

LATIN AMERICA / CARIBBEAN

**EL PINACATE AND GRAN DESIERTO DE ALTAR
BIOSPHERE RESERVE**

MEXICO



WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

EL PINACATE Y GRAN DESIERTO DE ALTAR BIOSPHERE RESERVE (MEXICO) – ID No. 1410

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

Key paragraphs of Operational Guidelines:

77 Property meets natural criteria.

78 Property meets conditions of integrity and protection and management requirements.

1. DOCUMENTATION

a) Date nomination received by IUCN: 25 March 2012

b) Additional information officially requested from and provided by the State Party: IUCN requested in its letter of 20 December to the State Party the possibility to consider modifications of the boundary of the nominated property as to align it with the boundaries of the National Biosphere Reserve, to refine the buffer zones as to maximize their effectiveness to maintain the integrity of the nominated property, and to assess the potential to consider the eventual inclusion of the adjacent Bahía de Adair Ramsar site. The State Party provided an official response, supported by revised maps of the nominated property, outlining the revised boundaries of the nominated property.

c) Additional literature consulted: Chester, C.C. 2006. **Conservation across Borders.** Biodiversity in an Interdependent World. Island Press. Cohn, J.P. 2007. **The Environmental Impacts of a Border Fence.** BioScience 57(1). American Institute of Biological Sciences. Felger, R.S., Broyles, B., Ezcurra, E. 2005. **Dry Borders: Linking Nature Reserves across the Sonora – Arizona Border.** In: Mittermeier, R.A. Kormos, C.F., Mittermeier, C.G., Robles Gil, P., Sandwith, T. Besancon, C. 2005. **Transboundary Conservation: A New Vision for Protected Areas.** Goudie, A., Seely, M. 2011. **World Heritage Desert Landscapes: Potential Priorities for the Recognition of Desert Landscapes and Geomorphological Sites on the World Heritage List.** Gland, Switzerland. IUCN. Hayden, J.D. 1998. **The Sierra Pinacate.** Southwest Center Series. University of Arizona Press, Tucson. Hume, B. 2000. **Water in the U.S.-Mexico Border Area.** Natural Resources Journal, Vol. 40, No. 2. Marshall, L.G., Blake, C. 2009. **Land of Black Volcanoes and White Sands.** The Pinacate and Gran Desierto de Altar Biosphere Reserve. Environmental Education Exchange, Tucson, Arizona. Murguía, M. 2000. **El Agua en la Reserva de la Biosfera el Pinacate y Gran Desierto de Altar, Sonora, Mexico:** Comunidades, Vida Silvestre y la Frontera con Estados Unidos. IMADES. Natural Resources Journal, Vol. 40, No. 2. Salazar, J., Spalding, M. 2007. **Adjacent U.S.-Mexican Border Natural Protected Areas: Protection, Management, and Cooperation.**

In: Van Schoik, D.R., Lelea, E., Cunningham, J., Salazar, J., Spalding, M., Brown, C., Czerniak, R., Buscaglia, C. Graizbord, C. de la Fuente, E., Singh, J. 2007. **The US-Mexican Border Environment. Transboundary Ecosystem Management.** Pp. 69-107. SCERP Monograph 15. Wood, C. 2009. **World Heritage Volcanoes: Thematic Study.** Global Review of Volcanic World Heritage Properties: Present Situation, Future Prospects and Management Requirements. IUCN, Gland, Switzerland.

d) Consultations: 13 external reviewers consulted by IUCN. The field evaluators met with representatives of governmental institutions CONALMEX (National UNESCO Commission), SEMARNAT (Ministry of Environment), SEP (Ministry of Education), CONANP (Protected Areas Agency under SEMARNAT), INAH (National Institute for Anthropology and History) and SRE (Ministry of Foreign Affairs) and with representatives of State and municipal governments in Sonora (Tourism, Environment, Forests, Environmental Attorney, Commission for Ecology and Sustainable Development). In the field, the mission was accompanied by CONANP headquarters staff, the Regional Director and the Director of the nominated property, as well as the entire park staff. The Director and staff of the contiguous Upper Gulf of California and Colorado River Delta Biosphere Reserve were also consulted. Further meetings were held with: Advisory Council of the Biosphere Reserve, representatives of the Tohono O'odham Nation, a representative of private landowners ("ejidos"). The field evaluators also met with non-governmental and academic institutions including the International Sonoran Desert Alliance (ISDA), Centro Intercultural de Estudios de Desiertos y Océanos, Museo de la Universidad de Baja California, University of Sonora, Mexican Institute for Ecology (INE), Autonomous University of Mexico (UNAM), University of Arizona Tucson, Scripps Institution of Oceanography / University of California San Diego (UCSD), University of California Institute for Mexico and the United States (UC MEXUS).

e) Field Visit: Tilman Jaeger and Doris Cordero, 23-29 October 2012

f) Date of IUCN approval of this report: April 2013

2. SUMMARY OF NATURAL VALUES

El Pinacate and Gran Desierto de Altar National Biosphere Reserve (EPGDABR) is located in the Sonoran Desert. The Sonoran Desert is one of four great North American deserts along with the Chihuahuan Desert, the Great Basin Desert and the Mojave Desert. Surrounding The Sonoran Desert extends across most of the Peninsula of Baja California, including large parts of the Mexican State of Sonora. On the United States of America side, the Sonoran Desert extends across the southernmost third of Arizona and a smaller area in South-Eastern California. The entire nominated property is in the Mexican State of Sonora. The nominated property, following the revision of the boundaries originally proposed in the nomination document, coincides with the National Biosphere Reserve and has a surface of 714,566ha surrounded to the East, South and West by a buffer zone of 763,631ha. To the North the nominated property aligns with the USA border.

