

LATIN AMERICA / CARIBBEAN

ARCHIPIÉLAGO DE REVILLAGIGEDO

MEXICO



Manta birostris in San Benedicto - © IUCN German Soler

WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

ARCHIPIÉLAGO DE REVILLAGIGEDO (MEXICO) – ID 1510

IUCN RECOMMENDATION TO WORLD HERITAGE COMMITTEE: To inscribe the property under natural criteria.

Key paragraphs of Operational Guidelines:

Paragraph 77: Nominated property meets World Heritage criteria (vii), (ix) and (x).

Paragraph 78: Nominated property meets integrity and protection and management requirements.

1. DOCUMENTATION

a) Date nomination received by IUCN: 16 March 2015

b) Additional information officially requested from and provided by the State Party: A progress report was sent to the State Party on 16 December 2015 following the IUCN World Heritage Panel meeting. The letter reported on progress with the evaluation process and sought further information in a number of areas including the State Party's willingness to extend the marine no-take zone up to 12 nautical miles (nm) offshore from the islands to correspond with the outer boundaries of the nominated property; additional information on deep sea biodiversity and ecosystems within the nominated property and a comparative analysis of their values; and clarification on the numbers of endemic and threatened species within the property. The information in response was received from the State Party on 26 February 2016.

c) Additional literature consulted: Various sources including: Critical Ecosystem Partnership Fund (CEPF) 2015. *Biodiversity hotspots: Mesoamerica*. Downloaded from <http://www.cepf.net/resources/hotspots>, accessed in October 2015. Dutton, P.H., Jensen, M.P., Frey, A., Lacasella, E., Balazs, G.H., Zárate, P., Chassin-Noria, O., Sarti-Martinez, A.L. and Velez, E. 2014. *Population structure and phylogeography reveal pathways of colonization by a migratory marine reptile (Chelonia mydas) in the central and eastern Pacific*. *Ecol. Evo.* (22):4317-31. Hillary, A., Kokkonen, M. & Max, L. (2002). *Proceedings of the World Heritage Marine Biodiversity Workshop*. Hanoi, Viet Nam. Ketchum, J.T. and Bonilla, H.R. 2001. *Taxonomía y distribución de los corales hermatípicos (Scleractinia) del Archipiélago de Revillagigedo, México*. *Revista de Biología Tropical*, 49(3): 803–848. Wanless, R.M., Aguirre-muñoz, A., Angel, A., Jacobsen, J.K., Keitt, B.S. and McCann, J. 2009. *Birds of Clarion Island, Revillagigedo Archipelago, Mexico*. *The Wilson Journal of Ornithology*, 121(4): 745–751. Wilkenson, T., Wiken, E., Bezaury-Creel, J., Hourigan, T., Argardy, T., Herrmann, H., Janishevski, L., Madden, C., Morgan, L. and Padilla, M. 2009. *Marine Ecoregions of North America*. Jehl Jr, J. R., & Parkes, K.C. (1982). *The status of the avifauna of the Revillagigedo Islands, Mexico*. *Wilson Bulletin* 94(1):1-19. Reyes Bonilla, H., Ketchum Mejia, J. T., Cupul Magana, A. L & Alvarez del Castillo Cirdenas, P. A.

(2014). *Evaluación de la capacidad de carga para buceo en la Reserva de la Biosfera Archipiélago de Revillagigedo*. Informe Final para la Dirección de la Reserva de la Biosfera, CONANP. La Paz, B.C.S. 83 pp. Martínez-Gomez, J. E., & Jacobsen, J.K. (2004). *The conservation status of Townsend's shearwater Puffinus auricularis auricularis*. *Biological Conservation* 116(1): 35-47. Spalding, M.D., Fox, H.E., Allen, G.R., Davidson, N., Ferdaña, Z.A., Finlayson, M., Halpern, B.S., Jorge, M.A., Lombana, A., Lourie, S.A., Martin, K.D., McManus, E., Molnar, J., Recchia, C.A. & Robertson, J. (2007). *Marine ecoregions of the world: a bioregionalization of coastal and shelf areas*. *Bioscience* 57(7): 573-583. Bohrson W A, Reid M R, 1997. *Genesis of silicic peralkaline volcanic rocks in an ocean island setting by crustal melting and open-system processes: Socorro Island, Mexico*. *J Petr*, 38: 1137-1166. Bryan W B, 1976. *A basalt - pantellerite association from Isla Socorro, Islas Revillagigedo, Mexico*. In: Aoki H, Iizuka S (eds), {Volcanoes and Tectonosphere}, Tokyo: Tokai Univ Press, p 75-91. Luhr J F, Kimberly P G, Siebert L, Aranda-Gomez J J, Housh T B, Kysar Mattiotti G, 2006. *Quaternary volcanic rocks: insights from the MEXPET petrological and geochemical database*. In: Siebe S, Macias J-L, Aguirre-Diaz G J (eds) *Neogene-Quaternary continental margin volcanism: a perspective from Mexico*, {Geol Soc Amer Spec Pap}, 402: 1-44.

d) Consultations: 10 desk reviews received. The mission also met with representatives of the State Party of Mexico; senior officials and staff of Mexico's protected area authority: Comisionado Nacional de Áreas Naturales Protegidas, (CONANP); and the Federal Attorney for Environmental Protection (Procuraduría Federal de Protección al Ambiente - PROFEPA). Meetings and interaction also took place with various NGOs, Universities, Conservation Foundations and Institutes including Grupo de Ecología y Conservación de Islas (GECI); Instituto del ciencias del mar y limnología (UNAM); Pelagios Kakunjá, A.C.; Universidad de Guadalajara; Fondo Mexicano para la Conservación de la Naturaleza (FMCN); and the WWF Marine Programme La Paz. The mission also consulted with military officials from the Mexican Navy including from the Socorro Naval Base.

