

## Achievements in Marine Conservation, I. Marine Parks

by

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### INTRODUCTION

The economic activities of Man at sea, in particular the exploitation of the sea-bed and coastal zones, have increased in recent years to such an extent that the detrimental effects on the ecological balance in some habitats are no longer minor and incidental. The most serious of these effects are those caused by pollution, dumping, and dredging. The advancement of technology will inevitably bring about even more intensive and diversified uses of the sea and sea-bed in future. Oil and gas exploitation is now being followed by large-scale extraction of minerals. Off-shore dredging for sand and gravel is also increasing, as are many other activities. However, the *laissez faire* attitude of many countries exploiting the sea will, hopefully, come to an end if only the current Law of the Sea Conference can succeed in establishing an international programme for the allocation and conservation (including rational utilization) of marine resources.\*

Hitherto, the open seas were considered as belonging, in principle, to no individual nation, but to all nations. However, all nations do not have equal possibilities to exploit ocean resources, as they are at different stages of development and many are hampered technologically and/or geographically. As far as national jurisdiction is concerned, many nations have no access to the sea. A solution to these problems may be found when the Law of the Sea Conference discusses areas of territorial waters, marine areas of limited national jurisdiction, and deep ocean areas. Already, many international, national, and regional, organizations have set up baseline programmes for monitoring the sea (e. g. making systematic measurements of the chemical composition of the sea as well as recording the movements of plankton and other marine biota such as particular marine mammals, fishes, or birds).

\* See also the communication of Professor Sidney J. Holt, Director of the International Ocean Institute, published in our last issue, page 138.—Ed.

Many of these monitoring programmes are being carried out by a Joint Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP), which is an advisory body of experts nominated by the Intergovernmental Maritime Consultative Organization of the United Nations (IMCO), the Food and Agriculture Organization of the United Nations (FAO), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the World Meteorological Organization (WMO), the International Atomic Energy Agency (IAEA), and the United Nations *per se* (UN). GESAMP was established for the purpose of facilitating interdisciplinary work in the field of marine pollution for the above-mentioned sponsoring agencies and for the Intergovernmental Oceanographic Commission (IOC) of UNESCO, and to provide them with scientific advice on marine pollution problems. The IOC endorsed, in 1969, the idea of forming the International Decade of Ocean Exploration (IDOE) to gather information about the oceans for the purpose of increasing the utilization of their resources for the benefit of mankind. At the same time, IOC took steps to establish the Long-term and Expanded Programme of Oceanic Exploration and Research (LEPOR), of which IDOE is an important element. The Global Investigation of Pollution in the Marine Environment (GIPME), established by IOC in 1971, is one of the more important elements of LEPOR, and is expected to concern itself with long-term international cooperation in the scientific investigation of marine pollution. In addition, there are many institutions and marine scientists in various countries who are concerned with these matters. Recently, for example, a U.S.—U.S.S.R. Joint Working Group on the Effects of Pollutants on Marine Organisms has agreed to set up a joint marine environmental monitoring network.

The data generated by these monitoring programmes will provide invaluable background information for marine conservation projects, and two leading organizations concerned with conservation of wildlife

and their habitats, the International Union for Conservation of Nature and Natural Resources (IUCN) and the World Wildlife Fund (WWF), have understandably followed these particular programmes with great interest. IUCN/WWF are now actively launching a world conservation programme of the oceans. In this programme, particular prominence is being given to coastal and estuarine areas, and there is special emphasis on monitoring the conservation status of critical marine habitats throughout the world and on the requirements for their conservation through the promotion of marine parks and equivalent reserves. The objective of the programme is to ensure that representative areas of marine ecosystems are protected, and, concomitantly, that the existence of all important marine forms of life is safeguarded. IUCN/WWF will be working in close collaboration with the United States International Biological Programme Conservation of Ecosystems Group (US/IBP/CE), which already has taken action to bring pertinent information together. In addition, organizations such as the FAO Advisory Committee on Marine Resources Research (FAO/ACMRR), the scientific committee of the International Whaling Commission (IWC), the U.S. Department of the Interior, and the National Oceanic and Atmospheric Administration (NOAA), as well as various specialist groups in IUCN, have already accumulated data relative to critical marine habitats for certain species or groups.

#### TOWARDS HABITAT CONSERVATION

In too many cases in the past, marine parks and equivalent reserves have been established merely because of an emergency—for example, to preserve a last important marine area from degradation due to development activities on land—or following the establishment of a terrestrial park on shore. The shortcomings of such an approach are being increasingly recognized, and the concept of having the results of an ecological survey as a basis for a comprehensive marine conservation programme is at last gaining acceptance.

A number of other organizations, both international and national, have also undertaken many specific activities in relation to marine conservation. The marine parks concept, for example, has been stressed in a number of international conferences. Thus, the First World Conference on National Parks (held in Seattle in 1962) recommended that the governments concerned, and other appropriate agencies, examine the possibility of creating marine parks and reserves (U.S. National Park Service, 1964). The Eleventh Pacific Science Congress (held in Japan in 1966) brought together international authorities to discuss

marine parks (Japan Nature Conservation Society, 1966). The Regional Symposium on Conservation of Nature—Reefs and Lagoons (held at Nouméa, New Caledonia, in 1971) recommended that all the governments concerned take action to create a range of underwater reserves and marine parks that would be suitably and effectively protected under appropriate legislation (South Pacific Commission, 1973). The Second World Conference on National Parks (held in Yellowstone and Grand Teton National Parks in 1972) urged that action be taken to conserve representative parts (habitats) of marine ecosystems (IUCN, 1974). The promotion of marine parks was also stressed by the U.N. Conference on the Human Environment, held in Stockholm in 1972 (U.N., 1973).

Preparation is now in hand for further detailed discussion of a wide-ranging conservation programme at a planned International Conference on Marine Parks and Reserves to be held on 12–14 May 1975 in Tokyo, Japan.

As mentioned above, the overall objective of IUCN/WWF involvement in the field of marine conservation is to examine priorities and coordinate international and national conservation of marine environments—with special emphasis on the description, classification, and conservation, of marine habitats, and particularly on those that are of critical importance for the survival of marine mammals, marine turtles, and species of other groups inhabiting these areas and which are in need of immediate protection. High priority is also being given to the coastal zone—including, in particular, estuarine areas, which are characterized by a high concentration of marine species and biotic communities, and which may also be important feeding and breeding grounds for other species. In addition, the IUCN/WWF project will be directed towards areas having special aesthetic values, e.g. coral reefs. Also, emphasis is given to promoting the establishment of a world system of marine parks and equivalent reserves for scientific, educational, recreational, and economic purposes, and to developing guidelines for their establishment, protection, and management—including rules of conduct to cover touristic and other recreational uses of marine areas.