EPGDABR is a large, relatively undisturbed protected area, part of a vast network of various conservation units on both sides of the international border between Mexico and USA. This complex, sometimes referred to as the "Greater Sonoran Desert Protected Ecosystem", exceeds three million hectares and is considered the largest contiguous desert protected area complex in North America.

As reflected in the name of the nominated property, the diverse and visually stunning desert landscape of EPGDABR comprises two very distinct broad landscape types. To the East, there is a dormant volcanic area of around 200,000 ha, comprised of the Pinacate Shield, extensive black and red lava flows and desert pavement. The volcanic shield boasts a wide array of volcanic phenomena and geological formations, including a small shield-type volcano (Santa Clara). To the West towards the Colorado River Delta and South towards the Gulf of California, is the Gran Altar Desert, North America's largest field of active sand dunes and only active Erg dunes. The dunes can reach 200 meters in height and contain linear dunes, star dunes and dome dunes, displaying enormous and constantly changing contrasts in terms of form and color. The dunes originate from sediments from the nearby Colorado Delta and local sources. Besides, there are several arid granite massifs emerging like islands from the sandy desert flats, ranging between 300 and 650 m.a.s.l., which represent another remarkable landscape feature harbouring additional and distinct plant and wildlife communities.

The variety of landscapes is reflected in habitat diversity. The diversity of life forms across many different taxa is notable. Many species are endemic to the Sonoran Desert or even locally to (parts of) the nominated property. All feature sophisticated physiological and behavioural adaptations to the extreme environmental conditions. This includes for example the ability of the Pronghorn to feed on thorny cactus species or the extremely long seed dormancy of most plants. According to the nomination dossier, the subtropical desert ecosystem hosts more than 540

species of vascular plants, 44 mammals, more than 200 birds, over 40 reptiles, as well as several amphibians and even two endemic species of freshwater fish.

The biodiversity richness of this desert appears to be a product of a very unusual freshwater regime. At first sight, water seems almost non-existent in a place considered to be the driest in all of North America. However, despite minimal rainfall, the very particular bi-seasonal precipitation pattern favours localized but permanent water availability in so-called "tinajas", natural rain-fed water tanks in the lava or rock that capture and retain rainwater. Depending on precipitation patterns and the particular nature of the "tinaja", some of them contain water year-round, thus serving as a crucial resource for wildlife. A small stretch of the otherwise intermittent Sonoyta River is likewise a permanent and ecologically important source of freshwater. This area is located in the Northeast of the nominated property and has been recognized as a Ramsar site. Furthermore, there is ecologically important air moisture input from the nearby Gulf of California. There are a number of Artesian wells to the South of the nominated property.

3. COMPARISONS WITH OTHER AREAS

EPGDABR has been nominated under natural criteria (vii), (viii) and (x). To justify this claim the State Party conducted an extensive comparative analysis. The central claim resulting from the comparative analysis is that the nominated property is home to a wide range of features all of which exist elsewhere but are not found in such a concentrated area. The main feature is the diverse geomorphology of the Gran Altar Desert and the exceptionally rich biodiversity contained in this subtropical desert ecosystem. The analysis compared a number of similar sites against key geomorphological criteria including the presence of Linear Dunes, Star Dunes and Dome Dunes. The analysis concludes that EPGDABR is unique due to the unusual coincidence of large-scale, extraordinary geomorphological desert features and an intact, biodiversity-rich ecosystem, all combined in a stunning landscape. The IUCN thematic study on World Heritage Desert Landscapes mentions EPGDABR highlighting the variety of its desert geological formations combined with impressive volcanic features and granite massifs.

It is noteworthy that there are two inscribed World Heritage properties in the Mexican part of the Sonoran Desert, both serial properties. These are the Whale Sanctuary of El Vizcaino on the Pacific Coast of Baja California and the Islands and Protected Areas of the Gulf of California. One of the components of the latter property (Upper Gulf of California and Colorado River Delta Biosphere Reserve) is very close to the nominated property but it is a restricted marine area. Therefore it can be argued that in both cases the justification for the inscription on the World Heritage List is primarily based on marine and coastal values. In terms of terrestrial biodiversity the key features of EPGDABR are sufficiently distinct to set the nominated

property apart from the existing World Heritage properties in the wider Sonoran Desert.

