot Marmota olympus, Beardslee trout Salmo gairdneri beardsleei and Crescenti trout Salmo clarkii crescentis, and four subspecies: Olympic mole Scapanus townsendi olympicus, short-tailed weasel Mustela erminea olympicus, Olympic chipmunk Tamias amoenus caurinus and Olympic mazama pocket gopher Thomomys mazama melanopes. Other noteworthy species are cougar Felis concolor, coyote Canus latrans, mule deer Odocoileus hemionus ssp columbianus, fisher Martes pennanti, snowshoe hare Lepus americanus subsp. washingtonii, peregrine falcon Falco peregrinus (V) and spotted owl Strix occidentalis. Over 50 species of smaller animals have been identified. Nearly 1,000km of streams

and rivers in the park are inhabited by some 20 native fish species, including seven species of salmon and trout that migrate to and from the ocean.

CULTURAL HERITAGE A few abandoned homestead clearings (0.5 to 5ha) are evident in certain lowland valleys, and several are designated as historical sites.

LOCAL HUMAN POPULATION Towns on the peninsula are small (Port Angeles has 16,500 inhabitants) but less than 80km to the east the Seattle-Tacona urban complex has a population of nearly two million.

VISITORS AND VISITOR FACILITIES Nine ranger stations and nine seasonal tourist facilities are located around the periphery of the park.

SCIENTIFIC RESEARCH AND FACILITIES Since 1971 management studies by the park staff have extensively investigated human recreational impact and its mitigation in back-country camping areas. Other management problems needing research attention include baseline surveys of all major biotic subsystems, terrestrial and aquatic, as benchmarks for sound management strategy; the
ecological role and appropriate management of wildfire, population ecology and protection of Cervus elaphus roosevelti and its role as consumer in forest communities; status and protective measures needed for native genetic stocks of anadromous fish species; and status and protection of alpine plant endemics with increasing recreational use. Distinctive plant communities have been described by Fonda and Bliss 1969, Kuramoto and Bliss 1970, and Fonda 1974. Research has suggested that the goats have reduced plant cover, increased erosion and shifted plant community dominants toward more resistant or less palatable species, and they have been recorded feeding on at least three of the endemic plant species. There is a 5,000-specimen study collection and reference library.

CONSERVATION MANAGEMENT Complete protection under Act of Congress of 29 June 1938. Fishing is permitted. There are various management plans for the area. In April 1981 a goat control programme began, aimed at removing 180 goats and expanding a goat-free alpine zone. 96% of the park is managed as a wilderness area and 4%, including all public facilities, is managed as a natural area.

MANAGEMENT PROBLEMS The core of the Olympic Mountains is still largely undisturbed mountain and forest. No timber harvesting is permitted in the park but there is some illegal felling, rapidly increasing around the boundaries. Introduced mountain goats Oreamnos americanus have had an impact on high elevation communities. 0.4% of the park, which is privately owned, is visually obtrusive. A proposed oil superport and related refineries to be located in Port Angeles harbour, 4.6km from the park could have an adverse effect on the park. Water quality in coastal areas is also threatened by large-scale applications of herbicides in timber-producing areas adjacent to the park. No timber harvesting occurs in the park but is rapidly increasing around its boundaries. Tourists and other visitors have an adverse effect on the park. Over 2.5 million people visit the park

annually but most stay near 267km of the road that enters the mountain valleys peripherally and skirts about 25% of the Pacific Ocean coastline. 1,000km of trails interconnect the mountainous interior for foot and horse passage. There are at least 125,000 overnight hikers each year, many along the ocean coastline.

STAFF Seventy-eight permanent, 28 permanent part-time and 107 seasonal employees

BUDGET US$3,400,000 in 1980

LOCAL ADMINISTRATION Superintendent, Olympic National Park, 600 E. Park Avenue, Port Angeles, Washington 98362

REFERENCES Numerous publications are available in the park library, Pioneer Memorial Visitor Centre, Los Angeles.

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DATE August 1982, revised August 1986
0070U

Infobase produced by WCMC, January 1992

PATRIMOINE MONDIAL: CANDIDATURE

EXAMEN TECHNIQUE PAR L'UICN

1. NUMERO D'IDENTIFICATION ET NOM: 151 Parc national "Olympic"

2. SITUATION GEOGRAPHIQUE: Au nord-ouest de l'Etat de Washington, 47°50'N, 124°0

3. CANDIDATURE PROPOSEE PAR: Service des parcs nationaux, Département de l'Intérieur, gouvernement des Etats-Unis d'Amérique

4. DOCUMENTATION:

(i) Formulaire de candidature avec cartes et photos
(ii) Documentation complémentaire (UICN)

a) Le plan directeur du parc national "Olympic".

b) Consultation de Harold K. Eidsvik, conseiller auprès de Parks Canada

c) M. Jim Thorsell, planificateur de parcs

d) Hutchins, M. et Stevens, M. 1981. "Olympic Mountain Goats". Natural History. Janvier.

e) Evaluation environnementale sur la gestion des chèvres de montagne introduites dans le parc national Olympic (février 1981).

