



How

TO BECOME AN ECO-TOURIST

Travel can be much more than simply visiting places, taking pictures and buying souvenirs. We are here to help you make positive contributions to conservation and communities while on vacation.

When executed mindfully, and with the minimum impact, travel can inspire cultural awareness, tolerance, and commitment to environmental responsibility. Your journey to becoming an eco-tourist starts with an awareness that as a vital part of the global tourism industry, you, the traveler, have the power to help transform the way the world travels.

By exploring alternative trav-

el choices, you can have a unique trip and avoid leaving negative marks on cultures, economies, and the environment, while making a positive impact on the people and places you visit. On your next trip, be sure to take with you these tips on Do's and Dont's to maximize your opportunity to make a difference while on vacation.



Ecotourism in CUBA

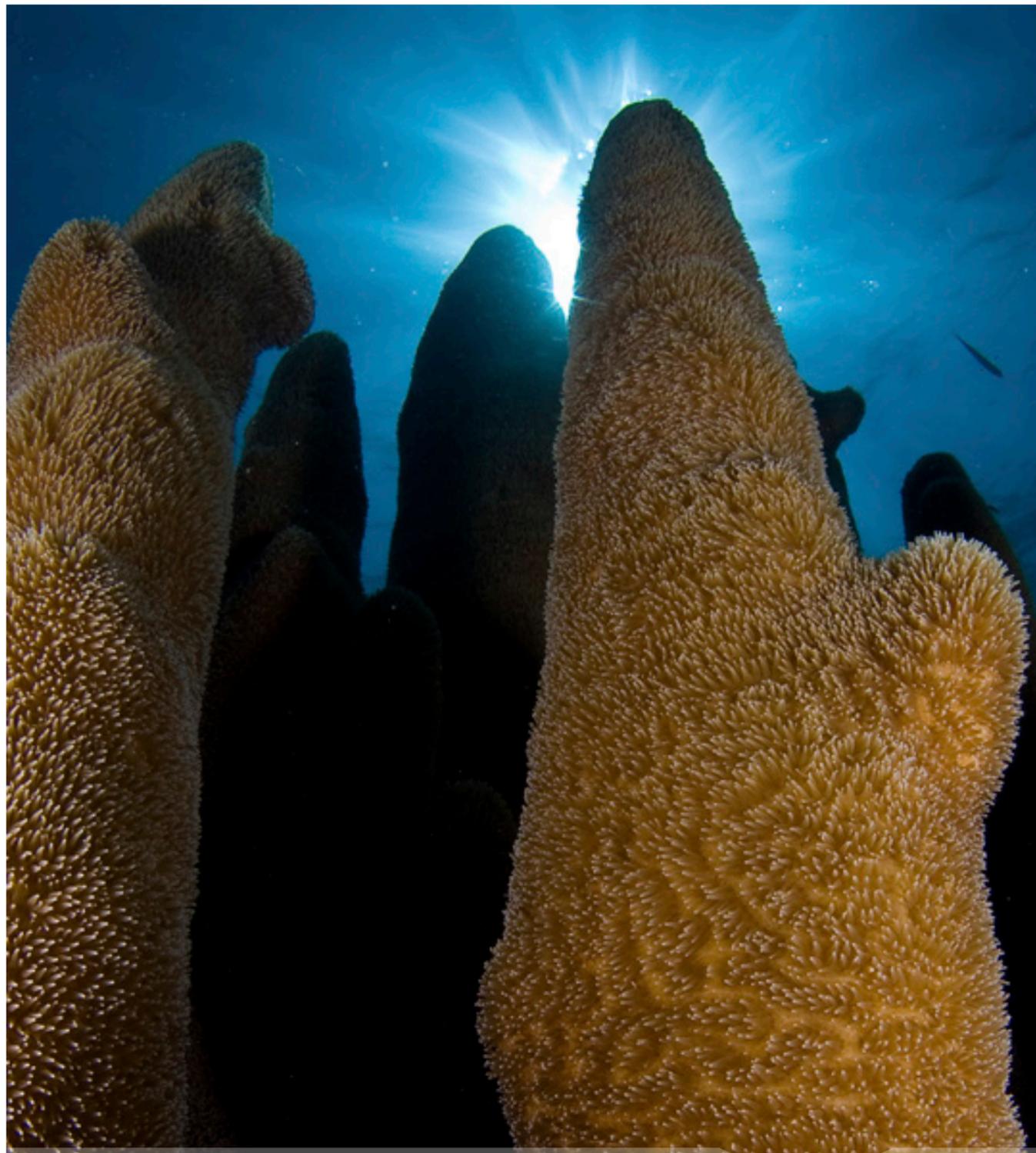
Cuba is the largest island in the Caribbean, a well preserved tropical ecosystem, home of a wide biodiversity. Many areas in this fascinating country are popular ecotourism destinations, offering a unique range of cultural experiences, eco-friendly accommodations, adventure opportunities, and community based tours. The region's abundance of flora and fauna, as well as the diverse landscapes including tropical rain forests and protected marine parks, provide unique wildlife encounters, and great opportunities for learning about and experiencing examples of effective parks and protected areas management practices.

