World Heritage Sites

Protected Areas and World Heritage

VOLCANOES OF KAMCHATKA
RUSSIAN FEDERATION

One of the last pristine wilderness areas and most active volcanic regions in the world, with a high density (34 volcanoes) and an unusual range of types of volcano and related features. The seven areas within the designation include most of the volcanic characteristics of the Pacific Ring of Fire. The contrast of high active volcanoes and glaciers creates a dynamic landscape of great beauty. The sites contain great diversity of species, including the world's greatest known variety of salmonid fish and notable concentrations of sea otter, brown bear and Steller's sea eagle.

COUNTRY
Russian Federation

NAME
Volcanoes of Kamchatka

NATURAL WORLD HERITAGE SERIAL SITE
1996: Inscribed on the World Heritage List under Natural Criteria vii, viii, and ix.
2001: Extended to include Klyuchevskoy Zakaznik under Natural Criterion x.

STATEMENT OF OUTSTANDING UNIVERSAL VALUE
The UNESCO World Heritage Committee issued the following statement at the time of inscription:

Justification for Inscription
The Committee inscribed the Volcanoes of Kamchatka as one of the most outstanding examples of the volcanic regions in the world on the basis of natural criteria (vii), (viii) and (ix). The site contains a high density of active volcanoes, a variety of different types and a wide range of volcanic features. The Peninsula location between a large continental landmass and the Pacific Ocean also exhibits unique characteristics with major concentrations of wildlife.

Criterion (viii): The addition of Kluchevskoy Nature Park as the sixth component of the site further adds to the overall coverage of the range of Kamchatka's natural features. The addition to the site clearly meets criterion (viii) in its own right as an outstanding example of geological processes and landforms and therefore contributes in a very significant way to the expanded site as a whole meeting criterion (viii).

Criterion (ix) : The expanded site is also biologically analogous to six islands and its geographic location between a large continental landmass and the Pacific Ocean has given it unique characteristics. Natural processes continue with on-going volcanic activity and colonisation. Kluchevskoy Nature Park contributes significantly to the expanded site as a whole meeting criterion (ix).

Criterion (vii): The Kamchatka Volcanoes is a landscape of exceptional natural beauty with its large symmetrical volcanoes, lakes, wild rivers and spectacular coastline. It also contains superlative natural phenomena in the form of salmon spawning areas and major concentrations of wildlife (e.g. seabird colonies) along the coastal zone of the Bering Sea. Kluchevskoy Nature Park contributes very significantly to the site as a whole meeting criterion (vii).
Criterion (x): The Kamchatka Volcanoes contain an especially diverse range of palearctic flora (including a number of nationally threatened species and at least 16 endemics), and bird species such as the Stellar's Sea Eagle (50% of world population), white tailed eagle, gyr falcon and peregrine falcon, which are attracted to the availability of spawning salmon. The rivers inside and adjacent to the site contain the world's greatest known diversity of salmonid fish. All 11 species coexist in several of Kamchatka's rivers.

INTERNATIONAL DESIGNATIONS
1984: Kronotskiy Strict Nature Reserve designated a Biosphere Reserve under the UNESCO Man and Biosphere Programme (1,142,134ha).

IUCN MANAGEMENT CATEGORY

Kronotskiy Zapovednik:	Ia Strict Nature Reserve / Biosphere Reserve
Klyuchevskoy Prirodny Park:	V Strict Nature Reserve
Bystrinskiy Prirodny Park:	IV Habitat/Species Management Area
Nalychevo Prirodny Park:	IV Habitat/Species Management Area
Yuzhno Kamchatkiy Prirodny Park:	IV Habitat/Species Management Area
Yuzhno Kamchatkiy Federal Zakaznik:	IV Habitat/Species Management Area
Southwestern Tundra Zakaznik:	IV Habitat/Species Management Area

Zapovednik: State Biosphere Nature Reserve;
Prirodny Park & Zakaznik: Nature Park.

BIOGEOGRAPHICAL PROVINCE

Kamchatkan (2.7.5)

GEOGRAPHICAL LOCATION

The Kamchatka peninsula is in the far east of Russia between the Sea of Okhotsk and the north Pacific Ocean. The heritage complex comprises seven separate protected areas in the centre and south-east of the peninsula. Bystrinskiy Zakaznik is in the Sredinny Range west of the centre. Klyuchevskoy Zakaznik rises on an isolated massif above the central valley. The mountainous Vostochniy range on the Pacific coast has four sites which are, from north to south, Kronotskiy Zapovednik, Nalychevo Zakaznik, Southern Kamchatka Zakaznik and the neighbouring Southern Kamchatka State Zakaznik; the Southwestern Tundra Zakaznik is on a plain in the south-west.