In relation to Criterion (vii) there is a strong case for exceptional beauty and aesthetics due to the grandeur, scale, intactness, diversity and the sharp visual contrasts of the desert landscape features. There is a rare ensemble of natural features ranging from the dark-coloured Pinacate Peaks at around 1200 m.a.s.l. across the lava flows and the variety of sand dunes all the way to the Gulf of California, only interrupted by rugged, lighter coloured granite ranges. The magnificent views remain essentially unspoiled.

In relation to criterion (viii) what stands out is the scale, huge variety and complexity of desert features. The geomorphology of the dunes is highly diverse, intact, of large scale and based on almost undisturbed ongoing processes. A key feature is the presence of very large star dunes which makes EPGDABR globally unique. In addition the nominated property and its buffer zones comprise 50% of the Greater Sonoran Desert Ecosystem which is of remarkable value in relation to the conservation of this globally important ecosystem.

There is an extraordinary diversity of life across many taxonomic groups characterized by the unexpected availability of freshwater and the presence of a mosaic of habitats, which justify the application of criterion (x). Different types of xerophytic brush dominate the vegetation but many other communities have been identified by scientists (9 to 10 types have been proposed). A widely used study found 560 species of vascular plants, including an endemic plant restricted to the volcanic shield. Even in the seemingly bare dunes 85 highly specialized (short-lived) plants were recorded, of which several are endemic. Four of the plants found in the nominated property enjoy special federal protection. As for fauna, 5 mammals, 15 birds and 22 reptiles occurring in the nominated property are federally protected, an indication of their national rareness. The endemic Sonoran Pronghorn deserves to be mentioned, as some of the last specimens roam in and through EPGDABR. Other highlights include endemic freshwater fish and very large maternity roosts of the migratory Lesser Long-Nosed Bat in lava caves. Their role as pollinators and seed dispersers is just one example of sophisticated plant-animal interactions in this fragile, harsh desert environment. Due to its largely unaltered condition, the nominated area serves as a rare baseline reference of the major scientific interest for the study of desert ecology and many other fields.

In conclusion, there is no doubt that EPGDABR is of major global significance. The mostly pristine and large scale of the nominated property covers half of one of the most globally significant desert ecosystems worldwide when compared to other desert ecosystems worldwide.

4. INTEGRITY, PROTECTION AND MANAGEMENT

4.1. Protection

Besides well-documented historic use by indigenous peoples, human presence and use was extremely limited prior to the construction of Route 2 (connecting Baja California Peninsula with the Mexican mainland, completed in 1956) and Route 8 (connecting Arizona to the Gulf of California through Northern Sonora, completed in the 1940s) because access to the harsh and remote area was extremely difficult.

Starting in the late 1960s, the Mexican government allocated so-called "ejidos" in the Pinacate region. Ejidos are a form of communal land tenure promoted as a component of the Mexican agrarian reform. The expectation to establish agriculture and ranching was of little success when irrigation attempts proved costly and resulted in soil salinization. Even though irrigation efforts were abandoned over the years, most land tenure rights are formally still in place, including within the nominated property. Therefore, EPGDABR has a complex land ownership structure. However this does not appear to constitute a conservation challenge, as there are little incentive or practical options to economically benefit from the land, besides the legal limitations through the protected area status.

The formal conservation history of the nominated property started in 1979, when 28,660 ha were set apart for the Sierra del Pinacate Protected Forest Zone and Wildlife Refuge and then turned into an Ecological Reserve in 1982. El Pinacate y Gran Desierto de Altar Biosphere Reserve was nationally declared by Presidential Decree in 1993. Internationally, it was recognized as a UNESCO Biosphere Reserve jointly with the adjacent Bay of Adair under the name of Alto Golfo de California in 1993, later expanded to include the national Upper Gulf of California and Colorado River Delta Biosphere Reserve. Mexico's "General Law on the Ecological Equilibrium and Environmental Protection" of 1988 is fully applicable to the entire nominated property, regardless of ownership. This law and its regulations specify internal zonation and management requirements including for buffer zones. The buffer zones are considered protected areas according to Mexican legislation where local communities may only engage in activities which have taken place at the time of the establishment of the protected area and which are supportive of conservation and sustainable use.

The site's large size, remoteness, harsh climate and terrain contribute to a high degree of natural protection. The large, contiguous conservation units, including in the United States of America, further contribute to the protection of the nominated property.

IUCN considers the protection status of the nominated property meets the requirements set out in the Operational Guidelines

4.2 Boundaries

As stated above, "Biosphere Reserves" are a protected area category according to Mexican legislation. Both "core zones" and "buffer zones" enjoy full formal protected area status in line with Mexico's "General Law on Ecological Equilibrium and Environmental Protection" (1988). The revised boundaries of the nominated property coincide with the boundaries of the National Biosphere Reserve which facilitates its conservation and management guided by the existing management plan. The integrity of the nominated property is enhanced by an extensive buffer zone that includes to the east extensive natural areas (161,737ha) with almost no human occupation and use due to the predominant extreme harsh desert conditions. To the south the buffer zone covers a portion (408,760ha) of terrestrial and coastal habitats protected by the Alto Golfo de California and Delta del Rio Colorado National Biosphere Reserve. To the west the buffer zone includes vast sand dunes fields (193,134ha) of El Gran Desierto de Altar with no human occupation and only occasionally visited by organized tours. Whilst the northern border of the nominated property aligns with the international border between Mexico and USA there are three protected areas in the USA: the Organ Pipe Cactus National Monument, Cabeza Prieta National Wildlife Refuge and the Barry M. Goldwater Range, which are effectively managed thereby contributing to the integrity and ecological connectivity of the nominated property.