e) Field Visit: German Soler and Wendy Strahm, 3-13 November, 2015

f) Date of IUCN approval of this report: April 2016

2. SUMMARY OF NATURAL VALUES

The nominated property Archipiélago de Revillagigedo is located in the eastern Pacific Ocean inside the Exclusive Economic Zone of Mexico, some 390 km southwest of the southern tip of the Baja California Peninsula, and 720 to 970 kms west of the Mexican mainland. Archipiélago de Revillagigedo is a serial nomination made up of four remote islands and their surrounding waters: Isla San Benedicto, Isla Socorro, Isla Roca Partida and Isla Clarión. The nominated area covers some 636,684 ha and includes a marine protected area extending 12 nm around each of the islands. A very large rectangular buffer zone of 14,186,420 ha surrounds all four nominated components. Ocean depths within the buffer zone of the nominated property reach 3,700 m, particularly to the west of Isla Roca Partida, and to the west and south of Isla Clarión. Due to their volcanic origin, depths around the islands increase abruptly at distances of between 10-12 kms from the island shorelines. Archipiélago de Revillagigedo is part of a submarine mountain range with the four islands representing the peaks of volcanoes emerging above sea level. Apart from two small naval bases, the islands are uninhabited.

The island landscape of the nominated property is striking with imposing cliffs, coastlines and volcanos, some of them very active. The highest volcano in Socorro rises 1,050 m above sea level and is very active with hydrothermal vents reaching the surface to produce clouds from the boiling waters. The Archipiélago de Revillagigedo was declared a Natural Protected Area and Mexican Biosphere Reserve in 1994. The reserve was also designated as a Ramsar wetland of international importance in 2004.

Isla Socorro, the largest and highest of the four islands, is a shield volcano, reported as the only silicic peralkaline volcanic island in the Pacific Ocean. The island is still volcanically active with the most recent activity recorded in 1993. On Isla San Benedicto, the Barcena volcano erupted in 1948 and 1952, denuding the island of all flora and fauna. Roca Partida is the smallest of the islands and also the crest of a submarine stratovolcano. Isla Clarión, the western most of the islands in the group, was formed by volcanic eruptions during the Miocene and older Eocene. The Clarion Fracture Zone was named for this island, and it is the first sub-aerial expression of the fracture zone as it approaches the Mexican mainland. The nomination asserts that the four islands of the nominated property are one of a few places worldwide which illustrate the geologic evolution process of island formation.

The Archipiélago de Revillagigedo represents an exceptional convergence of two marine biogeographic regions: the Northeastern Pacific and Eastern Pacific. More particularly, the property lies along the junction where the California and Equatorial current mix, generating a complex and highly productive transition zone. Due to its location, the Archipiélago de Revillagigedo strongly influences connectivity within

the Tropical Pacific Ocean and the islands are recognised as important stepping-stones and stop overs for migratory species.

The marine ecosystems of the archipelago are known to be largely undisturbed and harbour abundant populations of sharks, rays, and large pelagic fish that attract recreational divers from around the world. The surrounding waters host some of the largest aggregations of pelagic fauna in the world such as manta rays, tunas, turtles, whales and sharks. For millennia the archipelago has been a key breeding ground for the Humpback Whale (*Megaptera novaeangliae* - LC), and may host a separate sub-population from mainland Mexico. One of the most outstanding aspects of the property are the Giant Manta Rays (*Manta birostris* - VU) which aggregate around the islands. These animals exhibit behaviour which includes close up interest in divers that is reported nowhere else in the world. Furthermore, the seascape has sheer drops in crystal clear water and encompasses abyssal plains with depths down to 3,700 m all contributing to underwater scenes of great beauty.

Due to its geographic isolation, the Archipiélago de Revillagigedo supports functional species assemblages with a high level of endemism. Following a request for additional information on the endemic and threatened species found within the nominated property, the State Party provided an updated list of 61 endemic species. However, it is clear that there are gaps in biodiversity knowledge, for instance in deep sea areas, and species conservation assessments are still needed for plants and invertebrates.

Practically all of the terrestrial breeding birds on the islands are endemic (4 endemic species with 1 Extinct in the Wild); and 11 endemic subspecies, 2 Extinct) with only 2 or 3 recent bird introductions. Four endemic species of reptiles including 2 lizards and 2 snakes, and 9 invertebrates (with potentially many more once further studies are undertaken) have been recorded on the islands. It is noted that the Archipiélago de Revillagigedo exhibits the highest terrestrial endemism of any of the Mexican islands. Unique evolutionary strategies have developed, such as that of the Burrowing Owl (*Athene cunicularia* - LC), which after 200,000 years of isolation has adapted to survive with no terrestrial mammal prey. Revillagigedo is also regionally and globally important for seabirds with 46 species recorded as using the waters around the island, with 12 of these breeding, including the only known breeding site for the Critically Endangered Townsend's Shearwater (*Puffinus auricularis*). The islands are of great importance to seabirds with Masked, Blue-footed, Red-footed and Brown Boobies (LC), Red-billed Tropicbirds (LC), Magnificent Frigatebirds (LC) and many other species dependent on the island and sea habitats. Among the marine fauna, 251 fish species of which 10 endemic species have been recorded, as well as 22 species of scleratinian corals, 25 species of elasmobranchs, 4 species of sea turtle, 6 marine mammals and a high diversity of invertebrates, especially crustaceans and molluscs.

Plant diversity is less well-documented and, whilst overall species richness is low as is common in oceanic islands, the levels of plant endemism are high with 33 higher endemic plant species and 2 species of fungi recorded. The nomination reports that 31.6% of the plants on Socorro Island are endemic, 26% on Clarión and 45% on San Benedicto. The terrestrial vegetation is generally tropical and varies from island to island. Socorro as the largest island supports 9 vegetation associations including cloud forest, tropical dry forest, grasslands, shrublands and saltmarshes. Twenty-two species of marine algae have been recorded in the sub-tidal areas of the property.