DATES AND HISTORY OF ESTABLISHMENT

1880-2: Three reserves, for sable (Kronotskiy and Asachinsky) and sea-otter (Lopatkinsky), the latter two in the far south, established by imperial decree; twice reconfirmed but unfunded until 1936;

1934: Kronotskiy National Nature Reserve established by the Council of Ministers decree 1459 to protect sable and control hunting (964,000 ha). Designation removed 1951-59 and 1961-66;

1967: Kronotskiy Zapovednik re-established; 1982: 3-mile ocean buffer zone added (135,000 ha);

1975: Southern Kamchatka (Yuzhno-Kamchatskiy) State National Sanctuary/ Nature Reserve established as a Federal Reserve under a 1973 agreement between Russia and Japan to protect migratory birds;

1984: Kronotskiy designated a MAB Biosphere Reserve; 1985: Nalychevo conservation zone established;

1990: Southwestern Tundra Reserve established; 1994: Ichinsky Reserve set up (later in Bystrinskiy);

1995: The Southern Kamchatka (Yuzhno-Kamchatskiy), Bystrinskiy and Nalychevo (Nalychevskiy) Nature Parks established;

1999: Klyuchevskoy Zakaznik established as a Nature Park;

2001: Klyuchevskoy Zakaznik added to World Heritage site.

LAND TENURE

Federal, under the jurisdiction of the Ministry for the Protection of the Environment & of Natural Resources (MEPNR) since 2000, with some long-term lease concessions to tourist companies. Kluchevskoy Nature Park is under both regional and federal jurisdictions as the land belongs to the State Forest Fund (Menshikov *et al.*, 2000). Kronotskiy Zapovednik and South Kamchatka State Zakaznik are federally administered. The other Parks come under the Kamchatka Board of Nature Parks on behalf of the Kamchatka Oblast administration.

AREAS

Core area total: 3,830,208 ha (WHC List, 2010). The original nominated area was 3,911,134 ha.
The following areas were given in the State Party Nomination and UNESCO's 2001 Evaluation Mission:

	Area (ha)	Central Coordinates
Bystrinskiy Prirodny Park	1,500,000	55º50'N/158º30'E
Kronotskiy Zapovednik	1,007,134	54º38'N/160º52'E

Yuzhno Kamchatskiy Prirodny Park	800,000	51º55'N/157º35'E
Yuzhno Kamchatskiy Federal Zakaznik	225,000	
Klyuchevskoy Prirodny Park [extension]	375,981	55º50'N/160º35'E
Nalychevo Prirodny Park	265,000	53º28'N/159º00'E
Southwest Tundra Prirodny Park	23,000	52º05'N/156º50'E
Total	**3,796,115**	

ALTITUDE

From sea level to 4,688m (Klyuchevskoy), 3,607m (Ichinskiy) and 3,528m (Kronotskiy).

PHYSICAL FEATURES

The 1200km-long Kamchatka peninsula is almost an island running north-south between the north Pacific and the sea of Okhotsk. Its southern half is formed mainly by two parallel mountain ranges The western, Sredinniy range in the west centre of the island, is of dormant shield and strato-volcanoes of which Ichinskiy (still active) is by far the highest. This is the setting of Bystrinskiy Zakaznik. The eastern Vostochniy range which parallels the sea with nearly 30 young volcanoes, has the greatest concentration of active vulcanism in Eurasia. This is the setting of four of the other reserves. Between the ranges is the wide Kamchatka river valley out of which, to the north of the eastern range, rises the highest group, the Klyuchevskaya massif.

This 700km-long volcanic belt is the surface expression of the northwesterly subduction (by 8-10cm a year) of the Pacific Ocean plate under the Eurasian plate. The peninsula has over 300 volcanoes and shows a complete range of the vulcanism characteristic of the Pacific Ring of Fire. Since 1690 some 200 eruptions have been recorded. 29 mountains are currently active, most of explosive character and many of perfect pyramidal form. 34 volcanoes, including 19 active volcanoes, occur in the heritage areas. Most of them are basaltic composite stratocones and andesite stratovolcanoes; some are shield volcanoes. There are also calderas, scoriae cones, lava streams, cinder fields, over 160 thermal and mineral springs, geysers, solfataras, mud pots and many other constantly active volcanic features.