IUCN considers that the boundaries of the nominated property meet the requirements set out in the Operational Guidelines.

4.3 Management

The nominated property is under the responsibility of the National Commission for Protected Natural Areas (CONANP), which is the agency in charge of all federal protected areas, under the Mexican Ministry of Environment and Natural Resources (SEMARNAT). The responsible Regional Directorate for the Mexican Northwest and the Upper Gulf Region operates out of the Sonoran state capital of Hermosillo. While the Federal Government formally manages EPGDABR, the State Government and local governments of the municipalities neighbouring EPGDABR, in addition to a committed community of conservationists, indigenous groups, researchers and non-governmental organizations, have supported its management.

All Mexican biosphere reserves have mandatory management programmes, refined through thematic sub-programmes (e.g. for tourism, research, monitoring etc.) and annual operational plans. The present overall management programme dates from 1995 and is currently being updated through a participatory process. In line with the existing protected areas legislation the instrument established and used for this purpose is a participatory Advisory Council.

Over the years, the management of the nominated property has vastly improved in terms of human and

financial resources. Locally, there is a dedicated director and 17 staff, including 6 rangers. The formal management team is complemented by a dedicated group of researchers and non-governmental supporters who jointly have accumulated a wealth of knowledge about the area. The regular involvement of local stakeholders increases the chances of broadly accepted management and helps to address possible conflicts.

Facilities include a biological station, housing and office space. Several ranger stations along the three key roads are currently being built, supported by resources from the Federal Ministry for Communications and Transport (SCT). The 2011 budget totalled USD 1,857,000 from different federal and state sources, projects and to a lesser degree from tourist fees. Whilst the budget available for the management of the property is considered adequate there is a need to explore options to ensure the sustainable long-term financial management of the nominated property.

There is a visitor centre named Schuk Toak (the indigenous name of the Pinacate Range) within the property. The visitor centre is supported by federal and state resources and aims to promote tourism. Annual visitors in 2010 totalled 17,504, compared to 6,495 in 2003 and 3,177 in 1997. The centre is well appreciated by tourists and no doubt has further potential for revenue generation as a part of a diversified financing strategy. The tourism potential may explain part of the strong political support the nomination enjoys locally and at State level. Despite important educational and economic opportunities it should be remembered that the fragile and inhospitable desert environment sets tight limits to visitation.

Monitoring of a large number of indicators is carried out by staff in cooperation with several institutions of the Sonoran government and many academic partners. There is a long history of cooperation with governmental and academic partner institutions in the United States of America. The collaboration is not restricted to monitoring but extends across research, species recovery and management.

IUCN considers the management of the nominated property meets the requirements set out in the Operational Guidelines

4.4 Community

The nominated property has a long history of human occupation, as evidenced for example by ancient trails, sleeping circles and numerous archaeological artefacts. The traditional native lands extend across both sides of the current Mexican-US border, which is the reason why the contemporary Tohono O'odham find themselves living in two countries. The Hia C'ed O'odham or "people of the sand", a subgroup within the larger O'odham culture, lived in the area that is today the national Biosphere Reserve. Members of the Tohono O'odham regard the nominated property as part of their native homeland and a spiritual place of origin, celebrated in sacred ceremonies.

Representatives of the Tohono O'odham expressed strong support for the conservation of the nominated property. At the same time, they understandably insist on the need to participate in decision-making. The Advisory Council is an adequate vehicle to do so. Practical concerns mentioned in the discussions with indigenous representatives related to ceremonies, such as the revival of salt pilgrimages to the Gulf of California through the nominated property. There are current efforts to better understand native place names, considering sensitive locations. Management protocols, including tourist and scientific access to archaeological sites, should be determined in consultation with the Tohono O'odham.

4.5 Threats

While most of the Mexican Northwest and the American Southwest along the border has experienced major population growth and economic development over the last decades, EPGDABR continues to be a remote area with comparatively little development and use pressure. Today, there are no permanent residents in the nominated property. A few landowners occasionally enter their "ejidos". Other than that human presence is restricted to protected areas staff and limited numbers of visitors and researchers. Access remains difficult as vast areas consist of rugged lava flows and inhospitable sand dunes, and there is practically no infrastructure. In this sense, the very character of EPGDABR serves as a natural protection.