5. PRESENTATION RESUMEE

Le parc national Olympic, d'une superficie de 3628 km^2, est isolé des autres chaines de montagnes par les eaux du Pacifique et Puget Sound. Cet isolement a permis l'évolution d'une faune endémique, notamment de la marmotte d'Olympic, de quatre sous-espèces d'autres mammifères, deux sous-espèces de truites, et de 12 espèces ou variétés de plantes. Dans cette région se trouve une grande richesse de formations géologiques, affectées par des précipitations élevées (5000 mm) à l'ouest, et faibles (300 mm) à l'est. Les montagnes comportent environ 60 glaciers actifs. La région est unique en ce qu'elle est située à la latitude la plus basse qui soit à laquelle les glaciers commencent à une altitude inférieure à 2000 m et se maintiennent encore au dessous de 1000 m. La frange côtière du site s'étend sur 80 km de plages caractérisées par des avancées rocheuses, un rivage parsemé de bois mort et riche en vie intertidale. Les ilots rocailleux le long de la côte sont des vestiges d'une côte changeante, en recul continuel, et les arches, cavernes et anfractuosités rocheuses, sont autant de témoignages, des coups de boutoir des vagues. Les zones de végétation du site sont complexes et variées, et reflètent la diversité du relief (des plages aux glaciers) et des précipitations (de la zone continentale américaine la plus humide à la plus sèche, sur la côte nord-ouest). Présentant un remarquable intérêt, la forêt humide d'Olympic atteint son développement maximal sur ce site, où l'épicéa sitka, le sapin de Douglas, cèdre rouge occidental (Thuja plicata), et d'autres espèces constituent la plus biomasse vivante permanente la plus considérable qui soit.

6. INTEGRITE

Ce site est suffisamment vaste pour contenir les processus géologiques actuels (formation de glacier) et modification du tracé de la côte) et évolution des nombreux types de forêts. L'idéal serait que le site inclut la forêt nationale qui sépare la frange côtière de 80 km de long des régions montagneuses, mais cela n'est pas jugé faisable, ni indispensable à l'intégrité du site, car aussi bien la zone côtière que les 3350 km^2 des montagnes Olympic peuvent subsister l'un sans l'autre. Le principal danger que court l'intégrité du site est, paradoxalement, l'une de ses principales attractions: la chèvre de montagne. Etant donné l'isolement du site, les chèvres de montagne n'étaient jamais allées d'elles-mêmes vers les monts Olympic, de sorte que leur introduction en 1925-29 a peut-être provoqué des changements importants dans l'écosystème naturel. Des études donnent à penser que les chèvres de montagne ont réduit la couverture végétale, accroissant l'érosion et modifiant la communauté végétale - les espèces dominant faisant place à d'autres plus résistantes ou qui ont moins de goût; les chèvres se nourrissent d'au moins trois espèces endémiques, et certains auteurs craignent que ces espèces soient menacées par la chèvre de montagne. Un programme de limitation de la chèvre de montagne vise à enlever 180 chèvres et étendre la zone alpine dépourvue de chèvres établie le 15 avril 1981.

7. COMPARAISON AVEC D'AUTRES REGIONS

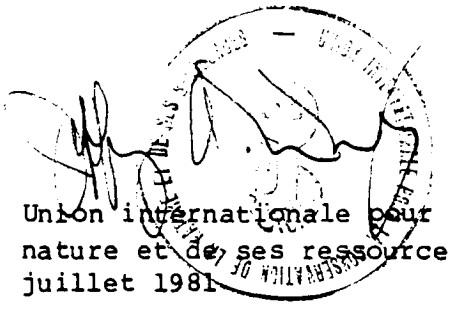
Nul autre site n'est comparable en Colombie britannique ou en Alaska. Le parc national du Bord du Pacifique, en Colombie britannique, ne couvre pas encore largement la forêt vierge. Des négociations sont en cours, mais même si elles aboutissaient, elles n'incluraient pas de régions alpines, ni de glaciers à ce parc national. D'autres parcs nationaux comme celui de Garibaldi (Colombie britannique) ne comportent pas de zones côtières. A partir de l'extrémité septentrionale de l'île de Vancouver, la composition de la forêt change. A mi-chemin de la côte de la Colombie britannique, le magnifique sapin de Douglas disparait, les sites de l'Alaska deviennent tous très différents. Le parc national de Redwood n'a pas de montagnes, et sa diversité en plantes et en traits géologiques est bien moindre.

8. EVALUATION

Il ressort du formulaire de candidature et d'autres documents que le parc national Olympic est la meilleure région naturelle de tout de nord-ouest du Pacifique, avec son rivage spectaculaire, le panarama qu'offrent ses lacs, ses glaciers et ses montagnes majestueuses, et sa magnifique forêt humide. Ce sont là des exemples remarquables de phénomènes naturels et de l'évolution. Ce parc n'a pas son pareil au monde.

9. RECOMMANDATION

Le parc national Olympic répond aux critères (ii) et (iii) et devrait être ajouté à la liste du patrimoine mondial. Le comité pourrait se préoccuper des chèvres de montagne qui y ont été introduites, et demander un exemplaire du plan de gestion de la chèvre de montagne.



Union internationale pour la conservation de la nature et de ses ressources
juillet 1981