Supplementary information has confirmed a total of 36 endemic species are included on the IUCN Red List with 22 of these species considered globally threatened (VU, EN or CR). The Archipiélago de Revillagigedo hosts particularly important numbers of threatened fish and bird species.

3. COMPARISONS WITH OTHER AREAS

The nomination included a comparative analysis which in most areas is considered logical and systematic. The nomination's analysis however, has some shortcomings, lacks detail, and also has some discrepancies in species data, which were evident and needed to be clarified, particularly regarding endemic and threatened species. The nomination reviews marine World Heritage sites narrowing these to comparable properties in the Pacific. Some 13 sites were chosen based on logical comparative criteria. It is clear that the nominated property has values which match or in some cases exceed these other inscribed sites. The Archipiélago de Revillagigedo is considered most comparable to Galápagos Islands in Ecuador and Malpelo Fauna and Flora Sanctuary in Colombia but is argued as being in better condition and suffering less from the impacts of invasive species and fishing.

Concerning criterion (vii) both the landscape and seascape of the Revillagigedo Archipelago exhibit impressive active volcanos, cliffs, arches, and a general landscape and underwater scenario which are all striking. The vision of Roca Partida, a lone guano-covered rock in the middle of nowhere, and the active volcano of San Benedicto with its bare lava with very little vegetation after its last eruption in 1952, is visually very impressive. On Socorro, the rock and soil of diverse geomorphology are of different colours and textures adding to the beauty of the landscape. The islands also serve as breeding grounds for the northern populations of Humpback Whales, which aggregate around the Archipelago's shallow waters during the winter months to mate and give birth to their young. The songs of these majestic cetaceans can be heard during the winter months while diving, adding another sensation to the already outstanding marine seascape. Two aspects of criterion (vii) need to be considered: firstly the superlative natural phenomenon, in this case the natural features and processes of the islands including active volcanism as well as the aggregations of marine life around the islands. Secondly the exceptional natural beauty and

aesthetics of the islands and their marine setting. It is clear on both counts that the Archipiélago de Revillagigedo has comparable values with other similar island systems in the Pacific. For example the Malpelo Fauna and Flora Sanctuary (Colombia) exhibits similar aggregations of large marine predators and pelagic species (Hammerhead, Silky and Whale Sharks as well as tuna). Cocos Island National Park (Costa Rica) is also well-known for its diving experiences with large numbers of sharks, rays, tuna and dolphins. These sites therefore share some charismatic species with the nominated property, however, the Archipiélago de Revillagigedo displays greater numbers within a wider range of pelagic and benthic habitats than these properties. The archipelago boasts the largest congregation of resident manta rays; the greatest diversity of sharks (20 species) in the Tropical Eastern Pacific; provides critical breeding for marine turtles (one of three main breeding grounds for the Green Turtle - *Chelonia mydas* (EN) in the Pacific Ocean); and is home to a wintering population of Humpback Whale. The unique interaction between divers and manta rays provides a special added dimension to the appreciation of the site's natural phenomena and beauty.

Unlike for the biodiversity values, which are its major focus, the nomination dossier does not provide commentary in the comparative analysis of the values of the site under criterion (viii). Reviewers note that there are both interesting volcanic and tectonic values, and also geological features that are not mentioned in the nomination, such as those related to coast geomorphology. There are some features that are distinctive in relation to other better known and more widely researched volcanic island systems included on the World Heritage List, such as sites in Hawai'i, the Canary Islands, Galápagos and Iceland. However the majority of reviewers (including those with a focus on geological values) do not support a case for Outstanding Universal Value under this criterion, noting that the features do not correspond to major geological themes related to volcanism or tectonism, and the main frame of reference taken for the justification of the criterion appears to be regional rather than global. In addition the claims that are made are of a relatively specialised nature. The nominated property is not recognised in past thematic studies as representing a gap under criterion (viii). Considerable further work would be needed with a large range of comparisons to consider if any revised case could be made under this criterion, however IUCN's conclusion based on the lack of justification in the nomination, and the mainly unfavourable views of desk reviewers, is that there is no basis for Outstanding Universal Value to be recognised under criterion (viii).

Comparative analysis, and further consideration by IUCN and UNEP-WCMC suggests there is a case for the Archipiélago de Revillagigedo's biodiversity values to meet World Heritage criteria. The Tropical East Pacific Province is one of the most represented marine provinces on the World Heritage List with three existing sites (Area de Conservación Guanacaste, Costa Rica; Cocos Island National Park, Costa Rica; and Coiba National Park and its Special Zone of

Marine Protection, Panama). However it is important to note that this Province is one of only two in the higher order Tropical Eastern Pacific Realm, the other being the Galapagos Province. Within the Tropical East Pacific Province, the nominated property belongs to its own marine ecoregion (Revillagigedo). The nominated property therefore lies within a distinctive marine ecosystem, one that is characterised by a transition zone where temperate nutrient rich waters from the Californian Current mix with warm waters from the North Equatorial Current, creating important stepping stones for the migration of marine species.

The presence of three other World Heritage sites in the same marine province means the Archipiélago de Revillagigedo has not been recognised as a gap in any of the recent IUCN/UNEP-WCMC themed studies. However, the Archipiélago de Revillagigedo was recognised in the Proceedings of a 2002 World Heritage Marine Biodiversity Workshop as one of 120 tropical coastal, marine and small island ecosystems that may merit consideration for inscription on the World Heritage List. The proceedings of this 2002 marine workshop highlighted the Archipiélago de Revillagigedo for its particular “biogeography and endemism; its charismatic mega-fauna; for being the only Eastern Pacific atoll; for constituting a stepping stone in migration of coastal marine species from the western to eastern Pacific; and for its highly intact marine ecosystems”. Based on the strong relationships to the application of criterion (x), IUCN considers that on balance a case can be made for inscription under criterion (ix), and this is supported by the high degree of integrity of the ecosystem.