As part of this programme, the IUCN Secretariat is collecting, processing, and analyzing, information on existing and projected marine parks and reserves, including islands and coastal areas as well as terrestrial parks, for the preparation of a world list of established protected areas.

Important aspects of marine habitat conservation are the implications of size of protected areas *versus* species numbers and population genetics, and the nature of boundaries of the protected areas and particularly whether fluctuating boundaries may be necessary in the dynamic equilibrium of the sea. As a

part of the project, information is also being gathered on the range, distribution, movements, and behaviour, of aquatic vertebrates, in addition to gathering data on their habitats and niches.

International organizations concerned with conservation have an important catalytic role to play in ensuring international cooperation for effective conservation of marine resources throughout the world, and by providing an international framework for action. They carry out this role by formulating

is given in the Appendix to this paper, while Fig. 1 indicates the location of these areas.

#### MARINE PARKS AND EQUIVALENT RESERVES

##### *North America*

*Canada:*—With its extensive ocean boundaries, Canada has established a number of marine parks, most of which are islands or sea-shores with a marine component. Montague Harbour Marine Park was the first

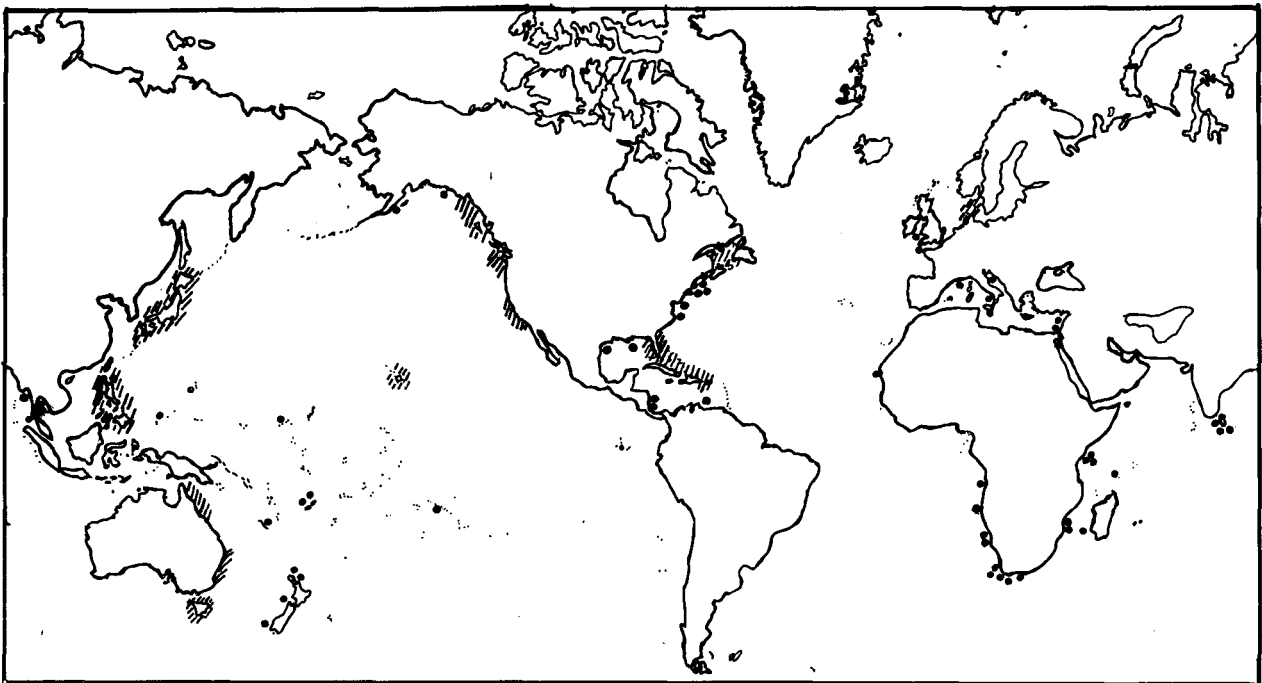


FIG. 1. World map indicating areas (hatched) that are served by a number of established marine parks. Individual marine parks outside such areas are indicated by spots. For details, see Appendix.

essential projects in relation to priorities for conservation of marine habitats and the establishment and management of marine parks and reserves—particularly by advising governments concerned about conservation problems in this field.

Although there is a great economic incentive to exploit marine resources, a number of governments are already aware of the necessity to save representative parts of marine ecosystems for future enjoyment by Man, and have already taken steps to establish a considerable number of marine parks and equivalent reserves within their jurisdiction.

There follows a general review of the status of marine conservation in a number of countries with marine resources. A detailed list of the world's established and proposed marine parks and reserves

marine protected area to be established in British Columbia (in 1957). Since then, more than a dozen other marine parks have been created in this most westerly Province, where a number of additional sites have been proposed, e.g. to establish a part of the Strait of Georgia, between Vancouver Island and British Columbia, as a marine park. However, as this Strait is in very heavy multiple-use already, it is proposed that, as a first step in the establishment of a marine park, a water purity standard should be set under a new Canada Waters Act. Other marine parks in British Columbia include Cape Scott, Naikoon, Atlin, and Desolation Sound, Provincial Parks. On the Atlantic side, Canada has established several other coastal protected areas such as those of Fundy Island (New Brunswick) and Prince Edward Island.

*U.S.A.*:—The United States of America has a number of national parks and equivalent reserves which have important marine components as parts of their protected areas. These marine protected areas cover hundreds of thousands of hectares. Furthermore, there are eight national sea-shores adjoining the sea.

Fort Jefferson National Monument, Florida, created in 1935, was the first marine protected area on the North American continent, covering 18,850 ha of sea and 35 ha of land. Full protection is given to all underwater areas within the legal boundaries of the Monument, which consists of the seven Dry Tortugas Islands and the surrounding shoals and waters of the Gulf of Mexico. Again in Florida the Biscayne National Monument, and the John Pennecamp Coral Reef State Park (adjoining Key Largo Coral Reef Preserve) with its 2,500 ha of water and 85 ha of land, are examples of other marine parks in the U.S.A.

In California, a number of marine-life refuges have been created to protect the marine resources. The Redwood National Park includes about 50 kilometres of Pacific Ocean coastline, and extends 400 m off-shore from mean high-tide. The marine protected area covers 1,538 ha.