The value of the nominated property is supported by the various large conservation units in the broader Sonoran Desert on both sides of the border. There are increasing concerns about the connectivity of the land both within Sonora and across the international border, including for flagship species like the Sonoran Pronghorn and the Desert Bighorn Sheep. Major roads are located on the margins (East, South) or within the boundaries of the nominated property. The fencing of roads, typically parallel on both sides of major roads, is common and apparently a legal requirement. Within Sonora, the relatively recent construction of the coastal route has opened a new access and increased the risk of disturbance from that side. Positively, the coastal road is defined as a scenic route which limits size, infrastructure and fencing. The current expansion of Mexican Route 2, parallel to the border near the northern edge of the nominated property, may represent the greatest current disturbance factor. The construction is accompanied by extraction of construction material and water, construction of temporary deviation and access tracks, noise, dust and pollution risks. Encouragingly, the responsible state institution dealing with this infrastructure development is fully involving CONANP in its design and location in order to minimize impacts.

The Sonoran Desert is bisected by the international border between Mexico and the United States of America. It was noted during the field evaluation mission that the border was no obstacle whatsoever until very recently. This changed over the last years, when physical barriers were erected and border control was tightened. In the Northwest of the

nominated property, a high metal barrier prevents the migration from and to the Barry M. Goldwater Range. Elsewhere, the physical infrastructure is restricted to vehicle barriers which are in principle permeable for wildlife. At the same time, other border measures result in unprecedented disturbance. Effectively, what used to be a "soft" international border with a small road in the North of EPGDABR only a decade ago is about to turn into a "development corridor" soon to be comprised of a wide highway, electricity transmission and physical barriers. Whilst the State Party took the decision to not locate electricity transmission infrastructure along the coast, in order to conserve the visual integrity of the nominated property, there is a need to apply the highest environmental standards in the alternative power lines transmission corridor proposed for the northern part of the nominated property.

The environmental conditions of the Sonoran Desert are extreme; however there is an overarching concern that climate change may increase water scarcity, already under pressure from human use in the broader region. This in turn would have severe consequences for vegetation and wildlife. The relatively large size and contiguity with other large-scale conservation units appear to be the best possible mitigation measure to address this challenge. This implies that efforts to maintain or, where needed, enhance ecological connectivity and the prevention of new physical barriers are a good investment to enhance resilience in the face of climate change. This requires conservation and management actions across the international border. Realistic measures at the level of park management might well be restricted to monitoring in order to understand changes and inform adaptive management.

Both surface water and groundwater are scarce resources of utmost ecological importance and under increasing pressure in the Sonoran Desert. With the exception of a short stretch of the Sonoyta River there are no perennial surface water courses in EPGDABR. Agua Dulce, the only permanent stretch of about three kilometres of the river reminds an oasis. It supports important riparian and aquatic habitat for resident and migratory birds, endangered native fishes, rare Sonoyta Mud Turtles and many other species, all reasons for which it was recognized as a Wetland of International Importance under the Ramsar Convention. The Sonoyta River is thus a unique resource. It is also under pressure from pollution and overuse. Waste disposal in the border town of Sonoyta is a concern requiring adequate waste management and sewage treatment facilities. There is also groundwater withdrawal in the watershed on both sides of the border.

Other sources of surface water of major conservation importance are the rain-fed "tinajas" and some Artesian wells in the South of the nominated property. Domestic livestock is thought to compete for this resource and may also pose disease risks as wildlife aggregates near the waterholes. The situation and potential impacts from feral animals needs to be better understood and may require management responses.

Tourism is a major economic factor near the nominated property, most importantly in the nearby coastal resort and fishing town of Puerto Peñasco (Rocky Point). The resort attracts domestic and North American tourists, the latter mostly from nearby Arizona and Southern California. The bordering US side has experienced rapid population growth over the last decades leading to strongly increasing recreation demand on both sides of the border in the Sonoran Desert. At the same time, the economic situation and possibly the perception of the security situation in Northern Mexico have resulted in a noticeable decline of tourism over the last years even though there are ambitious and controversial plans to further promote tourism. The obvious focus is the coastal strip at the head of the Gulf of California. This pressure has been responsible for decades of coastal development.

Indirect impacts to the nominated property of nearby tourism development include increased traffic, which translates in a certain amount of disturbance, road kill of wildlife and littering. More importantly, it creates pressure to extend existing road infrastructure which could facilitate entry points for alien invasive species. Increasing off-road driving has been observed, requiring control and law enforcement in EPGDABR. However the most critical long term issue may be tourism-related water consumption.

On the other hand tourism development opens great opportunities for visitor education and awareness-raising, as well as for conservation financing. The visitor centre stands out as exemplar in this regard. Within the nominated property itself, the harsh environment imposes natural limits to tourism development.

There is a long history of uncontrolled extraction of natural resources facilitated by road construction in the 1940s and 1950s. Volcanic rock and pyroclastic material from the cinder cones, locally known as "morusa", for use in construction and adornment of gardens, has had localized impacts in the past. This practice was abandoned after the declaration of the national Biosphere Reserve.