Daydreaming of Cuba typically leads to images of being enveloped in crystalline, azure waters, surrounded

by blue skies, lush green forests, and a symphony of mingling accents, animal chatter, and island rhythms. Cuba supports a range of rich ecosystems, some islands and archipelagos remain largely unspoiled and waiting to be discovered, explored and protected. Cuba has no real winter period, and the sun shines here throughout the year. With over 12 hours of sunshine a day, the sun rises at about 6 am and sets at about 6 pm consistently throughout the year.

There is no question at all that, in relation to the number of species and species only found in the country (endemic species), Cuba is the single most important island in the New World, comprises more than one-third of the land area in the Caribbean, boasts nearly

four times as many plant species as Jamaica and almost 12 times as many as Puerto Rico. Recent biological surveys show that 40 percent of species of macro-fauna (animals, including insects, reptiles, and amphibians, visible to the naked eye) that they encountered are endemic species. More than 50% of the most important ecosystems and 55 % of the endemic species of Caribbean islands are found in Cuba. Cuban marine and coastal ecosystems are particularly outstanding – more than 95 % of its shelf is fringed by coral reefs, sea grass beds cover half of the Cuban shelf and mangroves represent one fifth of Cuban forests.



Cuban Marine Parks

JARDINES DE LA REINA

DREAMED DESTINATION FOR ECO-TOURISTS

Named by Christopher Columbus in one of his trips around the island and dedicated to Her Majesty Isabel of Castile, this island group was populated by the Cubans indigenous, which the Admiral called Cays Indians. On the 1960's they were frequented by pirates and privateers and helped pass the human trade in African slaves. It was also a place of temporary residence of escaped African slaves from the plantations of coffee and sugar cane. Since the late nineteenth century until the 60 twentieth-century Queen's Gardens were inhabited by fishing families. After the Triumph of Cuban Revolution, people were leaving the place to enjoy the social and economic benefits of the revolutionary process and thus the Jardines de la Reina were depopulated and only used for fishing and forestry. Of the inhabitants born in the Jardines de la Reina or periods of time lived in them, some now living in coastal communities, which constitute a valuable historical source.

The Archipelago of "Jardines de La Reina" comprises the whole set of islands, keys, islets and banks located south the Gulf of Ana Maria at the southeastern section of the Cuban shelf. This system is located between the 21 08.101' N; 079 27.700' W and 20 30.479'N; 078 19.955' W, and has a longitude of 74km approximately.