This volcanic country is one of the most pristine parts of the peninsula. The Klyuchevskaya group is beautiful as well as dangerous. Most of Bystrinskiy Zakaznik in the Sredinniy range is a mosaic of different mountain landscapes. Kronotskiy National Reserve, in the northern half of the coastal range, is famous for its mountainous scenery. Nalychevo Zakaznik in a valley just north of the capital city has vigorous glaciers with good hunting and fish spawning grounds. The Southern Kamchatka Zakaznik and, south of it, Southern Kamchatka State Zakaznik encompass active glaciation, wild unpolluted rivers, and a spectacular steep rocky coastline with several islands, deltas and wide swampy estuaries. Lake Kronotskiy and Lake Kurilskoe in the far south, surrounded by active volcanoes, are very scenic and important fish spawning habitats. The Southwest Tundra Zakaznik is a flat partly coastal wetland covered with pools.

The Klyuchevskaya range has three of the highest and most active volcanoes, and 12 volcanic peaks. Klyuchevskoy itself is Eurasia's highest and most active volcano after Etna, and is still growing: its 1986 height was 4,813m; in 2002 it was 4,835m. It is a strato-volcano which has erupted 25 times in the last 50 years and still erupts regularly, most recently in 2007, creating a wilderness of ash and lava. Its magma flow of about 60 million tonnes per year is half of all that produced by the intensely active Kuriliy-Kamchatka region. It has a wide variety of features: several lateral craters, shield volcanoes, scoriae and lava cones, extrusive domes and huge detached rocks, maars, calderas, explosion funnels and fractures. Despite this, the Klyuchevskaya group is also the largest centre of glaciation in Kamchatka, with 47 glaciers covering 269 square kilometres, the largest being the Erman glacier which continues to advance at 30-50m per year. Two glaciation periods during the Pleistocene influenced much of its landscape, creating cirques, hanging valleys, u-shaped valleys, moraines and glacial till and almost all the types of ice formation common in volcanic areas. The drainage network of the Reserve consists of many dry rivers, typical of volcanic regions, which are formed by the low water-holding capacity of the substrate. These only fully flow in the spring and after catastrophic snowmelt during eruptions. The soil profile is of layered ash falls affected by freezing but fertile where undisturbed.

Bystrinskiy Nature Park in the Sredinniy range has quaternary volcanic formations and the isolated high peak of Ichinskiy. It is divided by a wide valley and has many high wetlands amongst the forests. Kronotskiy National Reserve is a rugged landscape around the perfect cone of Kronotskiy Sopka. It has 12 volcanic peaks, 7 being active, some 800 lakes, is ±50% forest, ±40% open land and extends over 5

kilometers of coastal waters. The Uzon caldera within it is an enormous bowl ten by twelve kilometers across with sides rising to 900m and constant hydrothermal activity on its floor. The nearby spectacular Valley of the Geysers has 20 large geysers, over 100 hot springs, some with rare thermophilic algae, pulsating water funnels, mud cauldrons, poisonous miasmas, fumaroles, cascades, turquoise lakes and multicoloured algae fields (Ponomariva *et al.*). However, in June 2007 two mudslides instantly buried nearly two-thirds of the famous Valley, though geysers began to reappear after a few days. Nalychevo Zakaznik lies in a volcanic complex around the valley of the Nalychevo river. On its upper reaches is a 40 square kilometer depression with a great number and variety of hot and cold mineral springs.

The Southern Kamchatka Zakazniks include lava tableland formed during eruptions and volcanic cones, and ten of Kamchatka's most active volcanoes with a wide range of geothermal activity and coastal habitats. Volcanic rocks throughout the protected areas are formed of basalts, andesite-basalts, andesites and andesite-dacites. Other features are eroded accumulations of volcanic ash, foothills, piedmont plains and coastal lowlands. Below the ash-covered slopes, soils are tundra gley, forest-tundra and brown forest types, podzols and peat. River valleys are thickly covered with fertile volcanic alluvium. The uninhabited Southwest Tundra Zakaznik is a flat high-rainfall coastal wetland covered with past volcanic ash, peat, lakes and pools very attractive to migrant waterfowl.

CLIMATE

The peninsula being all but surrounded by sea has a moist cool maritime climate moderated by the ocean. Central Kamchatka, enclosed between the two mountain ranges, has a climate similar to the Siberia, and is snow-covered from October to May. On the west coast, temperatures are lowered by the cold Sea of Okhotsk. The climate is windy, often foggy and subject to very heavy snowstorms. At sea level, the mean temperature in July is 12°C but can reach 20°C; the mean temperature range in January is -6° to -10°C. The central valley becomes both warmer and colder than this, and drought there can give rise to very destructive forest fires. The rainfall is less than 400mm in the centre of the peninsula, nearly 1,000mm along the western coast and nearly 2,500mm in the southeast which is in the path of monsoonal rains and can be windy, stormy and snowy (Borodin, 1983).