Extraction of Ironwood and other woody species, such as Mesquite and Ocotillo, for fuelwood, charcoal production and carved handicrafts was an important subsistence and commercial activity. Ironwood is believed to be a keystone species in the desert ecosystem, as its seeds and leaves are important food sources for countless insects, rodents and birds, and acts as a substrate for cacti species. The extraction has come to an end due to the depletion of the resource, legal protection and control efforts. Regeneration is visible but probably occurring at a slow pace given the harsh environmental conditions.

Poaching of fauna for trophy, food and predator control was widespread prior to the establishment of the Biosphere Reserve, however, it seems mostly under control today. Clear regulations are in place and effectively enforced. Nevertheless some poaching is reported to occur which stress the need to maintain effective control and enforcement. In the case of the

highly valued Bighorn Sheep, the strong financial incentive for poaching is difficult to counter. Many of the dirt roads have probably been created by poachers so there is also an indirect impact, including an ongoing visual impact.

Government backed petroleum prospecting reportedly took place some decades ago and the results of possible plans for follow-up appear to be unknown. There is no current exploration or active mining within EPGDABR or its immediate vicinity and there are no current concerns about changes in this regard.

Alien invasive species (AIS), both plants and animals, are of major concern in the wider Sonoran Desert, even in the rare aquatic habitats. A number of experts consulted during the evaluation mission rate IAS among the key conservation challenges. A specific study using the nominated property as a pilot area published in 2005 found 97 invasive plant species. The authors consider 18 of "particular" concern and three of "major" concern: Salt Cedar (*Tamarix ramosissima*), Buffelgrass (*Pennisetum ciliaris*), and Sahara Mustard (*Brassica tournefortii*). The spreading and establishment of AIS varies in relation to access, humidity and the prevalence of wildlife or domestic livestock. The central parts of the nominated property have been spared from major invasions due to their relative isolation and the exceptional aridity of the nominated property. Of major concern are the rare and valuable riparian habitats along the Sonoyta River where AIS compete with native species. Salt Cedar, a well-known invasive across the entire Colorado River Basin changes the ecology of rare and fragile riparian habitats. In water, non-native species compete with the struggling populations of two endemic fish species. In terms of animal species the key concerns appear to be feral pets and livestock, including cats, dogs, donkeys, goats and cows, competing with, preying on or spreading diseases to native species. Monitoring, eradication when possible, and prevention of further invasions will have to be a component of future management of EPGDABR.

In conclusion, IUCN considers the nominated property meets the conditions of integrity as outlined in the Operational Guidelines.

5. ADDITIONAL COMMENTS

5.1 Transboundary natural resource management and conservation along the US-Mexican border

The international border between Mexico and the United States of America harbours many and very diverse areas of major conservation importance along its roughly 2000 miles, including well known protected areas in the Sonoran Desert. Transboundary conservation efforts in the Sonoran Desert date back as early as the 1930s and have continued since that time at very different levels. Concrete discussions about a formal transboundary protected area started in the 1960s. Building upon several earlier agreements, the U.S. Department of the Interior (DOI) and

SEMARNAT signed a Letter of Intent (LOI) on Adjacent Protected Areas in 1997. The LOI names the Western Sonoran Desert region as one of two pilot areas, explicitly including the nominated property. Within this encouraging framework, there has been a wealth of ongoing information exchange, staff exchange programs, joint environmental education, cooperation on AIS removal, and species conservation.

More recently, border security aspects have increasingly dominated government decision-making in the border region. Drug trafficking and illegal immigration have increased in remote areas along the border between Mexico and the USA. The new physical infrastructure, a high wall along the border, and augmented security activities on the US side, have generated negative impacts and have also introduced a new barrier for wildlife movements. It is hoped that the present governmental focus on security issues will not undermine the encouraging and functional working relationships across the border.

6. APPLICATION OF CRITERIA

The El Pinacate and Gran Desierto de Altar Biosphere Reserve has been nominated under criteria (vii), (viii) and (x).

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

The property presents a dramatic combination of desert landforms, comprising both volcanic and dune systems as dominant features. The volcanic shield in the nominated property boasts a wide array of volcanic phenomena and geological formations, including a small shield-type volcano. The visually most striking feature is the concentration of a total of 10 enormous, deep and almost perfectly circular Maar (steam blast) craters, believed to originate from a combination of eruptions and collapses. The nominated property is visually outstanding through the stark contrast of a dark-coloured area comprised of a volcanic shield and spectacular craters and lava flows within an immense sea of dunes. The dunes can reach 200 meters in height and contain linear dunes, star dunes and dome dunes, displaying enormous and constantly changing contrasts in terms of form and color. In addition to these predominant features there are several arid granite massifs ranging between 300 and 650m high which emerge like islands from the sandy desert flats. The combination of all these features results in a highly diverse and visually stunning desert landscape.

IUCN considers that the nominated property meets this criterion.