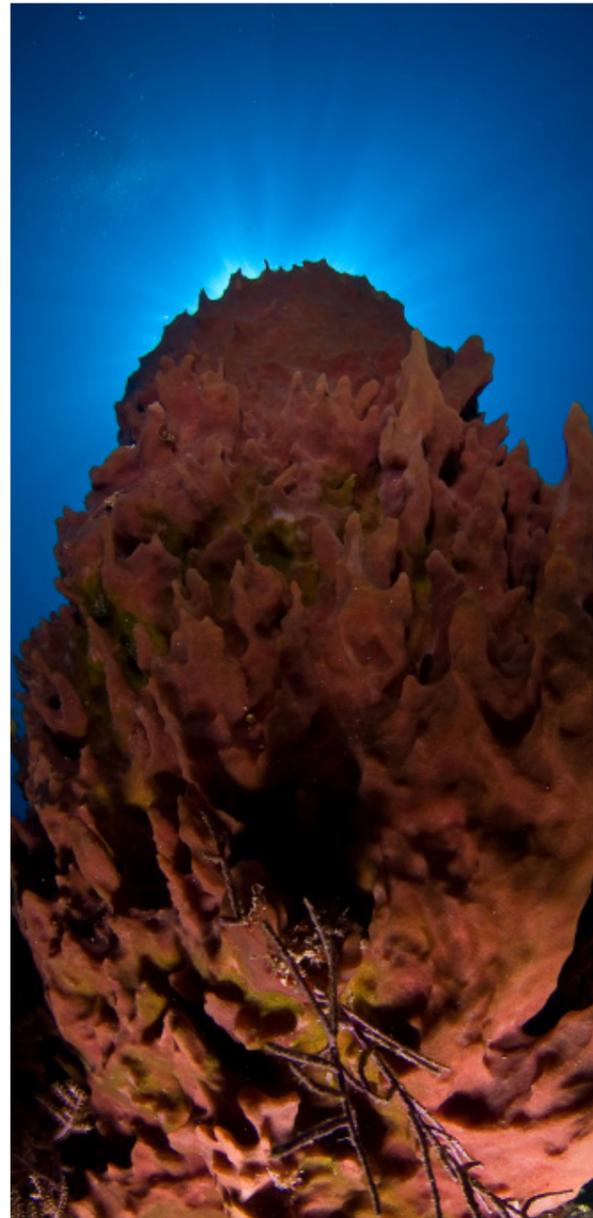
This marine park is probably the most important group of islands in the Caribbean, integrated for one million-acre wetlands, one of the largest in the West Indies, located at about 200 miles southeast of Havana.

The archipelago and its near-twin, Florida's Everglades, share many of the same plant species like sea grass and mangroves and coral reefs flora and fauna. However, Jardines de la Reina is unique. There has been reported 7 new species for science of marine mollusks and around 20 new species reported for Cuba (fish, gorgonians, algae, echinoderms and annelids). Jardines de la Reina marine environment host the most mature food web of the Caribbean and similar to the best preserved communities of the Central Pacific with high biomass of top predators like sharks, large groupers and snappers. Its coral reef fish are the species richest, the densest and of the highest biomass of Cuba and of the islands of the Caribbean. Jardines de la Reina shows the largest population of Goliath grouper among the Caribbean islands with SCUBA divers sightings every week and it is the most important nesting area of hawks bill turtle in Cuba. This archipelago has shown resilience of sea grass and corals before hurricane and repeated bleaching and a strong recovery Long-spine black sea urchin in reef crests. All these make Jardines de la Reina one of the best diving and game fishing (100 % catch and release mainly for bonefish, tarpon and permit) destinations in the world when compared with other 50 places. In addition, this marine park acts as a critical refuge for North American birds migrating along the route through Florida and the Gulf of Mexico to South America. This is wildlife sanctuary that hosts more than 68 species of migratory birds. In the migratory season, the birds are really incred-

ible. There are just clouds of them. Of the 22 species of birds endemic to Cuba, three can be found here only. There are one species/genus (Cuban Green Woodpecker) and four subspecies of birds exclusive of Jardines de la Reina.

This is one of the most important marine and coastal wildlife areas of the Caribbean, containing many species of algae, sea grasses, hydro corals, gorgonians, stony corals, black corals, sponges, cnidarians, comb jellies, flatworms, ribbon worms, segmented worms, crustaceans, bryozoans, mollusks, echinoderms, tunicates, fish, etc. Some emblematic species are found in the region such as the American crocodile which inhabits the islands and near shore areas. Some, such as the green turtle and the hawks bill turtle, nest in the beaches of Jardines de la Reina

The high abundance of the fishes (tarpons, bonefish, permits, jacks, snappers and groupers, mainly) and the presence of extensive sea grass beds and mangrove forests that support nursery areas make this archipelago an important source of adults through spillover to fishing grounds and of larvae to downstream regions, respectively.