VEGETATION

There are six vegetation zones; taiga, birch forest, riparian forest, wetland, sub-alpine and mountain tundra. The moist climate and rich volcanic soils have produced a thick vegetation, that is very lush in the lowlands. With little human exploitation, the vegetation in the Parks is in largely pristine condition. It extends from extensive coastal wetlands and meadows of tall grass, with alluvial riparian forests of Siberian and Komarov poplar *Populus suaveolens* and *P.komarov,* aspen *P. tremuloides*, alder *Alnus kamschatica* and willows *Salix sachalinense* and *Chosenia macrolepis*; through much logged maritime taiga of Kamchatcan and Cayander larch *Larix kamtschatica,* and *L. cayanderi*, ayan and yeddo spruce *Picea ajarensis*, *P. jezoensis* and white birch *Betula kamchatica*; peat wetlands covered with crowberry *Empertum nigrum*; very extensive higher-level forests of stone birch *Betula ermani*, which is the dominant tree of the peninsula, interspersed with meadows. Above these are a zone of elfin woodland of Korean pine *Pinus koraiensis* and 'cedar', dwarf mountain pine *Pinus pumila,* mountain ash *Sorbus scoparius*, Manchurian alder *Alnus hirsuta* and cedar scrub and sub-alpine meadows; and mountain tundra, the degree of the freeze-thaw cycle determining the zoning of higher vegetation belts.

The total number of plant species is 1,168, 10% being endemic to Kamchatka. Klyuchevskaya Nature Park has an especially diverse range of Palaearctic flora and, above the birch and larch forests, many species of montane tundra and sub-Alpine scrub, including the rare *Leontipodium kamtschaticum.* In Bystrinskiy Nature Park in the western range, coniferous forests grow along with 615 species with 16 endemic to Kamchatka. Kamchatkan larch and ayan spruce are dominant on the eastern slopes; stone birch dominates the west slopes. Kronotskiy National Reserve has 749 species, with 16 endemics. Over half is densely covered with boreal deciduous and mountain tundra forest with Arctic-alpine and Bering vegetation. There are isolated groves of the rare endemic Kamchatkan fir *Abies gracilis*, also Sakhalin fir *Abies sachalinensis*, unusual thermally influenced caldera communities and several nationally threatened plants such as *Cypripedium macranthon*, *Carex viridula*, *Fimbristylis ochotensis*, *Isoetes asiatica*, *Poa radula* and *Rhodiola rosea*. In Nalychevo Nature Park 549 species of vascular plants have been recorded, with many rare orchids (*Cypripedium macranthon*, *Epipactis papillosa, Neottia asiatica*) and forests of the rare Asian white birch *Betula platyphylla.* The South Kamchatka State Nature Park and South Kamchatka National Reserve on the southern tip are in mountainous forest where the Kurile larch *Larix gmelinii* var.*japonica* grows. Their flora is very rich, with 718 species (76% of Kamchatka's species), 85 species being considered rare, including *Epipogion aphyllum*,

Gymnadenia camtschatica, *Oreorchis patens*, *Nuphar pumila*, *Carex laxa*, and *Lilium dauricum* (MEPNR, 1995).

FAUNA

The terrestrial fauna like that of islands is low in diversity, but high in subspecific endemism. But some species are found in great abundance, including over 5,000 Kamchatcan brown bears *Ursus arctos piscator*, northern pika *Ochotona hyperborea,* sable *Martes zibellina*, Kamchatcan wolverine *Gulo gulo albus*, 1,500 Kamchatcan reindeer *Rangifer tarandus phylarchus* (known as northern deer) and over 10,000 Kamchatcan snow sheep *Ovis nivicola nivicola*. There are no reptiles and only one species of amphibian, Siberian salamander, *Salamandrella keyserlingii*. The marine fauna is very diverse with both arctic and southern species mixed, thousands of sea otters *Enhydra lutris lutris* (EN), and 11 salmonid species.