The geographic isolation of the Archipiélago de Revillagigedo combined with specific oceanographic conditions has contributed to making the archipelago a unique site both for terrestrial and marine conservation and makes for a strong case for inscription under criterion (x). Despite low species richness, the nominated property encompasses high levels of endemism. The waters and islands of the archipelago are home to at least 94 endemic species (almost half of which are plant species), with one third of the terrestrial species being endemic. The property also hosts a large number of threatened species compared to seven other similar World Heritage properties in the Tropical East Pacific, Galapagos and Warm Temperate Northeast Pacific marine provinces. 80% of the fish species are globally threatened. Important marine phenomena also occur in the waters of the Archipiélago de Revillagigedo, including the largest aggregation of resident Manta Rays, the greatest diversity of sharks in the Tropical Eastern Pacific and a wintering sub-population of Humpback Whales. The Archipiélago de Revillagigedo is also the only breeding site of the endemic and Critically Endangered Townsend's Shearwater. The importance of Revillagigedo for rare species is evident in its ranking as one for the world's most irreplaceable protected areas. It ranks in 133th place for overall biodiversity and 94th with regards to threatened species. These rankings are very high when measured against the more than 173,000 protected areas assessed in this analysis.

The property hosts several globally threatened species on the IUCN Red List (2015) including the Clarion Wren (*Troglodytes tanneri* - VU), Socorro Mockingbird (*Mimus graysoni* - CR), Townsend's Shearwater (*Puffinus auricularis* - CR), Whale Shark (*Rhincodon typus* - VU), Dusky Shark (*Carcharhinus obscurus* - VU), Scalloped Hammerhead shark (*Sphyrna lewini* - EN) and Giant Manta Ray (*Manta birostris* - VU). The island of Socorro has been designated as an AZE (Alliance for Zero Extinction) and EBA (Endemic Bird Area) with the following trigger species: Socorro Mockingbird, Townsend's Shearwater and Socorro Wren. The islands of Revillagigedo have also been proposed as a marine Important Bird Area (IBA), however, this has not yet been confirmed.

In supplementary information the State Party has provided updated information on submarine and deep sea biodiversity. This notes that limited knowledge is available for this category of the property's biodiversity but recent research supports the probability that Revillagigedo has significant values in this realm also.

In summary, IUCN considers that comparative analysis supports the case that the nominated property meets criteria (vii), (ix) and (x).

4. INTEGRITY, PROTECTION AND MANAGEMENT

4.1. Protection

The Archipiélago de Revillagigedo is Mexican federal territory and all parts of the nominated area are hence state-owned and controlled. In 1994 the Archipiélago de Revillagigedo was declared a protected area by Presidential decree under the designation of national Biosphere Reserve, and it was designated as a Ramsar site in 2004. The nominated property is protected under a range of legislation pertinent to different agency jurisdictions. The principal piece of protective legislation is the *General Law of Ecological Balance and the Protection of the Environment (LGEEPA)* and its regulations with respect to protected areas.

The islands are managed as a natural protected area by the Natural Commission of Natural Protected Areas (CONANP), an agency of Mexico's Secretariat of the Environment and Natural Resources (SEMARNAT). The property is managed in close collaboration with the Mexican Navy (SEMAR) which operates military bases on Socorro and Clarión Islands. The presence of the Navy strengthens the protection of the natural values of the property. In addition, dive boat operators collaborate with the authorities on reporting any fishing boats in the area.

The Mexican government has gone to great lengths to ensure the protection of these islands. The conservation of the area has strong inter-institutional support including the direct support of the Mexican Navy with infrastructure (including an airstrip) and full-time staff. The property also benefits from effective partnerships with several NGOs (GECI, WWF, Pelagios) and universities.

IUCN considers that the protection status of the nominated property meets the requirements of the Operational Guidelines.

4.2 Boundaries

The boundaries of the nominated property extend 12 nm seaward from each of the four islands. The site design ensures that all the attributes of potential Outstanding Universal Value are included within the boundary and it is considered an adequate size for most of the populations of animals that reside within the property. However, it is important to note that pelagic species such as sharks, manta rays, cetaceans and tunas will transcend these boundaries on a regular basis. Hence it is essential that responsible fisheries management in the surrounding waters takes place in order to protect these species on their long inter-oceanic journeys. Currently the marine portion of the nominated property is divided into three zones (based on the zoning of the Biosphere Reserve). First, there is a core area (no-take) of 6 nm around each island where no fishing is allowed except for scientific purposes, 3.5 nm where fishing is not allowed (except for scientific purposes and fishing for aquariums) and finally 2.5 nm where fishing (commercial and sport fishing) is allowed under very strict permits given by the Mexican Government.

To ensure complete protection IUCN recommends the extension of the no-take fishing zone to 12 nm corresponding with the nominated area. In its supplementary information the State Party has confirmed its willingness to consider this extension of the no-take zone and has proposed, in collaboration with Mexico's Commission of Fisheries (CONAPESCA), to review the legal instruments that could lead to its formal establishment. Whilst no timeframes were provided it was noted that such agreement will be provided to the World Heritage Centre and IUCN when signed. In the meantime the State Party has indicated it will implement a number of actions leading to the establishment of the no-take zone including revision of the management plan and series of actions to improve protection and regulate diving and maritime traffic.

The nominated property has an enormous buffer zone of over 14 million ha which, if well-managed, would considerably increase the conservation value of the property. As is noted below, measures are needed to strengthen buffer zone management.

Whilst IUCN recommends that the entire marine area of the nominated property be covered by a no-take zone, it nevertheless considers that the boundaries of the property as nominated meet the requirements of the Operational Guidelines.

4.3 Management

As noted above CONANP is charged with the management of the nominated property. CONANP is an experienced and competent national level management body. They also work in close collaboration with a number of very active NGOs (in

particular GECI and Pelagios), universities, the private sector (dive companies) and the Mexican Navy to achieve management objectives. CONANP is adequately equipped to manage the property.