Many of the states of the U.S.A. are in the process of further developing conservation programmes for their marine resources—particularly Florida with its Keys, California with its outstanding coast, and the Hawaiian Islands with their unique marine resources including coral reefs (*see* Indo-Pacific part of Appendix). In Florida, a System of Aquatic Preserves has been proposed between the high-water line and the outer territorial limits, to give protection to coastal waters (including marshes, mangrove areas, coral reefs, and open waters, to mention only a few) in their present state by regulating human activities in these areas. It has been proposed that the Channel Islands National Monument in California should become a national park, with the inclusion of some additional islands and surrounding waters. Many other marine reserves in the United States, including those in the colder regions, are listed in the Appendix.

### Caribbean

*Bahamas*:—Under the provision of the Bahamas National Trust Act, the Exumas Cays Land-and-Sea Park was established in 1958 to protect numerous fishes and coelenterates as well as unique coral reefs with their adjacent terrestrial land. Two other marine protected areas are under the Trust—one at Inagua and the other, called Pelican Cays, situated off Abaco.

*Turks and Caicos Islands (U.K.)*:—After a preliminary survey in 1971, Dr G. Carleton Ray and Dr Alexander Sprunt IV proposed that a number of islands etc. be set aside as marine parks to conserve the marine as

well as land resources of these Islands (Ray & Sprunt, 1971).

*Puerto Rico*:—A proposal has been made for establishing Phosphorescent Bay and Puerto Mosquito as marine parks.

*Virgin Islands, etc.*:—Other marine parks in United States territories are the Buck Island Reef National Monument in the U.S. Virgin Islands, offering self-guiding underwater trails along the barrier reef (Greenberg & Greenberg, 1971; Robinson, 1971*b*), and the Virgin Islands National Park, with its protected coastal waters and underwater trail in Trunk Bay (Robinson, 1971*a*, 1973). A proposal has been made to add 46.5 ha of the sea and 2.8 ha of the adjacent coastline and swamp area to the terrestrial park system of the U.S. Virgin Islands by establishing Lagoon Point Coral Reef Reserve on the Island of St John (Robinson, no date.)

The British Virgin Islands are now looking into the possibility of establishing marine parks and reserves, and have appointed a Marine Conservation Committee for this purpose.

Antigua, Barbados, Barbuda (Leeward Islands), and Guadeloupe, are also considering the possibility of establishing marine conservation programmes.

*Dominican Republic*:—Following a survey of marine and terrestrial resources, establishment was proposed of a marine park in the south-east to include the semi-arid Isla Saona, Bahia Catalinita, and the entire Bayahive–Boca de Yuma Peninsula, with their surrounding marine areas. The Green Turtle (*Chelonia mydas*) and the Hawksbill Turtle (*Eretmochelys imbricata*), as well as the North American Manatee (*Trichechus manatus*), are found here.

*Tobago*:—Bucco Reef and Bon Accord were proclaimed as a restricted area under the Marine Areas Act of 1970, in order to protect undisturbed biotic communities for scientific studies and for the benefit of tourism. Noteworthy marine habitats include those of fishes that are typical of West Indian coral reefs, of the West Indian Spiny Lobster (*Panulirus argus*), and of the Queen Conch (*Strombus gigas*).

*Costa Rica*:—Established in 1970, Cahuita National Monument is for the protection of some of the coral reefs and their rich marine life off the coast of Costa Rica. Tortuguero National Park on the Caribbean coast is totally protected, and the fauna includes such marine turtles as the Green Turtle, the Hawksbill Turtle, and the Leatherback Turtle (*Dermochelys coriacea*).

It should be added that marine turtle sanctuaries have been established by a number of countries, including Surinam, Costa Rica, and Mexico.



### South America

*Venezuela*:—Archipelago Los Roques Marine National Park was established in 1972. It is situated 120 km from the coast and covers an area of 225,153 ha.

*Colombia*:—The Archipelago of San Andres, near the Nicaraguan border, has been proposed as a marine national park.

*Ecuador*:—Parts of the land area of the Galápagos Islands were established as a national park in 1971. It has been suggested that marine areas should also be included in the park, to protect marine resources of turtles, corals, lobsters, etc., from being exploited.

### Antarctica

*Antarctica*:—One of the Recommendations (No. 5) of the Second World Conference on National Parks held in the U.S.A. in 1972, covered the proposal that the Antarctic Continent and the surrounding seas be established as the first World Park, under the auspices of the United Nations. Subsequently, IUCN sent a note to the various states adhering to the Antarctic Treaty, calling their attention to this Recommendation. New Zealand, a party to the Antarctic Treaty, has also taken action to bring this matter to the attention of the Treaty nations, and formal replies are awaited.

The present protection measures of Antarctica are covered by the Antarctic Treaty, which includes protection above (i.e. south of) latitude 60 degrees south but does not apply to the high seas. The Treaty includes conservation measures, termed Agreed Measures, for the conservation of Antarctic fauna and flora. These Agreed Measures are based on scientific advice from the Scientific Committee on Antarctic Research (SCAR). The Treaty covers protection of all the land belonging to Antarctica but does not include protection of seas except the shore ice or ice-shelves, nor does it include protection of marine animals, which have to be protected by special treaties. All seals are protected through the establishment of Specially Protected Areas. The Ross Seal (*Ommatophoca rossi*) and all the southern fur seal species (*Arctocephalus* spp.) are specially protected, and so is the Blue Whale (*Balaenoptera musculus*), the Humpback Whale (*Megaptera novaeangliae*), and the Black Right Whale (*Eubalaena glacialis*). In addition, by decree of 1938, France gave natural park status to its antarctic territories, and Norway, by decree of 1971, declared the island of Bouvetøy with surrounding territorial waters as a natural reserve.

Due to the good protection which already exists on the Antarctic Continent, its establishment as a world park would improve the situation only if this would involve protection of the seas with their marine resources at least above latitude 60 degrees south, would control tourism which is becoming an increas-

ing threat to the area, and would control future utilization of resources (such as coal, oil, gas, and ice).

### Indo-Pacific

*Hawaii* (U.S.A.):—In Hawaii, the coral reef surrounding Little Coconut Island in Kaneohe Bay on Oahu was the first marine reserve. Farther south is the City of Refuge National Historical Park, with interesting marine gardens and many reef fishes (U.S. National Park Service, 1972). It has been suggested that existing state beach parks, for which jurisdiction ends at the shore, should include marine zones that are interesting from a conservation viewpoint. In the case of Hawaii Volcanoes National Park, with its extended coastline on the Pacific Ocean, the Park boundary is at mean high-tide. It has been suggested that either the Park boundary be extended to 0.4 km off-shore or a separate marine park be established to adjoin Hawaii Volcanoes National Park.