Mammals in Klyuchevskoy Nature Park include a herd of wild reindeer, the largest population of brown bears, east Siberian lynx *Lynx lynx wrangeli*, snow sheep, wolverine and ermine *Mustela erminea*. Bystrinskiy Nature Park encloses the Ichinskiy zoological zakaznik, and includes American beaver *Castor canadensis*, collared lemming *Dicrostonyx lorquatus*, black-capped marmot *Marmota camtschatica*, muskrat *Ondatra zibethicus*, American mink *Neovison vison*, Kolymskiy moose *Alces alces buterlini* and large numbers of domesticated reindeer. Nalychevo Nature Park, which encloses the Three Volcanoes zoological zakaznik, has 33 mammal species. The Kronotskiy National Reserve has 60 mammal species, 900 bears, 1,000 snow sheep and the largest population of wild reindeer in Kamchatka (1,500). It shares with the southern parks abundant marine life: Kamchatka crab *Paralithodes camtschatica*, sea otter (EN: 900 animals), Steller sea lion *Eumetopias jubatus* (EN: 800 breeding animals), Kuril seal *Phoca vitulina stejnegeri* (500), spotted *P.largha* and ringed seals *Pusa hispida ochotensis*, Risso's dolphin *Grampus griseus*, narwhal *Monodon monoceros* and Pacific walrus *Odobenus rosmarus divergens*. Another 1,800 male sea lions live on the southernmost point of the peninsula, Cape Lopatki, and during migration, 2,500-3,000 sea otters visit the South Kamchatka Nature Reserves where there are 57 other species of mammals. Offshore, at least ten species of whales occur: blue *Balaenoptera musculus* (EN), fin *B. physalis* (EN), sei *B. borealis* (EN), North Pacific right *Eubalaena japonica* (EN), humpback *Megaptera novaeangliae*, bowhead *Balaena mysticetus*, minke *Balaenoptera acutorostrata*, gray *Eschrichtius robustus*, Stejneger's beaked whale *Mesoplodon stejnegeri* and Cuvier's beaked whale *Ziphius cavirostris* (MEPNR, 1995).

Tundra birds and seabirds are very numerous. Some 179 bird species have been recorded. Nine species noted in Nalychevo Nature Park are considered nationally threatened: emperor goose *Chen canagica*, brent goose *Branta bernicla*, osprey *Pandion haliaetus*, Steller's sea eagle *Haliaeetus pelagicus* (VU), white-tailed eagle *H. albicilla*, gyrfalcon *Falco rusticolis*, peregrine *F. peregrinus*, and solitary snipe *Gallinago solitaria.* Other uncommon species are golden eagle *Aquila chrysaetos,* redlegged kittiwake *Rissa brevirostris* (VU), and spotted greenshank *Tringa guttifer* (EN). Kamchatka, especially Cape Lopatka on its southern tip, is a major staging point on migration routes and a wintering ground for a great number of eastern bird species. Southern Kamchatska State Reserve has the world's largest winter concentrations of raptors, attracted by the huge populations of sockeye *anerka,* at Lake Kurilskoye Lake which is the largest spawning ground in the world for this species of salmon.

There are numerous seabird colonies along the coasts of the reserves, several of which contain a notable portion of the world population of certain species. More than half the world populations of Steller's sea eagle and of Aleutian tern *Sterna aleutica* nest on the peninsula. In the past 20 years spotted and spoon-billed sandpipers *Actitis macularius* and *Eurynorhyncus pygmeus* (CR) have been seen on the southeast coast. Other numerous species include the yellow-billed diver *Gavia adamsii,* whooper swan *Cygnus cygnus*, lesser whitefronted goose *Anser erythropus* (VU), slatybacked gull *Larus schistisagus*, Kamchatka tern *Sterna camtschatica,* guillemot *Uria aalge*, thickbilled guillemot *Uria lomvia,* pigeon guillemot *Cepphus columba,* ancient murrelet *Synthliboramphus antiquus*, horned puffin *Fratercula corniculata* and tufted puffin *F. cirrhata*.

The rivers of western Kamchatka contain the greatest concentration and diversity of salmonid fish species on earth and are the only place on the Pacific rim where all the species of Pacific salmon coexist. Nearly all the rivers are exceptionally unpolluted spawning grounds for this key food source which sustains the very large populations of brown bears, sea otters, Steller's sea-eagles and dozens of other marine and terrestrial animals. One watershed adjacent to the Bystrinsky Nature Park contains eleven species of salmonid fish, several being considered nationally threatened: king *Oncorhynchus tschawytscha*, silver or coho *O. kisutch*, chum *O. keta*, pink *O. gorbuscha,* cherry *O. masu*, both

resident and anadromous forms of sockeye salmon *O. nerka* and steelhead and rainbow trout *Salmo mykiss*. Dolly Varden char *Salvelinus malma,* white-spotted char *S. leucomaenis*, and whitefish *Coregonis* ssp. The Nalychevo River and its tributaries also support great numbers of five of the above species plus Arctic char *Salvelinus alpinus*. Wild salmon are declining rapidly throughout their range along both the Atlantic and Pacific rims. Outside western Alaska, there are very few if any large areas left along the Pacific rim to preserve not only native runs of salmon and steelhead, but also the intact ecosystems they support and that support them (MEPNR, 1995).