In 2014 the Secretariat of the Mexican Navy, SEMARNAT, and PROFEPA signed a collaboration agreement for the "Protection of Ecosystems and Natural Resources". This agreement enables inspection and surveillance measures in Mexico with special emphasis in the conservation of their environmental resources. One of the most important consequences is the mobilization of eight patrol boats for surveillance of Mexican waters.

Legally in Mexico every protected area needs to have an advisory committee composed of all stakeholders (representatives of the federal government, research institutions and academics, non-governmental organizations, and providers of tourist services) and in 2011 an advisory committee, meeting twice a year, was created for the Archipiélago de Revillagigedo.

The Management and Conservation Plan for the Archipiélago de Revillagigedo, published in 2007 and updated in 2012 with a legal requirement that it be updated every five years, is considered fully adequate for the management of the nominated property. The plan has monitoring measures in place particularly focused on alien invasive species (AIS) and effectiveness of AIS management programmes. Surveys on key indicators such as bird and lizard abundance are being undertaken. The plan appropriately emphasizes the importance of interagency cooperation to support surveillance and protection. Of positive note, since 2013 work plans have been jointly implemented by relevant authorities including SEMAR, SEMARNAT, PROFEPA, the Commission of Fisheries (CONAPESCA) and CONANP. Through its supplementary information the State Party has indicated the management plan will be reviewed to consider recommendations proposed by the IUCN mission, including the revision of administrative regulations to exclude fishing activities and better control tourism.

The Reserve receives what appears to be only modest annual operational funding from the federal government (USD 9,000-18,000 p.a.). Staff salaries are separately funded and the government allocation is supplemented by funding from various sources, much of it linked to projects such as the Conservation Program for Sustainable Development (PROCOCES) on baseline invertebrate studies or the Conservation Program for Species at Risk (PROCER) which focuses on habitat restoration for the endemic Socorro Dove. Other special purpose funding comes from NGOs, research institutes, international aid and foundations. The evaluation mission learned of funding to construct a biological research station linked to the Naval station on Socorro. Funding can also be raised from the Fondo Mexicano para la Conservación de la Naturaleza, an endowment fund that contributes to protected area conservation. In sum the modest government funding is supplemented such that an

annual budget of USD 43,000 was available to the property in 2015.

The nomination dossier is inconsistent in its information on staffing levels but CONANP has 6-8 permanent staff supplemented by a number of volunteers to cope with seasonal tours demand. Staff numbers are low given the large size of the property and vast surrounding marine buffer zone. This limited capacity within CONANP highlights the importance of effective interagency collaboration. The joint work with the Navy is critical to boost management presence.

The State Party has reported a number of new management proposals including proposals to purchase new patrol boats and surveillance drones and the introduction of GPS tracking to monitor sport fishing and to explore catch and release recreational fishing in cooperation with CONAPESCA. CONANP will also discuss with the Mexican Navy options to deal with solid waste and waste water to reduce impact to the surrounding areas as well as to explore the use of renewable energy and sustainable practices.

IUCN considers the management of the nominated property meets the requirements of the Operational Guidelines.

4.4 Community

The nominated property is uninhabited apart from the presence of a Mexican Navy station on Socorro (around 100 people) and a very small base on Clarión (around 10 people). There are thus no known issues concerning community tenure or rights. As noted above the Advisory Committee established for the Archipiélago de Revillagigedo fulfills a stakeholder engagement function to ensure some broader input into the management of the nominated property.

4.5 Threats

The Archipiélago de Revillagigedo is remote and largely uninhabited so threats are relatively low. The naval station on Socorro has resulted in localized impact surrounding the base, 8 km of sealed road, a recently reconstructed 1.6 km airstrip, and a 70m long port capable of docking a medium-sized battleship. A number of invasive animals were introduced to the islands as a result of this human occupation.

The greatest threat to the islands is introduced species. Major conservation successes by the Mexican Government working with NGOs have seen the eradication of pigs and sheep from Clarión in 2002, and sheep from Socorro by 2010. Unfortunately rabbits (and iguanas) remain on Clarión, and cats and mice on Socorro. However, it must be stressed that no rats have ever reached the Archipiélago de Revillagigedo, which is extremely rare and fortuitous in a tropical island system. There are also some potentially invasive plant species, including some grass species and a relatively small area of guava (*Psidium guaiava*) which should be removed. These invasive species cause great damage by increasing erosion, preying native species and out-competing or hybridising with

native vegetation. However, the single largest threat to the islands is the potential introduction of rats to Socorro, given that the naval base is resupplied every 2 weeks, and at times large ships dock at the port. The mission was informed that a biosecurity plan had received GEF funding and would soon be prepared. There is strong commitment evident on the part of concerned authorities to ensure that no new invasives arrive on the islands but this will require constant vigilance.

To date tourism has been restricted by the Mexican Government to a set number of diving boats, and no people are allowed on-shore without a permit. A 2014 study estimated the diving carrying capacity at approximately 33,400 dives per season, however, surveys suggest actual figures maybe as high as 53,300 dives per season. Diving regulations are set in the management plan, and given the restricted number of potential dive sites and their small area, it is unlikely that diving impacts within the nominated area will increase. The mission strongly advised that no new dive boat permits be issued in order to reduce future pressures from ecotourism. It would also be useful to introduce a system for installing and maintaining permanent anchor points for the dive boats, which station themselves in the same places at a limited number of dive sites.

Fishing is restricted through the marine area zoning system, however, there are concerns regarding policing and instances of sport fishing. For example a "sport fishing fleet" of around 10 vessels from San Diego, USA, conducts several trips per year, capturing large amounts of fish which is then sold in the United States. Improved monitoring is needed to prevent sport fishers entering no fishing zones and to manage their impacts and the possibility noted above of GPS tracking should be advanced. Enhanced measures are also needed to differentiate uses and controls in the buffer zone as opposed to marine areas outside. At present the buffer zone is simply a line on a map and there seems to be no appreciable difference between what one can do inside versus outside the buffer zone. If fishing in the large proposed buffer zone was managed to be sustainable, this would counteract the potential or real threat of over-fishing in the region.