Avalon

AN ECOTOURISM PIONEER IN CARIBBEAN DESTINATIONS

With a large experience in fishing and diving activities, since our start in 1993, Avalon is proudly considered one of the most important game fishing and SCUBA diving companies in the world. Avalon is always worried about protected areas protection, trying to keep the environmental resources as virgin as possible, its bounty of natural attractions, paired with its meticulous conservation practices, makes it one of the

best ecotourism destination in the Caribbean. Avalon operations are inside 4 protected areas, covering the largest portion of the Cuban South Coast, approximately 60 % of the total cays, coral reefs and mangrove areas. This includes unique ecosystems that range from the west coast of ISLAND OF YOUTH, to the eastern side of JARDINES DE LA REINA, the vast of carefully guarded land protects endangered species such as

the Goliath grouper, American crocodile, whale shark, other sharks, elk-horn coral, stag-horn coral, black corals, marine turtles, iguana, jutías, as well as birds, reptiles, mollusks, plants. Without any doubts, Jardines de la Reina is an amazing archipelago, a mangrove-lined everglades and one of the world's longest coral reefs systems (240 km), one of the biggest marine reserve (1010 km²) and national park (2170 km²) on



Earth. Avalon carries out a comprehensive patrolling and surveillance program in partnership with the National Office of Fisheries Inspection with remarkable effects on nature conservation such an increase of density of commercially important and large fish inside the Marine Reserve (about 30 % when compared to 1996) and on fisheries through spillover of biomass (about 20 % of the biomass spillover to fisheries grounds).



With Avalon Eco Tours you don't have to sacrifice quality and luxury of accommodations, we offer floating hotels and live aboard yachts with very high standards for quality and luxury. They bring nature and culture within your reach, while still assuring your level of comfort. Tours and accommodations come in a range of prices, depending on the level of comfort and convenience you desire.

Planning a trip with us is easy and fast, just ask our travel representatives for the dates you are looking for, estimate number of guests in your crew and budget, and we will put together a program and quote according your needs and preferences. People of all interests, ages, incomes, and backgrounds can become eco-tourists, and there are plenty of family-friendly options.

By encouraging travelers to behave in an environmentally responsible way. Avalon Eco Tours offer relevant information and advice on how travelers can minimize their impact on the ecosystem as well as how they can contribute to the protection of fragile ecosystems. We offer travelers the opportunity to participate in

conservation or preservation projects (as the recognized tagging program we have managed in Cuba for the last 3 seasons). An important element of this type of project is education. The goal is that through participation, eco travelers will return home with increased awareness and concern for environmental issues and therefore continue to behave in an environmentally conscious way.

We are also involved in working on initiatives and projects with the local community such as training and education programs.

Avalon has a particular credit, having established marine parks where flora and fauna is completely protected, and in almost all of them has trained guides, many of them well-educat-

ed biologists. Hosted trips offers by Avalon, assures exclusivity, first class service, amazing cuisine based on fresh sea fish and vegetables, comfort and a professional staff available to assist you all the time you are in our destinations. We are working on managing impacts of ecotourism, and ensuring that the appropriate management and development strategies are in place. Ecotourism in our marine destinations is promising and forward-looking, and certainly there are lots of ecotourism options for those seeking adventure, for Jardines de la Reina, to Isla de la Juventud and Cayo Largo

We want to be very orthodox in doing ecotourism. We know areas are fragile, and our main idea is reducing Ecotourism impact as much as possible, always giving our guests chances to discover our destinations and to learn and contribute with ecosystem protection. For this reason, our Eco Tours will be offered for small groups between two and twelve people, having the possibility of assign and protect each area on the best way, keeping balance between tourism and protection.

All the Eco Tour guests are accommodated on live aboard yachts and floating hotels, which allows them to be in perma-

nent contact with nature, enjoying amazing service, with a team of guides, managers, captain, crew and maids that will be happy to make your time with us, an experience for a lifetime.