CONSERVATION VALUE

The heritage areas cover one of the last largely unexploited and relatively pristine wildernesses in the world, and also one of its most active volcanic zones. They include a great number of unpolluted river systems with a large number of endemic species and subspecies of both plants and animals, including globally important spawning grounds for the world's greatest diversity of salmonid fish and a variety of wetlands exceptionally attractive to migratory birds. The continuing tectonic and volcanic activity constantly creates new areas for pioneer settlement by plants and animals. As a result, a range of different successional biological communities co-exist, developing in relative isolation.The only freshwater salmon species in Asia, living in Kronotskiye Lake, may be the result of these processes and the wide variety of organisms living in the hot springs are another unusual feature. The sites lie within WWF Global 200 Marine and Freshwater Eco-regions and contain a UNESCO Biosphere Reserve.

CULTURAL HERITAGE

The oldest Paleolithic settlement in the region is 21,000 years old. The Kamchatka Peninsula became part of Russia in 1699 and the first description of Kamchatka was given in 1742 by the explorer S.P. Krashenninnikov. At the beginning of the 18th century, the Itel'meni people settled in the central and southern parts of Kamchatka Peninsula, depending on fishing. Western Kamchatka and the Bystrinsky region were settled by the Eveni people, dependent on reindeer herding. There are also some Koryak people from the north, also reindeer herders.

LOCAL HUMAN POPULATION

Until 1992 the peninsula was a closed military zone around the home base of the Russian Pacific submarine and main fishing fleets near the capital Petropavlovsk-Kamchatskiy. This is the major city on the peninsula, with, including nearby Elisovo, most of the region's population. Almost the entire heritage area was then uninhabited, except for protected area staff and in some parts of the South Kamchatka and Bystrinskiy Nature Parks, used by small numbers (about 1,030) of Itel'meni and Eveni. This isolation, combined with few roads and settlements, has preserved much of the wilderness. The indigenous populations who were forced to abandon their villages and were resettled in the 1920s have declined greatly. Their traditional economic activity is prohibited or limited to a few non-intensive forms such as the two reindeer raising farms in Bystrinsky Natural Park and extremely limited winter hunting of fur animals in three Parks. Bystrinsky has some 1,800 other inhabitants in Esso and Anavgen villages. There are abandoned subsidised fishing settlements in the south. Recently, traditional land use areas have been zoned for permanent settlements in the northern part of the South Kamchatka Park and in Bystrinsky Park, but there is strong outside pressure to make greater economic use of these lands.

VISITORS AND VISITOR FACILITIES

Approximately 15,000 tourists visited Kamchatka in 1995, 4,000 of them foreign. Kronotskiy Nature Park is the only site in Russia with large geysers, which enhances its attraction for tourists (though their partial burial in 2007 may affect this). Approximately 2,500 tourists visit the Valley of the Geysers each year where a helipad and board-walk have been built and some measures have been taken to protect it from overuse by tourism (Krever, 1994; UNDP, 2001). There are Ecological Education Centres in both Kronotskiy Reserve and Nalychevo Park. Almost 1,200 visit the latter, but some 15,000 use its peripheral areas since it is very near Petropavlovsk. About 6,000 visit Bystrinsky each year, 100-150 being foreigners (UNDP, 2001). Helicopter access to tourist cabins within Nalychevo and Southern Kamchatka Nature Reserves is available. Between 1993 and 1999 the Klyuchevskaya group averaged about 250-300 visitors a summer, 100 being foreigners, but it does not yet cater for many tourists. Projects to promote eco-tourism are now underway, partly to supplement reduced government funding. No visitors are allowed to the reserves for a month in April to May while animals are breeding. The reserves are normally reached by helicopter along approved routes. The area's international airport is at Elisovo.

SCIENTIFIC RESEARCH AND FACILITIES

The Kamchatka Institute of Ecology and Nature Use and the Institute, established since 1935, of Volcanic Geology and Geochemistry of the Far Eastern Branch of the Russian Academy of Sciences are the main bodies conducting research in the territory. The latter has a large staff, employs 64 scientists and has a field station in Kronotskiy. Kronotskiy Zapovednik has academic staff who pursue research with these two institutions (MEPNR, 1995). The Klyuchevskaya range has been monitored for 68 years and been the subject of much research: 16 previously unknown minerals have been discovered there. A network of seismic stations and geological monitoring sites is located within the boundaries of several protected areas, including the Kluchevskoy volcanology station. The Kamchatkan Volcanic Eruption Response Team in Petropavlovsk has since 1972 constantly monitored the condition of volcanoes in cooperation with the Alaska Volcano Observatory. Many hydrogeological and vulcanological studies have been made in the territory and in 2001 a large field symposium was held on plants and vulcanism.