Finally occasional fires (it would seem from the naval stations, lightning, or volcanic activity) were listed as a potential threat and seem to have been a problem in areas where herbivore grazing reduced the native vegetation to introduced grasses (particularly on Clarión). The nomination notes that the removal of sheep as well as rabbits, which is considered as a priority action for Clarión, will diminish the fire risk, plus naval personnel are trained in fire-fighting.

In conclusion the nominated property is of adequate size and includes all elements necessary to express its outstanding values in the terrestrial and marine realms. Integrity of the marine area will be further strengthened if the entire area of the property becomes a no-take zone, and fishing regulations are strengthened in the large proposed buffer zone. For terrestrial values it must be noted that past development, i.e. the

introduction of invasive sheep, pigs, cats, rabbits and mice, have considerably damaged some of its values, but rats were never introduced to the islands which is exceptional for subtropical islands of this size. It is to be commended that pigs and sheep have been eradicated and the numbers of cats on Socorro have been severely reduced with the hope that they too will be eradicated.

CONANP, the site managers, and all its partners are well-organised and committed to protecting the property and there are long-term regulatory as well as financial procedures in place to ensure that its values and integrity are maintained and improved. Government funding should be increased to ensure it is adequate and sustainable to guard against over-dependence on short-term, project-dependent funding from a variety of sources.

In conclusion IUCN considers that the integrity, protection and management of the property meet the requirements of the Operational Guidelines.

5. ADDITIONAL COMMENTS

5.1 Justification to serial approach

When IUCN evaluates a nomination of a serial World Heritage property, it asks the following questions:

a) What is the justification for the serial approach?

A serial configuration is appropriate given the vast marine areas involved in any contiguous design which would connect all four islands. The proposed site design is thus considered a feasible approach to protecting the values of this region in a way that is manageable. All of the four islands are necessary to illustrate the Archipiélago de Revillagigedo's ongoing evolutionary processes and endemism, especially as from the terrestrial point of view there are endemic species (or subspecies) specific to each island. Each island has its own particular characteristics that collectively add to the Outstanding Universal Value of the property as a whole. The connectivity of the Archipiélago de Revillagigedo is crucial to some of the more mobile species such as sharks, whales, manta rays, tuna and birdlife which migrate from one area to another and indeed in some cases from much further afield.

b) Are the separate component parts of the nominated property functionally linked in relation to the requirements of the Operational Guidelines?

The islands are functionally linked given that they are connected by the vast marine buffer zone, with the marine species moving between the islands. Many species overlaps occur between the different components of the property, while each island also has a particular suite of species depending on variations in volcanic activity and ecological characteristics. The interconnecting massive buffer zone supports the dynamics of this extensive marine and island system.

c) Is there an effective overall management framework for all the component parts of the nominated property?

The nominated area is managed as a single entity under a common management plan and single managing agency CONANP.

6. APPLICATION OF CRITERIA

The **Archipiélago de Revillagigedo** has been nominated under all four natural criteria (vii), (viii), (ix) and (x).

Criterion (vii): Superlative natural phenomena or natural beauty or aesthetic importance

Both the landscape and seascape of the Archipiélago de Revillagigedo exhibit impressive active volcanos, arches, cliffs, and isolated rock outcrops emerging from the middle of the ocean. The clear surrounding waters create exceptional scenic vistas with large aggregations of fish gathering around the steep walls and seamounts, as well as large pelagic marine species including Giant Manta Rays, whales, dolphins and sharks. One of the most remarkable aspects of the property is the concentration of the Giant Manta Rays which aggregate around the islands and interact with divers in a special way that is rarely found anywhere in the world. Furthermore, the property encompasses an underwater seascape with abyssal plains at depths close to 4,000 meters and sheer drops in crystal clear water, all contributing to an awe-inspiring underwater experience. A large population of up to 2,000 Humpback Whales visit the islands. The songs of these majestic cetaceans can be heard during the winter months and while diving, add another sensory dimension to the marine seascape.

IUCN considers that the nominated property meets this criterion.

Criterion (viii): Earth history and geological processes

The nominated property provides well-exposed and pristine evidence of the interaction between geological processes and oceanic erosion in the formation of volcanic islands, and a range of features of geological interest, including some that are not described in the nomination document. However the claims made for global significance are not supported by convincing comparative analysis in the nomination, and appear to not demonstrate as strong a level of scientific interest as better known sites, such as those in Hawai'i, the Canary Islands, Galápagos and Iceland. The main frame of reference taken for the justification of the criterion appears to be regional rather than global, and the nominated property is not recognised in past thematic studies as representing a gap under criterion (viii). Whilst further work would be needed to consider if any revised case could be considered under this criterion, based on the lack of justification in the nomination, and the mainly unfavourable views of desk

reviewers, there does not appear to be a basis for Outstanding Universal Value to be recognised under criterion (viii).

IUCN considers that the nominated property does not meet this criterion.

Criterion (ix): Ecosystems/communities and ecological/biological processes

The Archipiélago de Revillagigedo is located in the northern part of the Tropical East Pacific Province, a transitional zone influenced mainly by the California current but mixed with the warm waters from the North Equatorial Current. This location results in the convergence of a multitude of fauna and flora, and creates a unique set of biological and ecological processes. The isolation and relatively pristine state of these islands has supported evolutionary processes which result in a high degree of endemism in both the terrestrial as well as marine realms. In the marine realm the waters surrounding these islands are composed of majestic aggregations of sharks, rays, cetaceans, turtles and fish, a number of which are endemic or near-endemic. On land, important evolutionary processes have led to the speciation of two endemic lizards, two endemic snakes, 4 endemic birds, at least 33 endemic plant species, and innumerable invertebrates. In addition, 11 endemic subspecies of birds have evolved on the islands, indicating the potential for future evolution on these remote and well protected islands.

IUCN considers that the nominated property meets this criterion.