Criterion (viii): Earth's history and geological features

The property's desert and volcanic landforms provide an exceptional combination of features of great scientific interest. The vast sea of sand dunes that surrounds the volcanic shield is considered the largest and most active dune system in North America. It includes a diverse range of dunes that are nearly

undisturbed, and include spectacular and very large star-shaped dunes that occur both singly and in long ridges up to 48km in length. The volcanic exposures provide important complementary geological values, and the desert environment assures a dramatic display of a series of impressive large craters and more than 400 cinder cones, lava flows, and lava tubes. Taken together the combination of earth science features is an impressive laboratory for geological and geomorphological studies.

IUCN considers that the nominated property meets this criterion.

Criterion (x): Biodiversity and threatened species

The highly diverse mosaic of habitats is home to complex communities and surprisingly high species diversity across many taxonomic groups of flora and fauna. More than 540 species of vascular plants, 44 mammals, more than 200 birds and over 40 reptiles inhabit the seemingly inhospitable desert. Insect diversity is high and not fully understood. Several endemic species of plants and animals exist, including two freshwater fish species. One local endemic plant is restricted to a small part of the volcanic shield within the nominated area. Large maternity caves of the migratory Lesser Long-Nosed Bat, which is important for pollination and seed dispersal are found within the nominated property. Noteworthy species include the Sonoran Pronghorn, an endemic subspecies of the Pronghorn restricted to Southwestern Arizona and Northwestern Sonora and threatened by extinction.

IUCN considers that the nominated property meets this criterion

7. RECOMMENDATIONS

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

The World Heritage Committee,

1. Having examined Documents WHC-13/37.COM/8B and WHC-13/37.COM/INF.8B2;

2. Inscribes the **El Pinacate and Gran Desierto de Altar Biosphere Reserve, Mexico**, on the World Heritage List under natural criteria (vii), (viii), and (x);

3. Adopts the following Statement of Outstanding Universal Value:

Brief synthesis

El Pinacate and Gran Desierto de Altar Biosphere Reserve (EPGDABR) is located in the Sonoran Desert. The Sonoran Desert is one of four great North American deserts along with the Chihuahuan Desert, the Great Basin Desert and the Mojave Desert. EPGDABR has a surface of 715,567 hectares with 354,871 hectares of buffer zone. It is a large and relatively undisturbed protected area which comprises two very distinct broad landscape types. To the East, there is a dormant volcanic area of around 200,000 ha, comprised of the Pinacate Shield with extensive black

and red lava flows and desert pavement. The volcanic shield boasts a wide array of volcanic phenomena and geological formations, including a small shield-type volcano. The most visually striking feature is the concentration of a total of 10 enormous, deep and almost perfectly circular Maar (steam blast) craters.

In the West towards the Colorado River Delta and South towards the Gulf of California, is the Gran Altar Desert, North America's largest field of active sand dunes and only active Erg dunes. The dunes can reach 200 meters in height and contain a variety of dunes types. The dunes originate from sediments from the nearby Colorado Delta and local sources. In addition, there are several arid granite massifs emerging like islands from the sandy desert flats, ranging between 300 and 650 m.a.s.l., which represent another remarkable landscape feature harbouring distinct plant and wildlife communities.

The variety of landscapes results in extraordinary habitat diversity. The diversity of life forms across many different taxa is notable with many species endemic to the Sonoran Desert or more locally restricted to parts of the property. All feature sophisticated physiological and behavioural adaptations to the extreme environmental conditions. The subtropical desert ecosystem reportedly hosts more than 540 species of vascular plants, 44 mammals, more than 200 birds, over 40 reptiles, as well as several amphibians and even two endemic species of freshwater fish.

Criteria

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

The property presents a dramatic combination of desert landforms, comprising both volcanic and dune systems as dominant features. The volcanic shield in the property boasts a wide array of volcanic phenomena and geological formations, including a small shield-type volcano. The most visually striking feature is the concentration of a total of 10 enormous, deep and almost perfectly circular Maar (steam blast) craters, believed to originate from a combination of eruptions and collapses. The property is visually outstanding through the stark contrast of a dark-coloured area comprised of a volcanic shield and spectacular craters and lava flows within an immense sea of dunes. The dunes can reach 200 meters in height and contain linear dunes, star dunes and dome dunes, displaying enormous and constantly changing contrasts in terms of form and color. In addition to these predominant features there are several arid granite massifs emerging like islands from the sandy desert flats, ranging between 300 and 650m high. The combination of all these features results in a highly diverse and visually stunning desert landscape.

Criterion (viii): Earth's history and geological features

The property's desert and volcanic landforms provide an exceptional combination of features of great scientific interest. The vast sea of sand dunes that surrounds the volcanic shield is considered the largest and most active dune system in North America. It

includes a diverse range of dunes that are nearly undisturbed, and include spectacular and very large star-shaped dunes that occur both singly and in long ridges up to 48km in length. The volcanic exposures provide important complementary geological values, and the desert environment assures a dramatic display of a series of impressive large craters and more than 400 cinder cones, lava flows, and lava tubes. Taken together the combination of earth science features is an impressive laboratory for geological and geomorphological studies.