MANAGEMENT

The federal State Reserves of Kronotskiy and Southern Kamchatka are managed by the Kronotskiy Zapovednik Administration. Klyuchevskoy, Bystrinskiy, Nalychevo and Southern Kamchatka Nature Reserves, previously separately administered, are now managed by the Kamchatka Regional Board of Nature Parks, a non-profit institution, for the Kamchatka regional administration. Each park is reported to have an updated management plan, and a badly needed integrated Management Plan for the whole property is being developed with GEF assistance. A new set of *Volcanoes of Kamchatka Regulations* has been issued to protect and regulate resource use within Nature Parks, but they also permit geological prospecting and mining which were previously banned (UNESCO, 2010). The Federal Forest Administration manages the Southwest Tundra Park. The present light use of the Parks has not yet necessitated a formal link between the State and Regional administrations. 16 smaller protected areas, several now absorbed within the larger parks, were initially established in many places to protect dwindling numbers of animals; later to preserve a range of the Peninsula's most important natural areas. The Kronotskiy National Reserve was originally founded for the strict protection of its resources. The Southern Kamchatka State Nature Reserve was founded to preserve beaver and otter and breed species for hunting. Nalychevo Nature Park combines the conservation of freshwater wetlands, recreation and education. Bystrinskiy Nature Park was founded to combine conservation of snow rams, black-capped marmots and salmon spawning grounds with traditional sustainable uses. Management is based on the Russian Federation Law 'On Strict Nature Reserves' of 1995, Kamchatka Oblast Law 'On Strict Nature Reserves' of 1997, revised 1999, and the Klyuchevskoy Nature Park statute of 1999.

Each of the three Nature Parks, Bystrinsky, Nalychevo, and South Kamchatka is zoned into conservation, tourist, recreation and service zones and allows limited hunting of brown bear and sheep and limited winter trapping of fur animals. Licensed fishing and the gathering of mushrooms, berries and fuel wood also occurs in the three Parks in limited areas. Management plans are being developed to regulate these activities. Bystrinskiy Park is important in stabilising the diverse ecosystems of its many headwaters. It also has reindeer farms. Mining, logging, military use and tourism all impacted the Kronotskiy Reserve in the past. A long-term scientific monitoring program is underway for both it and the Southern Kamchatka Nature Sanctuary. There are also programs for species protection, the renewal of the indigenous peoples' traditional use of nature, and to develop tourism in all the territories within the nominated area, to make up for insufficient government funding, partly in cooperation with international organizations.

MANAGEMENT CONSTRAINTS

Since 1989, federal funding has decreased by 90% with drastic consequences for the parks. When the National Committee for Environmental Protection was abolished in 2000, environmental issues became the responsibility of the Regional Committees on Natural Resources, and mining interests hostile to conservation in Kamchatka gained strength (Murashko, 2001). There are as a result two opposing concepts for the future development of Kamchatka and the Parks: a) expansion of mineral extraction (largely on land traditionally occupied by the native people) to help finance the regional administration, and b) activities based on protecting the environment which will sustain native populations and create sustainable tourism. The southern boundary of the Bystrinskiy Nature Park was revised 50km inwards to permit gold mining on its edge at Aginskoe, and there was pressure for nickel mining within the Park itself, which the State has prohibited (UNESCO, 2005). This mining venture is partly driven by North American and Australian interests. In 2004 the operators appeared unwilling to comply with regional environmental standards and international standards of tailings facility design, or to provide plans or financial guarantees for closure and reclamation. Their new 'forest' access road through a proposed

salmon reserve would open the area to poaching and is gated near the site which the operators were unwilling to open to observers (SRIC, 2004). Gold mining was also been proposed in the valley between the two Southern Kamchatka Parks which was therefore omitted from the nomination. Further mining and geothermal projects or geological prospecting are not taking place in Bystrinskiy but the new *Volcanoes of Kamchatka Regulations* permit geological prospecting within Nature Parks (UNESCO, 2010).