Some important areas and activities you will practice inside the Archipelago:



Cayo Anclitas:

1. Terrestrial tour (hurricane stone, vegetation (Punta Práctico), reptiles, feeding area of birds (Laguna Anclitas), iguanas, jutías), nesting area of Double-crested Cormorant (January-November, peak on May) and Anhinga (March-October, peak on May), migratory birds (spring migration (end of February-half of May, peak March-April; fall migration (beginning of August-half November, peak September-October).
2. Drift snorkeling on Pasa Anclitas during high tide (Eagle rays, other rays, nurse shark, Longspine black searichins, Queen conch, abundant fish)
3. Snorkeling on Manchado reef crest (lemon shark, abundant and large fish)

4. SCUBA dive/snorkeling in Anclitas/Cana (rays, high coral cover, abundant fish)
5. Terrestrial tour (vegetation (Mariflores), reptiles, feeding ground of birds (North of Punta Mariflores), doline (North of Punta Mariflores), iguanas, jutías, sink holes, nesting area of Double-crested Cormorant (January-November, peak on May) and Anhinga (March-October, peak on May), migratory birds (spring migration (end of February-half of May, peak March-April; fall migration (beginning of August-half November, peak September-October).
6. Drift snorkeling on Pasa Mariflores during high tide

7. Snorkeling in patch reefs North of the Cayo
8. Seafari to the blue (Flying fish, whale sharks, tuna, whales, etc)
9. Meseta de los Meros SCUBA dive (advanced divers group around full moon for spawning aggregation of fish, mainly groupers (December-April)
10. Hawksbill turtle nest. Playa Caballones East mainly from September to January, peak October to December.
11. Clean up beach.
12. Beach, Queen conch, swimming and sunbathing on Playa Anclitas
All the Eco Tour guests are accommodated on live aboard yachts and floating

Cayo Grande (up to El Fraile area):

1. Snorkeling in patch reefs, North side of the Cayo
2. Snorkeling through North open of Las Auras mangrove channel (to see the impressive Cubera snappers and Goliath grouper).
3. Seafari to the blue (flying fish, whale sharks, tuna, whales, etc)
4. Snorkeling around reef crests of El Fraile
5. SCUBA dive/snorkeling



Cayo Caballones:

1. Terrestrial tour (vegetation, butterflies, reptiles, birds, iguanas and jutías), migratory birds (spring migration (end of February-half of May, peak March-April; fall migration (beginning of August-half November, peak September-October).
2. Tour to Mangles Altos (10-m tall red mangroves)
3. SCUBA dive/snorkeling with silky sharks (and groupers (mainly black), jacks (mainly horse-eye)
4. Snorkeling at Puntica reef crest (alive Elkhorn corals, abundant Longspine black seurchins, higher density of fish in Jardines)
5. Snorkeling in patch reefs North of the Cayo
6. Drift snorkeling on Pasa Caballones during high tide.
7. Seafari to the blue (whale sharks, tuna, whales, etc)
8. Hawsbill turtle nest. Playa Guincho and Playa Caballones West mainly from September to January, peak October to December.
9. Clean up beach.



Cayos Boca de Piedra:

1. Terrestrial tour (hurricane stone, vegetation, reptiles, birds, iguanas, jutías, molusks), migratory birds (spring migration (end of February-half of May, peak March-April; fall migration (beginning of August-half November, peak September-October)
2. Tour to see the American crocodile.
3. SCUBA dive/snorkeling with Caribbean reef sharks & Goliath grouper
4. Drift snorkeling in Pasa Boca Piedra during high tide
5. Snorkeling in patch reefs North of the Cayo
6. Seafari to the blue (Flying fish, whale sharks, tuna, whales, etc)
7. Clean up beach.



Some of the protected species you will have the opportunity to discover in Jardines de la Reina:



FISH



Goliath grouper (*Epinephelus itajara*):

It is the second largest finfish on Earth (reach 8-foot and 800-pound). Population is almost vanished from the entire Caribbean due to

over harvesting and is considered Critically Endangered by IUCN. Jardines de la Reina shows the healthiest population of Goliath grouper of Cuba and the Caribbean, with weekly sightings during SCUBA diving. It is known that many large specimens left the protection of the Marine Reserve and National Park, presumably to spawn up to 100-mile away sites every summer.