Criterion (x): Biodiversity and threatened species

The highly diverse mosaic of habitats is home to complex communities and surprisingly high species diversity across many taxonomic groups of flora and fauna. More than 540 species of vascular plants, 44 mammals, more than 200 birds and over 40 reptiles inhabit the seemingly inhospitable desert. Insect diversity is high despite not being fully documented. Several endemic species of plants and animals exist, including two freshwater fish species. One local endemic plant is restricted to a small part of the volcanic shield within the area. Large maternity caves of the migratory Lesser Long-Nosed Bat, which is an important pollinator and seed dispersal vector are found within the property. Noteworthy species include the Sonoran Pronghorn, an endemic subspecies restricted to the South-western Arizona and North-western Sonora and threatened by extinction.

Integrity

El Pinacate and Gran Desierto de Altar Biosphere Reserve is relatively undisturbed and has an outstandingly high level of physical integrity to a greater extent related to its harsh environment. Whilst there are a limited number of private land ownership (Ejidos) areas, the entire property is under the authority of the Federal Agency for Protected Areas (CONANP).

Protection and management requirements

The property counts on an effectively enforced adequate legal framework and its management is well supported in terms of human and financial resources. Management of the property is guided by a long-term management plan supported by annual operational plans and implementation is supported by local governments, NGOs and indigenous peoples. Future revisions of the existing management plan should consider ways and means to maintain and enhance the Outstanding Universal Values and conditions of integrity of the property. It should also propose new options and mechanism to ensure the financial sustainability required for the effective long term management of the property. In addition the management plan should establish enhanced mechanisms to effectively involve indigenous peoples in the planning and management of the property.

Special attention should be given to avoid the indirect impacts of nearby tourism development including from increased traffic, which creates ecological disturbance, littering and wildlife road kills. More importantly, tourism can create pressure to extend existing road infrastructure which could facilitate entry points for

alien invasive species. Increasing impact from off-road vehicles has been observed, requiring monitoring and effective law enforcement in EPGDABR. However the most critical long term management issue is to address potential problems derived from tourism-related water consumption.

Long term protection and management of the property also includes the need to minimize and/or mitigate impacts derived from existing or proposed roads; to ensure effective implementation of measures to avoid further depletion of scarce water resources; to maintain and enhance ecological connectivity so as to buffer against climate change impacts and to effectively control and eradicate alien invasive species. Transboundary cooperation to maintain and enhance the management of the property is essential and therefore the formal establishment of a Transboundary Protected Area with adjoining protected areas in the United States is highly recommended.

4. Commends the State Party on the decision to not locate electricity transmission infrastructure along the coast, in order to conserve the visual integrity of the area, and requests the State Party to apply the highest environmental standards to be applied in the alternative corridor in the northern part of the property;

5. Requests the State Party to ensure full compliance with Environmental Impact Assessment requirements as regards the ongoing expansion of the Route 2 road development;

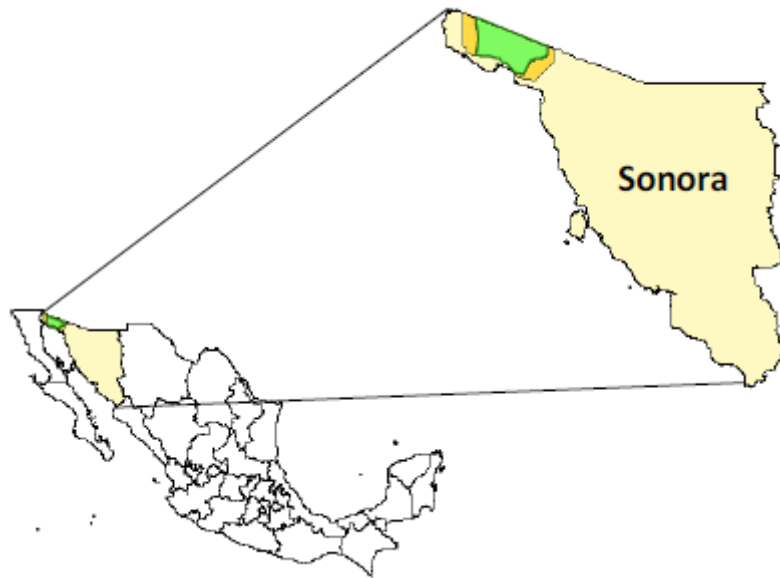
6. Encourages the State Party to consider the future expansion of the property to include the adjacent Ramsar site of Bahia de Adair;

7. Encourages the State Parties of Mexico and the United States of America to strengthen cooperation on the conservation and management of the shared Greater Sonoran Desert Ecosystem, building upon the existing agreements and working relationships at all levels, which may eventually lead to the formal establishment of a transboundary protected area;

8. Encourages the State Parties of Mexico and the United States of America to further cooperate on the saving of the Sonoran Pronghorn from possible extinction;

9. Further encourages the State Party, and the neighbouring State Party of the United States of America, to fully consider environmental concerns in security efforts along the international border that forms the northern boundary of the property.

Map 1: Nominated property location



Map 2: Nominated property and buffer zone