Salmon fishing is prohibited in the two federally protected areas but in Nature Parks, commercial, sport and indigenous fishing are permitted within quotas set by the Federal Fishing Agency. Poaching pressure is high in the South Kamchatka Sanctuary and in Nalychevo data from Kamchatka Fisheries show that 77-93% of the spawning run is taken, and 93% of the red salmon. Very high driftnet fishing quotas for the surrounding seas may also affect the returning salmon runs. Poaching of other wildlife might account for the marked recent declines in reindeer and bighorn sheep populations (UNESCO, 2010). Logging, oil and gas extraction in the Sea of Okhotsk near the coast and a nearby gas pipeline with a road to Petropavlovsk crossing 20 salmon rivers have all been projected with little consideration of their impacts on the Park where the present poaching of salmon is just under control. Construction of the road through previously inaccessible portions of the Park - a region proposed as a wild salmon reserve by the Kamchatka Geographic Institute, local government partners, KLIE and Wild Salmon Center – will open the region to increased timber, hunting and fishing. Well organised logging campaigns have already stripped the central Kamchatka river valley of half of its commercially viable timber, polluting the river in the course of extraction. A geothermal power station is also developing at Nizhnekoshelevsky in the Southern Kamchatka State Nature Park, an area earmarked for scientific work and regional monitoring. Any of these industrial activities might pollute salmon spawning grounds and degrade the pristine wilderness.

The frequent fires in the Park, and the granting by local authorities of 12 out of 24 hunting leases to business interests from outside the region cannot be monitored since the Park has no staff (IUCN, 2001). The man-set forest fires are a constant hazard since there are no effective fire management, response system or teams (UNESCO, 2002). Unsustainable levels of poaching are also a constant threat. There are highly organised campaigns of helicopter-hunting in the Geyser Valley, poaching of bears for gall-bladders, of salmon for caviar and illegal fishing at sea, but there are no systems to manage or monitor these activities (UNESCO, 2002). There is also considerable uncontrolled commercial tourism with consequent disturbance to wildlife, degradation and littering by tourists. Petrochemical and sewage pollution and general degradation have all increased in recent years (Newell, 1996). Geothermal and other rare flora are also disappearing.

Management is drastically underfunded with too few personnel at every level and too little infrastructure, training or equipment. Staffing levels remain inadequate to combat poaching (UNESCO, 2005). The local people are poor and lack environmental awareness. There is no community involvement in management, and an inadequate legal and policy framework. Management plans are lacking for Kluchevskoy Nature Park, and are still only in development for Bystrinsky, Nalychevo, and South Kamchatka Nature Reserves. Bystrinsky, where the boundaries are unmarked, zoning is unresolved and ecologically valuable areas are excluded, is described to exist “only on paper” (Newell *et al.*, 2001), but further changes in the boundary were said to have ended. Park staffing and finances for all the reserves are under pressure. An IUCN-UNESCO expert mission reported on these in 2004, examining the unmonitored adjacent mining development, unmonitored poaching of Pacific salmon caviar and of brown bear, fire management; the development of tourism, gas pipelines, roads and management effectiveness of the site (UNESCO, 2005).

STAFF

The Kamchatka Regional Nature Parks Board has a staff of 11 with a Director based in Petropavlovsk; each Park has an allocation of 5 field staff, but for Bystrinskiy for example the Director has only two staff for an area of 13,300 square kilometers. Federal areas have a Director and about 40 office and field staff (Newell *et al.*, 2001). The inadequacy is greatest for the Nature Parks.

BUDGET

The Kamchatka Regional administration finances the Board of Nature Parks. In 2000 this totalled Rub.1.5 million (US$53,960), but there were no funds for the maintenance and development of the Klyuchevskoy extension. In 2000, 20% of the revenue for Kronotskiy and Southern Kamchatka Reserves came from helicopter tourism. In 2001 WWF Germany granted US$40,000, the Ecological Fund of Kamchatka, Rub.360,000 (US$12,950) and the GEF proposed funding for the first stage of two

projects. These were to promote sustainable conservation of biodiversity in four protected areas (in 2 phases) and to improve the development and management of salmonid fish in four western watersheds. The cost to GEF over 7 years was US$1,117,000, and,LOCAL ADDRESSES
The Director, Kamchatka Board of Nature Parks, 29/1, Karl Marx Avenue, Petropavlovsk-Kamchatskiy 693006, Russian Federation.

The Director, Kronotskiy Zapovednik Administration, Ul.Ryabikova 48, Elizovo 684010, Kamchatka, Russian Federation.

The Director, Pacific Institute of Geography, Kamchatka Branch, Partizanskaya St. 6, Petropavlovsk-Kamchatskiy 693000, Russian Federation.

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