The Hanauma Bay and Kealakekua Bay Marine Life Conservation Districts were designated in 1967 and 1969, respectively, by the Hawaiian Board of Land and Natural Resources, to protect underwater resources including the coral-reef community. The main purpose of preserving the over-exploited Hanauma Bay was to restore it for the benefit of recreation and education, as well as for aesthetic reasons, and it has now become a very popular place for snorkellers to view fish on the broad shallow coral-reef in the Bay. The purpose of protecting Kealakekua Bay as a strict nature reserve was to preserve the almost pristine marine biotic communities.

The Hawaiian Islands National Wildlife Refuge, which includes a number of isolated bird islands, covers 809 ha of land and 80,900 ha of shallow lagoons. Green Turtles breed on the shores, which are also visited by the endangered Hawaiian Monk Seal (*Monachus schauinslandi*) (Bauer, 1972).

In the State's plan for marine development, 'Hawaii and the Sea', additional marine parks have been recommended for establishment on Maui, Molokai, and Kauai.

*Trust Territory of the Pacific Islands* (U.S.A.):— Regarding marine parks in this vast area, the Seventy Islands off Eil Malk in the Palau Islands were set aside in 1956 as the Ngerukewid Wildlife Preserve (Seventy Islands Preserve). It has been suggested that it be expanded to include the many small islands and the reef area west of the existing preserve. Consideration has also been given to the establishment of a Seventy Islands Tropical Park to encompass a larger marine and land area including also the Seventy Islands Preserve with its proposed extension (Johnson & Pierrepont, 1972).

*Guam (U.S.A.):*—The Guam National Seashore Park has been proposed to include about 2,833 ha of the sea for the protection of coral reefs.

*Samoa (U.S.A.):*—An outdoor recreation plan is being prepared with the aim of identifying marine parks and reserves.

*Western Samoa:*—The Government of Western Samoa has expressed interest to set aside representative parts of marine and land ecosystems for the benefit of the islanders as well as of tourists. IUCN has been approached to assist in the development of a conservation programme on the islands.

*Fiji:*—A survey has been carried out to identify sites which could be established as marine parks and reserves. A number of coral reefs, off-shore islands, and atolls, have been suggested for protection, and the National Trust for Fiji has prepared a Proposal for a System of Marine Parks and Reserves, which is now under consideration. The Ravileon and Nandarivata Islands have long been established as nature reserves, and the Cays of Heemskerck Reef and other uninhabited nesting areas of marine turtles have been recommended as strict turtle sanctuaries.

*Polynesia (France):*—The lagoon of Taiaro Atoll in the Tuamotu Archipelago in French Polynesia, about 555.6 km north-east of Tahiti, was designated as a permanent reserve for science in August of 1972 and was named the W. A. Robinson Sanctuary. The Sanctuary was extended in February 1973 to include also the Taiaro Atoll and its reefs, together with the sea surrounding the Atoll and extending 1 km off-shore. Close cooperation has been established between the owner of the Taiaro Sanctuary, the Administrative Committee of the Sanctuary, and the Governor of French Polynesia, for the protection of the Taiaro Atoll. The almost circular Atoll, with a diameter of about 5 km, is nowhere higher than 5 m above sea-level. Detailed scientific studies of the Atoll have recently been carried out (French Polynesia Commissioner for Monuments and Sites, no date).

*Tonga:*—Important breeding sites for marine turtles such as Fonuaika Island have been proposed to be set aside as turtle sanctuaries.

*New Caledonia:*—Yves Merlet Maritime Reserve was established in 1970 and covers 15,760 ha.

*New Zealand:*—Marine national parks are under the New Zealand National Parks Authority in the Department of Lands and Surveys, which so far has no jurisdiction beyond the high-water mark. Marine reserves, on the other hand, come under the jurisdiction of the Marine Department in Wellington, and a Marine Reserves Bill was passed in 1971 towards establishing and managing areas of the sea and foreshore as marine reserves for the purpose of preserving them in

their natural state to allow scientific study of marine-life habitats. According to information obtained from the Marine Department in Wellington, the public will, subject to certain conditions and restrictions, have access and entry to such reserves for the enjoyment of marine life in its natural habitats. Proposals for such reserves have been made but have not yet been implemented.

Existing parks in New Zealand contain extensive areas of coastal land, such as those in the Te Pahi Coastal Park and the Abel Tasman and Fiordland National Parks. The Hauraki Gulf Maritime Park, which covers 8,094 ha and includes a number of islands, was established in 1967. The Sounds Maritime Park has been proposed for establishment in the Marlborough Sounds.

*Australia:*—This very large country has several national parks which include scenic coastlines, coral reefs, and marine resources.

In Queensland, legislation was passed in 1971 to provide for the establishment of marine national parks. The Queensland Government is proposing the establishment of several marine national parks, particularly relating to the Great Barrier Reef. More than 110 islands along the Great Barrier Reef have already been declared national parks, but the protection normally does not extend to the off-shore resources and coral reefs as it only goes down to the high-tide mark. A proposal has been made to establish a major marine park along the Great Barrier Reef of Australia, to protect certain islands, coral reefs, and adjacent parts of the coastal zone of the mainland. The outer part of the Barrier Reef also offers unique undisturbed coral reefs, which likewise have been proposed to be set aside as marine fauna reserves. Meanwhile, corals are protected in all Queensland waters, apart from a few commercial leases. This special regulation may, in due time, be extended to cover all other marine species in selected areas—as has already been done for the Green Island and Heron Island—Wistari Reef National Parks, where all the marine organisms on the coral reef surrounding these islands are protected under the Fisheries Legislation. Fish may, however, be taken in these areas with a hand-line or rod. It has been suggested that the Swain Reef at the southern end of the Great Barrier Reef be protected, particularly to save the marine turtle nesting aggregations there. A different form of marine reserve has been established on Crown Land—the Fisheries Habitat Reserves. These reserves, now thirteen in number in Queensland, are strictly protected.