Criterion (x): Biodiversity and threatened species

The geographic isolation of the Archipiélago de Revillagigedo, shaped by the prevailing oceanographic conditions, results in high marine productivity, rich biodiversity and exceptional levels of endemism, both terrestrial and marine. The islands are the only breeding site for the Townsend's Shearwater, one of the rarest seabirds in the world. The Archipiélago de Revillagigedo is also home to numerous endemic species which include the Socorro Dove, Socorro Mockingbird, Socorro Wren, Clarión Wren (as well as 11 endemic bird subspecies), 2 lizards, 2 snakes, and numerous endemic plants and invertebrates, all which contribute to the importance of these islands in conserving terrestrial biodiversity. In the marine realm at least 10 reef fish species have been identified as endemic or near-endemic including the spectacular Clarión Angelfish (VU), which can be observed in 'cleaning stations' feeding on the ectoparasites of the Giant Manta Rays. These rays, some of them unusually completely black, aggregate in some of the largest numbers known worldwide. The property is a haven for a rich diversity of shark species with up to 20 having been recorded. Up to 2,000 Humpback Whales also migrate through these nutrient rich and productive waters. The islands are also of significant importance to seabirds notably Masked, Blue-footed, Red-footed and Brown Boobies, Red-billed Tropicbirds, Magnificent Frigatebirds and many other species which can be seen soaring around the rocky outcrops where they nest and fish in the sea.

IUCN considers that the nominated property meets this criterion.

7. RECOMMENDATIONS

IUCN recommends that the World Heritage Committee adopts the following draft decision:

The World Heritage Committee,

1. Having examined Documents WHC/16/40.COM/8B and WHC/16/40.COM/INF.8B2,
2. Inscribes the **Archipiélago de Revillagigedo (Mexico)** on the World Heritage List under natural criteria (vii), (ix) and (x);
3. Adopts the following Statement of Outstanding Universal Value:

Brief synthesis

The Archipiélago de Revillagigedo is located in the eastern Pacific Ocean, some 390 km southwest of the southern tip of the Baja California Peninsula, and 720 to 970 km west of the Mexican mainland. The Archipiélago de Revillagigedo is a serial nomination made up of four remote islands and their surrounding waters: Isla San Benedicto, Isla Socorro, Isla Roca Partida and Isla Clarión. The property covers some 636,684 hectares (ha) and includes a marine protected area extending 12 nautical miles around each of the islands. A very large buffer zone of 14,186,420 ha surrounds all four islands. Ocean depths within the buffer zone of the property reach 3.7 km, particularly to the west of Isla Roca Partida, and to the west and south of Isla Clarión. Due to their volcanic origin, depths around the islands increase abruptly at distances of between 10-12 km from the island shorelines. The Archipiélago de Revillagigedo is part of a submarine mountain range with the four islands representing the peaks of volcanoes emerging above sea level. Apart from two small naval bases, the islands are uninhabited.

The Archipiélago de Revillagigedo represents an exceptional convergence of two marine biogeographic regions: the Northeastern Pacific and Eastern Pacific. More particularly, the property lies along the junction where the California and Equatorial current mix generating a complex and highly productive transition zone. The islands and surrounding waters of the Archipiélago de Revillagigedo are rich in marine life and recognised as important stepping-stones and stop overs for wide ranging species. The property harbours abundant populations of sharks, rays, large pelagic fish, Humpback Whales, turtles and manta rays; a concentration of wildlife that attracts recreational divers from around the world.

Each of the islands displays characteristic terrestrial flora and fauna and their relative isolation has resulted in high levels of species endemism and micro-endemism, particularly among fish and bird species, many of which are globally threatened. The islands provide critical habitat for a range of terrestrial and

marine creatures and are of particular importance to seabirds with Masked, Blue-footed, Red-footed and Brown Boobies, Red-billed Tropicbirds, Magnificent Frigatebirds and many other species dependent on the island and sea habitats. The Archipiélago de Revillagigedo is the only place in the world where the critically endangered Townsend's Shearwater breeds.

Criteria

Criterion (vii)

Both the landscape and seascape of the Archipiélago de Revillagigedo exhibit impressive active volcanos, arches, cliffs, and isolated rock outcrops emerging from the middle of the ocean. The clear surrounding waters create exceptional scenic vistas with large aggregations of fish gathering around the steep walls and seamounts, as well as large pelagic marine species including Giant Manta Rays, whales, dolphins and sharks. One of the most remarkable aspects of the property is the concentration the Giant Manta Rays which aggregate around the islands and interact with divers in a special way that is rarely found anywhere in the world. Furthermore, the property encompasses an underwater seascape with abyssal plains at depths close to 4,000 meters and sheer drops in crystal clear water, all contributing to an awe-inspiring underwater experience. A large population of up to 2,000 Humpback Whales visits the islands. The songs of these majestic cetaceans can be heard during the winter months and while diving, add another sensory dimension to the marine seascape.

Criterion (ix)

The Archipiélago de Revillagigedo is located in the northern part of the Tropical East Pacific Province, a transitional zone influenced mainly by the California current but mixed with the warm waters from the North Equatorial Current. This location results in the convergence of a multitude of fauna and flora, and creates a unique set of biological and ecological processes. The isolation and relatively pristine state of these islands has supported evolutionary processes which result in a high degree of endemism in both the terrestrial as well as marine realms. In the marine realm the waters surrounding these islands are composed of majestic aggregations of sharks, rays, cetaceans, turtles and fish, a number of which are endemic or near-endemic. On land, important evolutionary processes have led to the speciation of 2 endemic lizards, 2 endemic snakes, 4 endemic birds, at least 33 endemic plant species, and innumerable invertebrates. In addition, 11 endemic subspecies of birds have evolved on the islands, indicating the potential for future evolution on these remote and well protected islands.

Criterion (x)

The geographic isolation of the Archipiélago de Revillagigedo, shaped by the prevailing oceanographic conditions, results in high marine productivity, rich biodiversity and exceptional levels of endemism, both terrestrial and marine. The islands are the only breeding site for the Townsend's Shearwater, one of the rarest seabirds in the world. The Archipiélago de Revillagigedo is also home to the endemic Socorro

Dove, Socorro Mockingbird, Socorro Wren, Clarion Wren (as well as 11 endemic bird subspecies), 2 lizards, 2 snakes and numerous endemic plants and invertebrates, all of which contribute to the importance of these islands in conserving terrestrial biodiversity. In the marine realm at least 10 reef fish species have been identified as endemic or near-endemic including the spectacular Clarión Angelfish, which can be observed in 'cleaning stations' feeding on the ectoparasites of the Giant Manta Rays. These rays, some of them unusually completely black, aggregate in some of the largest numbers known worldwide. The property is a haven for a rich diversity of shark species with up to 20 having been recorded. Up to 2,000 Humpback Whales also migrate through these nutrient rich and productive waters. The islands are also of significant importance to seabirds notably Masked, Blue-footed, Red-footed and Brown Boobies, Red-billed Tropicbirds, Magnificent Frigatebirds and many other species which can be seen soaring around the rocky outcrops where they nest and fish in the sea.

Integrity

The Archipiélago de Revillagigedo is remote and largely uninhabited so threats to the property are relatively low. Invasive introduced species represent the greatest threat to the ecology of these islands and their surrounding waters. Major conservation successes by the Mexican Government working with NGOs have seen the eradication of larger invasives such as pigs and sheep from various islands. Ongoing vigilance will be needed to ensure the natural systems of the archipelago are not impacted by damaging invasive species. Enhanced biosecurity measures directed by a biosecurity plan are required to protect the ecosystems of the archipelago from this threat.

To date tourism has been restricted by the Mexican Government to a set number of diving boats, and no people are allowed on-shore without a permit. Diving carrying capacities and regulations are set in the management plan, and given the restricted number of potential dive sites and their small area, it is unlikely that diving impacts within the nominated area will increase. Fishing is restricted through the marine area zoning system, however, there are concerns regarding policing and instances of sport fishing. The extension of a no-take fishing zone by 12 nautical miles to align with the property boundaries is considered essential to bolster protection of the island's marine resources as is the enforcement of strengthened fishing regulations in the property's large buffer zone.

In conclusion the nominated property is of adequate size and includes all elements necessary to express its outstanding values in the terrestrial and marine realms. Integrity of the marine area will be further strengthened if the entire area of the property becomes a no-take zone, and fishing regulations are strengthened in the large proposed buffer zone. For terrestrial values it must be noted that past development, i.e. the introduction of invasive sheep, pigs, cats, rabbits and mice, have considerably damaged some of its values, but rats were never introduced to the islands which is exceptional for subtropical islands of this size. It is to

be commended that pigs and sheep have been eradicated and the numbers of cats on Socorro have been severely reduced with the hope that they too will be eradicated.

Protection and Management requirements

The Archipiélago de Revillagigedo is Mexican federal territory and all parts of the property are hence state owned and controlled. The property is protected under a range of legislation pertinent to different agency jurisdictions with the principle protective legislation being the General Law of Ecological Balance and the Protection of the Environment (LGEEPA). The islands are managed as a natural protected area by the Natural Commission of Natural Protected Areas (CONANP) in close collaboration with a number of other government authorities and various NGO and university partners. Of particular importance is the effective collaboration with the Mexican Navy who provide staffing and infrastructure support to monitor the islands and ensure the enforcement of regulations. This cooperation among agencies is doubly important to augment relatively modest staffing and government financial resources which are applied to the property.

Improved monitoring is needed to prevent sport fishers entering no fishing zones and to manage their impacts. Efforts are also needed to ensure that fishing in the very large surrounding buffer zone is managed to be sustainable so as to counteract the potential or real threat of over-fishing in the region.

Management emphasis should be applied to the control and where possible eradication of alien invasive species from the islands and their marine environments. A biosecurity plan should also direct quarantining and response mechanisms to ensure protection from potential introduction threats. This is particularly important to maintain the island's rat free status which is both unusual in a sub-tropical island system and crucial to maintaining healthy functioning ecosystems and protecting key species.

Additional research and inventory is needed to better understand the biodiversity values of the property in particular submarine and deep sea ecosystems.

4. Requests the State Party, in order to further strengthen the integrity and long term management of the property, to:

- a) increase legal protection and revise the management plan in order to extend the no-take zone to 12 nautical miles from the islands, thereby aligning it to the boundary of property;
- b) strengthen monitoring and targeted management of alien invasive species within the property and introduce and rigorously implement a biosecurity plan to guard against the future spread of introduced species;
- c) ensure careful management of tourism in anticipation of future increases in the activities of recreational divers in order mitigate adverse impacts on marine environments and important species such as Humpback Whales and Giant Manta Rays;
- d) install, with the support of the diving boat operators, a limited number of permanent mooring buoys in agreed and limited locations, to reduce the impact of anchoring and to prohibit anchoring outside of these locations; and
- e) undertake further research into the property's biodiversity and ecology particularly in sub-marine and deep sea ecosystems in order to better understand and manage for the protection of the full marine resources of the property.

5. Commends the State Party for establishing strong inter-agency collaboration to protect the property and encourages strengthened cooperation particularly with the Mexican Navy and the Commission of Fisheries (CONAPESCA) to tighten uses and controls in the buffer zone; to improve capacity to address illegal fishing including sport fishing; to regulate diving activity; and to provide effective biosecurity measures for the property.

6. Request the State Party to provide to the World Heritage Centre a report on progress regarding the establishment of the extended no-take zone; improved monitoring and regulation of fishing; proposed improvements to overall management capacity, improved biosecurity measures and other matters by 01 December 2018, for review by IUCN.

Map 1: Location of the nominated property in the Pacific Ocean



Map 2: Nominated property (4 components) and buffer zone