In New South Wales, a marine park of 283 ha was established in Maitland Bay in 1971 under the provisions of the National Parks and Wildlife Amendment Act. This marine park adjoins the Bouddi State Park

and extends off-shore for 366 metres. It has been proposed that Jervis Bay near Sydney be zoned for recreation and tourism, and that parts of it be established as a nature reserve. A check-list of coastal mainland parks and off-shore island reserves of this State has been prepared by the National Parks and Wildlife Service in New South Wales.

In Victoria, the establishment of marine national parks has been considered but none exists as yet. However, most of the terrestrial national parks have their boundaries extended to the low-water mark.

Western Australia has announced proposals for the State's first, and Australia's biggest, marine national park of 259,000 ha of ocean which will also encompass many of the 100 islands in the 193-kilometres-long Recherche Archipelago in the south.

A recommendation has been made for the establishment of a marine park or reserve in the northern part of the Northern Territory.

In Tasmania, the National Parks and Wildlife Act provides for the creation of marine reserves, but none has been legally established as yet. There are, however, twelve coastal reserves, and the Freycinet Peninsula National Park contains marine resources.

*Papua and New Guinea*:—No marine parks have yet been established in Papua or New Guinea, although their extensive coral-reefs have been proposed to be set aside as protected areas.

*Japan*:—This country has 23 national parks and 44 quasi-national parks, most of which include some shoreline and extend therefrom for 1 km out to sea. Parts of these sea areas have been designated as marine park areas containing no dry land. Thus all the Japanese marine park areas, totalling 23 at present, are components of national or quasi-national parks, and are combinations of strict nature reserves and areas for tourism, sport, recreation, and education. Each of these marine park areas is subjected to the same legislation as the national park or quasi-national park of which it forms a part. Furthermore, the marine park areas also have special regulations for the protection of certain species as a help to maintaining stocks in surrounding fishing-grounds. Many of the marine park areas possess facilities for research, education, interpretation, and tourism—such as under-sea observatories, glass-bottom boats, aquaria, and research stations.

Because of the dependence of Japan on marine resources, selective commercial fishing is allowed within the park boundaries (Tamura *et al.*, 1966).

*The Philippines*:—With their high diversity of marine fish and invertebrate fauna, the Hundred Islands National Park (containing about 600 islands covering areas ranging from one square metre to 500 square metres), Manila Bay Beach Resort, and the shore and

territorial waters in Pangasinan, all include marine protected areas; so do the marine biological stations in Luzon, Majacalar Bay, and Puerto Galera. Action is in hand to increase the number of marine parks in order to prevent further damage to reef areas with their rich natural resources.

*Malaysia*:—There is a major threat to the inshore coral reefs of Malaysia due to the blasting by dynamite of reefs in fishing and to the over-collection of corals and shells by skin-divers. A number of areas have consequently been proposed as possible sites for marine parks, including Pulau Gaya in Semporna, Pulau Gaya in Kinabalu, four islands off Kuala Kedah, Pulau Lallang in the Sembilan Island group, Pulau Lang Tengah, and Tanjong Genting. It is likely that the Rantau Abang beach in West Malaysia, which is an important breeding area for the Leathery Turtle, will be set aside legally for protection.

In Sabah, the Sandakan Turtle Islands (Pulau Selingan, Pulau Bakkungan Kechil, and Pulau Gulisaan) were declared bird and game sanctuaries in June 1972.

*Thailand*:—Provision for the establishment of marine protected areas is made in the Fisheries Law, but no extensive reserve exists at the present time. A small marine turtle reserve is said to exist under the jurisdiction of the Royal Thai Navy at Koh Kram, an island on the east coast of the Gulf of Thailand. A Marine Biological Centre has been established at Phuket Island in southern Thailand. In the vicinity of this Centre, certain parts of the coast have been declared protected areas for marine biological research. Tarutao National Park (1974) includes marine areas.

*Burma*:—Diamond Island off the mouth of the Bassein River in the Indian Ocean was declared a Wildlife Sanctuary in 1970 to protect the Green Turtle, the Loggerhead (*Caretta caretta*), and the Hawksbill Turtle.

*Sri Lanka*:—Sri Lanka (Ceylon) has established only one marine sanctuary so far, namely that at Hikkaduwa. A number of proposals for additional protected marine areas have been made to the Government, notably that of the Great and Little Basses off the south coast which, because of its rich marine life, is considered one of the most outstanding underwater habitats in the world. The Basses are now threatened by the activities of commercial spear-fishermen. It has been suggested that the National Park of Yala should be enlarged to cover the Basses. Other proposals concern, particularly, the establishment of a sanctuary at Arippu, for the protection of Dugongs (*Dugong dugon*) and marine turtles, and it has also been suggested that the coastal Wilpattu National Park should be extended to protect adjacent marine habitats with their Dugongs and marine turtles—



particularly the Leatherback Turtle. Ruhunu is another coastal national park. Action is also proposed to protect the coral reefs surrounding Sri Lanka, by preventing their exploitation and destruction by sea erosion. As a step in this direction a Ministerial Order has been issued prohibiting the extraction of corals between Panichchankeni and Punnakudah. Fishing regulations as to the minimum size of lobsters will soon be introduced to safeguard this valuable species.

*Iran*:—A number of marine biological stations have been established in the Persian Gulf and the Indian Ocean, and action is in hand to establish the first marine park in Iran between the Island of Qeshm and the mainland near Bandar Abbas.

#### *Africa*

*Sudan*:—It has been proposed that some coral reefs in the Sudanese Red Sea be protected.

*Ethiopia*:—The Dahlak Islands, with their surrounding coral reefs, have been proposed as a marine national park following a survey carried out by Dr G. Carleton Ray in 1968. The recommendations made by Dr Ray emphasize the need for protection of island and reef habitats from the present overuse by tourism and also call for protection of the Green Turtles and bird-life occurring in the area. The Dugong has been reported to be very scarce in the archipelago itself and seems unlikely to occur within the area of the proposed marine park.

*Somalia*:—The proposed Lac Badana National Park in the southeastern part of the country would cover 480,000 ha (4,800 km<sup>2</sup>) and include 50 km of coastal zone and perhaps some off-shore islands with surrounding reefs.

*Kenya*:—Following the establishment of Watamu and Malindi Marine National Parks in 1968, two additional marine protected areas have been proposed. The one about to be gazetted is Shimoni-Kisiti Marine Park near the Tanzanian border, and the other proposed marine park would be at Diani (in the same general vicinity but nearer to Mombasa). It is hoped that such action will prevent the marine resources from being further depleted due to commercial collection of shells and corals, dynamiting, and spear-fishing. The Watamu and Malindi Marine National Parks, which are bordered to seaward by the more extensive Watamu Marine National Reserve, are famous for their corals and rich fish fauna. The Malindi Marine National Park includes the well-known Malindi Coral Gardens. The tourist impact in these areas has been quite detrimental to the marine resources. About 400,000 tourists visit annually the coastal regions of Kenya, including the marine parks, and, in 1977, about one million tourists are expected. The increasing

number of visitors will provide increased revenue to Kenyans, but at the same time the pressure on the coastal habitats will increase. It is expected that within a decade there will be an increasing number of coastal developments in Kenya which will increase the number of hotels, harbours, etc. The existing agricultural practices on the Athi River also pose severe long-range threats to the marine parks, owing to effluents, etc. Legislation exists for the protection of the Dugong and the Green Turtle, and efforts are being made to have it enforced (Eames, 1971; Njiri & Hyder, 1973).

*Tanzania*:—A number of areas have been proposed as marine parks and equivalent reserves following a survey of the coastal zone by Dr G. Carleton Ray in 1968.

*Mozambique*:—The Bazaruto National Park was established mainly for the protection of turtles and Dugongs. Paradise Island has been established as a maritime national park. Both Primeiras Island and Segundo Island have been recommended to be set aside as maritime national parks in order to protect the Green Turtle and the coral reefs. It is also recommended that the Maputo National Park be extended to include the coastal zone all the way down to the border of South Africa (Hughes, 1973).

*Seychelles (U.K.)*:—Following a recent survey, carried out by Mr Iain J. B. Robertson, a number of new marine parks and reserves have been proposed in addition to the existing Ste Anne Marine National Park. They include the proposed Baie Ternay and Port Launay Marine National Parks, both situated in the northern part of Mahé. It is also recommended that the boundaries of the Cousin Nature Reserve be extended to include the marine environment up to 400 m off-shore, for the establishment of a Special Marine Reserve (Robertson, 1972).

*Mauritius*:—Following a visit to Mauritius early in 1973, the Vice-President and Chairman of WWF and Chairman of IUCN's Survival Service Commission, Sir Peter Scott, made some proposals that were aimed at the maintenance of genetic diversity on the island and prevention of the extinction of further species. He also recommended the establishment of a conservation programme in Mauritius, covering among other things a survey of off-shore islands and coral reefs and establishing marine reserves to be zoned to include strict nature reserves as well as areas where traditional fishing would be allowed. Sir Peter Scott further recommended that consideration be given to the possibility of establishing an underwater observatory off Mauritius (Scott, 1973).

*Territoires d'Outre-Mer (France)*:—The small French islands around Madagascar—Tromelin, Les Glorieuses,



Juan de Nova, and Bassas da India—are proposed for establishment as nature reserves. Europa Island was gazetted a marine national park in August 1971. This Island was surveyed by Mr George R. Hughes in 1971, who reported that it has 'the largest Green Turtle rookery known to science' (Hughes, 1972).

*Madagascar*:—The Grand Récif de Tuléar has been proposed as a marine national park.

*South Africa*:—The Tsitsikama Forest and Coastal National Park includes a shoreline of almost 80 km and a marine area of 1,420 ha. The marine environment represents a transitional zone with a mixture of species from the cool-temperate waters off the coast of southern Africa and from the warm (tropical) waters off the eastern coast. Spear-fishing is prohibited but rock angling is allowed on a very limited scale. Other marine protected areas are covered by Betty's Bay Reserve, Robben Island Reserve, and Saldanha Bay Reserve. False Bay is at present listed as a permanent conservation area under the jurisdiction of the Sea Fisheries Branch. Proposals have been made for the establishment of the Tongaland coast, the only nesting area of marine turtles in South Africa, as a national park.

*South West Africa (Namibia)*:—The Skeleton Coast Park, established in 1967, covers 800,000 ha and has extensive coastlines. Legislation is at present envisaged to add another 320 km of shore to this Park. Here, as in the Tsitsikama Forest and Coastal National Park, there is an overlap between cool-temperate and warm (tropical) marine faunal elements. Sport-fishing is allowed in a restricted area of the coast (32 km long). The Namib Desert Park also includes a coastal zone where limited sport-fishing is allowed.

*Angola*:—This large territory has no special marine reserve, but its Iona and Quiçama National Parks have extensive coastlines which extend 180 and 125 km, respectively, along the Atlantic Ocean. Data on the marine resources are limited through lack of surveys. It has therefore been suggested by the South African Nature Foundation that a survey be undertaken in the near future for the establishment of a marine and estuarine reserve. The coast is visited by the Green Turtle and the Loggerhead Turtle, and the rivers and the estuaries by the Soft-skinned Turtle (*Trionyx triunguis*), but no nesting activities of these species have been recorded. Fur Seals and Manatees have also been observed.

*Nigeria*:—A coastal reserve is proposed in Lagos State.

*Mauritania*:—The Mauritania Islands Strict Nature Reserve covers about 10,000 hectares.

### *Mediterranean*

In the Mediterranean region, action for the establishment of marine protected areas is in hand as a follow-up to the International Marine Parks Conference which was held in southern Italy in June 1973. In order to decide upon the best possible location for such parks and reserves in the Mediterranean region, a survey of critical marine habitats should be given high priority. It is appreciated that, due to serious present threats to a number of Mediterranean marine habitats, interim action may have to be taken to protect legally such areas without awaiting the results of a detailed survey. The boundaries of such protected areas could be adjusted later to conform to the results of the survey.

*Algeria*:—The region of Tipasa-Chenoua west of Algiers has been proposed as a combined marine and terrestrial park (Université d'Alger, 1973).

*Tunisia*:—This country is planning to establish in the near future the proposed Zembra Marine Park and Zembra and Zembretta Natural Reserves (Baccar, 1973).

*Israel*:—Two marine parks (named marine natural reserves) have been established along the Mediterranean coast of Israel, one being situated between Tel Aviv and Haifa and the other next to the Lebanon border. These areas have been selected with an ecosystem approach in mind, taking into account maximum faunal and floral diversity along the littoral as well as avoiding disturbing influences from existing urban development. In the Red Sea, Israel has created a number of marine reserves for the protection of the coral ecosystems. The first of these reserves was established in the vicinity of Eilat in 1963 and comprises about 1.2 km of coastal region extending 200 metres seawards (Fishelson, no date).

*Greece*:—It has been proposed that a chain of marine parks be established in Greece (Vamvakas, 1973). A preliminary survey has already been made towards the establishment of a marine park in Lindos, Rhodos Island (Nicolaidou, 1973).

*Italy*:—A marine nature reserve was established at Castellabate in 1972. The Miramare Marine Park in the Gulf of Trieste was established in 1973 and covers 30 ha of sea. There is also a proposal to establish Asinara Island as a marine park.

*Malta*:—The Government of Malta is giving consideration to the establishment of a marine park on one of the Maltese islands (Saliba, 1973).

*France*:—A marine nature reserve has been proposed at Cerbère in the southwestern part of the Gulf of Lyon. Port Cros National Park was established in

1963 and covers an island of 640 ha plus a marine area surrounding the island and extending 600 m off-shore.

*Spain*:—The Isla de Alborán, as well as several sites on the Canary Islands, are under consideration for marine parks development.

*Portugal*:—A proposal has been made for having the Bay of Sesimbra established as a maritime park.

#### Northern Europe

*Denmark*:—Through the Hunting Act of 1967, the Minister of Agriculture can establish game reserves in marine territory as well as on land and in inland waters. By means of the Conservation of Nature Act of 1969, the Minister of Cultural Affairs can set aside for protection additional areas of territorial waters through public notice. A number of coastal areas and small islands have already been set aside as scientific reserves or game reserves of which some have the surrounding sea included in the protected area; for example, the Jordsand and Albuebugten Game Reserves include areas of the Waddensea north of the Danish-German border. The Guldborg Sund Game Reserve between the islands of Lolland and Falster includes 253 ha of the sea territory and the Scientific Reserve of the island of Klaegbanken includes 1 km of the surrounding sea territory. Only those with a major marine component have been selected for listing in the Appendix (Ovesen, no date).

*U.K.*:—In the United Kingdom of Great Britain and Northern Ireland, a Working Party on Marine Wildlife Conservation was established by the Natural Environmental Research Council (NERC) in 1971, to assess threats to marine resources and consider the need for conservation measures in the marine environment surrounding the United Kingdom. The results of the study were published by NERC in 1972.

Lundy Marine Nature Reserve, in the mouth of the Bristol Channel, was established in April 1973 but has no statutory protection. The marine area of the Reserve covers 1,500 ha (provisionally). The marine vegetation and fauna are much diversified, with many species that are considered to be at the limit of their distribution existing in great quantity around Lundy. The Reserve is divided into two zones: one which is totally protected and the other which is disturbed by a number of activities such as mooring, dredging, etc. A diving field-guide to Lundy has been published by the Advisory Committee on the Lundy Marine Nature Reserve (Hiscock, 1971, 1973).

Saltern Cove Local Nature Reserve in Devon, which was established in April 1972, extends 400 m out to sea where a low reef protects the cove from the sea. The objective of establishing the Reserve was to protect its rich variety of species and their habitat from

an even-increasing detrimental impact of tourism on such coastal areas (Lamerton, 1969).

In addition, it has been proposed that the National Nature Reserve on the island of Skomer off the Pembrokeshire coast in West Wales be extended to cover also the surrounding marine environment to a distance of 500 m from the low-water mark.

The above survey of marine parks and equivalent reserves in various regions is not a fully comprehensive list but is intended to give an indication of the marine conservation trends throughout the world.

It should also be noted that in the Appendix to this paper there are 52 contractions, all of which are used in the text without a proper definition. Mostly, a 'park' implies an area where visitors are welcomed for recreational, aesthetic, or educational, reasons. Other terms mentioned may imply areas which have been set aside for protection of certain species or biotic communities, research, effective management of coastal marine resources, etc. IUCN and WWF recognize the need to define a marine park as well as equivalent reserves, but feel that it would be premature to attempt to formulate such definitions until the marine guidelines to help governmental authorities, national park planners, and administrators, to establish and manage marine parks, which are now in preparation by IUCN and WWF, have been put in final form.

#### ECOLOGICAL GUIDELINES

As a follow-up to the book *Ecological Principles for Economic Development* (Dasmann *et al.*, 1973), IUCN is in the process of preparing more specialized pamphlets dealing with ecological guidelines related to the marine environment. They are intended for use, by national park authorities, for action concerning critical marine habitats and for the establishment of new marine parks and equivalent reserves.

Other publications are planned for specific geographical areas. As an example, the coastal and island guidelines will emphasize the ecological considerations to be taken into account in planning or executing development projects of various kinds in coastal regions and islands. The coastal guidelines are primarily meant to cover tropical countries, and will embrace coastal and estuarine regions (including mangrove areas).

#### CONSERVATION OF OCEANIC ISLANDS

A survey of the status of conservation of Pacific oceanic and off-shore islands was carried out by a section of the International Biological Programme (IBP), namely, that of Conservation of Terrestrial Communities (CT). The initiative was given by the 11th Pacific Science Congress (held in Tokyo in

August 1966). The results of the survey were reviewed at a technical meeting sponsored by IBP/CT and held at Koror, Palau Islands, in November 1968, when international action was planned. Also, at this meeting, a provisional list of 39 'Pacific Islands for Science' was suggested, which was later included in the Draft Check List of Pacific Islands (Douglas, 1969).

In order to be able to give more effective consideration to conservation of island ecosystems, IUCN was presented with a mandate by the Pacific Science Council at Kuala Lumpur in May 1969, as well as by IUCN's 10th General Assembly (held in New Delhi, India, in November 1969), to continue the preparation of the list of oceanic and off-shore islands in the Pacific for the recognition of such islands as 'Islands for Science'. Similar lists are also in preparation for the Indian and Atlantic Oceans.

By implementing IUCN's project 'Conservation of Certain Islands as "Islands for Science"', it is hoped that a coordinated programme of long-term scientific research can be established and that a number of islands which are generally uninhabited and scientifically interesting, with relatively undisturbed ecosystems, will be set aside as scientific reserves—a high-priority requirement in view of planned development projects on many of them. It is in mind that the islands to be designated shall also include the surrounding waters subject to national jurisdiction, and it is hoped that the governments concerned will cooperate in the establishment of the proposed conservation programme.

At the IUCN 10th General Assembly, it was also recommended (Resolution No. 28) that IUCN draft a Convention on Conservation of Certain Islands for Science (as originally recommended by the Pacific Science Council at Kuala Lumpur in May 1969). Work on this Convention is in progress, and drafts have been circulated to a number of countries for comments.

#### CONCLUSION

From the above survey of some of the achievements that have so far been attained in marine conservation, it is apparent that there is nowadays a growing interest by the governments concerned to set aside marine parks and equivalent reserves as a means of preserving the cultural and natural heritage of the sea with all its scientific, educational, aesthetic, economic, and recreational, values. In this connexion, there is a growing awareness of the ecological fragility of marine ecosystems, and of the increasing threats, from various development projects, to their ecological balance and to the survival of species which form integral parts of these systems. The needs for the identification of ecological principles, and for the formulation of ecological guidelines, are being more and more

widely recognized as a necessity in the planning and implementation of economic development projects. If development projects are not ecologically sound, particularly in such aspects as urbanization and irrigation, they can be detrimental to the ecological balance of marine protected areas—especially if sea and wind currents contribute towards bringing effluents into the park areas.

In order to avoid, as far as possible, disruption in the ecological equilibrium of the sea, it will be necessary to understand much better than we do today the processes going on in marine ecosystems. With the basis of such an understanding, we must try to establish, for harmful pollutants, the upper limits of tolerance of the various parts of the oceans and particularly of those waters lying over the continental shelves and in the coastal zones, where the productivity of renewable resources is concentrated—taking into account also the currents, temperature, winds, etc. Careful interdisciplinary studies on land-use practices and their impact on marine and estuarine areas have to be made, and wherever necessary there must be regulations for 'up-stream' control of pollution from such existing sources as pulp and paper mills, food processing industries, and domestic use. Controls have also to be instituted against thermal pollution, particularly in tropical waters, and against atmospheric pollution—as well as against the discharge or dumping of harmful substances from commercial and private boats into the sea and particularly into coastal waters. Restrictions in dumping of toxic wastes have already been initiated by 90 countries signing the International Convention on the Dumping of Wastes at Sea. The Convention has, however, only been ratified by a few countries and is not yet in force. Other conventions against ocean dumping have also been signed, e.g. one which concerns the Baltic Sea and another one which covers the North Sea. Nevertheless, high concentrations of harmful pollutants have been identified in various parts of the oceans—particularly outside large urban centres and where ocean currents have accumulated excessive concentrations of pollutants.

Other threats to the marine environment are caused by the increasing demand for oil and minerals in submarine deposits, the exploration and exploitation of which are likely to have adverse ecological effects unless guidelines are formulated for an ecologically sound programme for utilization of the oceans. There is also need for more caution in the transport of petroleum and petroleum products by sea. It is most ardently to be hoped that many such problems will be solved, or at least the situation ameliorated, through the present U. N. Conference on the Law of the Sea, which will attempt to establish an International Regime together with regional regimes for the oceans.



## SUMMARY

In order to facilitate the work of those who are faced with the difficult task of assigning priorities and guiding conservation action on a global scale, it is important that those countries which have jurisdiction over coastal areas start collecting, evaluating, and disseminating, data on the ecological status of their coastal zones. Only with such a data-base can the appropriate authorities effectively further the concept of conservation and sound management of marine resources. To these ends, also, the existing marine parks and equivalent reserves should be evaluated with special reference to the extent to which they provide adequate protection for representative examples of the ecosystems of the area, and to determine the need for additional areas to be protected.

As part of ongoing marine conservation programmes, IUCN/WWF is giving high priority to the identification of critical marine habitats either for the purpose of setting them aside as protected areas because of their fragility or high productivity, or for their research, education, or aesthetic, values. In cases where a 'park' is not the best solution to protect an area from pollution and other disturbances, IUCN/WWF, in cooperation with other organizations—international or national—is trying to help to influence the governmental authorities concerned to find the best possible solution to the problem, whether it concerns over-fishing, using wrong fishing methods (e.g. dynamiting), or is a matter of providing guidance to the authorities concerned to achieve a rational utilization programme of coastal marine resources. Such utilization is particularly important in those parts of the tropics where marine renewable resources play a vital part in the economy of tropical human populations, but where the native fishing cannot continue to supply yields that are sufficient to meet the (usually ever-increasing) demand.

Although the text and the Appendix give a general review of established and proposed marine parks and reserves in the world to date, it should be noted that no attempt has been made in this paper to give a comprehensive world-wide review of the activities of all the organizations involved in marine conservation. Rather, the objective has been to show the general trends, and to present the catalytic role of IUCN and WWF in implementing marine conservation programmes in close cooperation with many other international and national organizations.

With the increasing public awareness of the degradation of the marine environment in general and of the coastal zones in particular, governments of many maritime countries have been urged to set aside, for protection, representative areas of marine ecosystems with their marine species. The urgent need for

such action is caused by ever-increasing human pressure for the utilization of the marine resources of the sea-bed and of the water column above it. Intense human activity has already had deleterious effects on many coastal zones, including estuarine areas, with the result that many marine species and their habitats are now in serious jeopardy. The highest priority should therefore be given to the elaboration of a marine conservation programme, with initial emphasis on coastal zones. The latter are of great importance for food production, scientific research, conservation of genetic resources, education, tourism, and recreation.

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\* A more detailed reference list is available on application to the author.

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## Appendix (pp. 218–23)

## Explanations of Contractions

A	Area	NeRve	Nature Reserve
BGS	Bird and Game Sanctuary	NHP	National Historical Park
CA	Conservation Area	NM	National Monument
CP	Coastal Park	NP	National Park
EPve	Ecological Preserve	NSea	National Seashore
GRve	Game Reserve	NSeaP	National Seashore Park
M	Marine	NWR	National Wildlife Refuge
MBSn	Marine Biological Station	P	Park
MLCD	Marine Life Conservation District	PP	Provincial Park
MLR	Marine Life Refuge	Pve	Preserve
MNP	Marine National Park	QNP	Quasi-national Park
MNRve	Marine National Reserve	R	Refuge
MNeRve	Marine Nature Reserve	Rve	Reserve
MP	Marine Park	S	Sanctuary
MPA	Marine Park Area	Sc	Scientific
MPrA	Marine Protected Area	SeP	State Park
MPve	Marine Preserve	Sn	Station
MRve	Marine Reserve	SPA	Specially Protected Area
MS	Marine Sanctuary	St	Strict
MStNeRve	Marine Strict Nature Reserve	StNeRve	Strict Nature Reserve
MtNP	Maritime National Park	TP	Tropical Park
MtP	Maritime Park	UP	Underwater Park
MtRve	Maritime Reserve	WPve	Wildlife Preserve
MWRve	Marine Wildlife Reserve	WRve	Wildlife Reserve
NalRve	Natural Reserve	WS	Wildlife Sanctuary
NePve	Nature Preserve	WP	World Park