Other large groupers (to 4-foot long) found in Jardines de la Reina are Black grouper (*Epinephelus bonaci*), Nassau grouper (*Epinephelus striatus*), Tiger grouper (*Mycteroperca tigris*) and Yellowfin grouper (*Mycteroperca venenosa*). All have strong, stout bodies and large mouths. They solitary carnivores that live lurking in the shadows of reefs, ledges and wrecks to ambush fish and

crustaceans, drawn into their gullets by the powerful suction created when they open their large mouth. Their population has declined throughout their range: Nassau grouper is Endangered, Black grouper is Vulnerable. Jardines de la Reina shows the highest abundance and largest sizes of these species in Cuba and perhaps of the Caribbean



Cubera snapper (*Lutjanus cyanopterus*):

It is the largest snapper in the Western hemisphere reaching 5-foot and more than 100-pound. Cubera snapper is a nocturnal predator that feed on fish and crustaceans. During day time it tends to be solitary (mainly large specimens) or forming small schools (mainly medium size individuals). Jardines de la Reina shows the highest abundance and largest sizes of Cubera snapper in Cuba and perhaps of the Caribbean. It is considered Vulnerable by IUCN.



Gamefish:

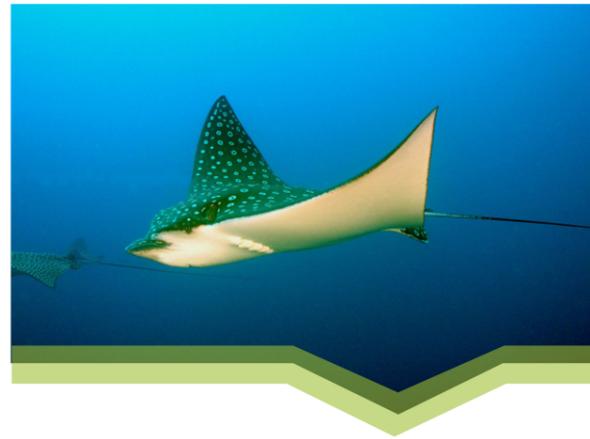
Jardines de la Reina is one of the best shallow water fly fishing destinations on Earth. Main species target by anglers are bonefish (*Albula vulpes*), tarpon (*Megalops atlanticus*), permit (*Trachinotus falcatus*) and snook (*Centropomus undecimalis*), which together show the highest abundance of gamefish in Cuba and probably in the Caribbean islands. Bonefish likes shallow waters (sand, mud, limestone, vegetated and reef bottoms). Old adults are solitary but younger adult and juvenile group on large schools of hundreds individuals. Bonefish feed mainly on crustaceans. It may reach 1 m and weight 10 kg and lives 19 years. Avalon Tagging Program has revealed that bonefish may travel up to 37 nautical miles in few months. It is considered Vulnerable by IUCN. Tarpon is considered the king of gamefishing due to its size (2.5 m), weight (160 kg) and strength (allow them to jump acrobatically out of the water). It lives in coastal and oceanic waters but prefer coastal ones. Tarpon may live more than 70 years and female produce up to 20 million eggs. It feeds mainly and fish and crustaceans. Permit behavior, shape and strength make its catch very challenging. It is mainly a coastal species, seen solitary or in small schools on sandy or sand-mud bottoms. Permit feed mainly in crustaceans. Juvenile are abundant in Jardines de la Reina beaches during summer. It may reach 120 cm and 36 kg. Snook is found on lower

salinity waters. It is a relatively sedentary and generally solitary species. Snook feed on fish and crustaceans. It may reach 1.3 m.



Sharks (Orders Orectolobiformes (Carpet sharks), Lamniformes (Mackerel sharks) y Carcharhiniformes (Ground sharks):

Sharks are critical to marine environment due to their ecological role as top predators, maintaining ecosystems health and equilibrium. Increase fishing pressure and value to tourism make important their conservation and sustainable management. The Orders mentioned above include about 40 species reported for Cuban waters and potentially found in Jardines de la Reina. Of the 10 species reported in Jardines de la Reina, 6 are considered Vulnerable by IUCN. The list include: Rhincodon typus (Whale shark, the largest fish existed ever), Ginglymostoma cirratum (Nurse shark), Carcharhinus brevipinna (Spinner shark), C. falciformis (Silky shark), C. perezii (Caribbean reef shark), Negaprion brevirostris (Lemon shark), Rhizoprionodon porosus/terranovae (Caribbean/Atlantic Sharpnose sharks), Sphyrna mokarran (Great Hammerhead), C. limbatus (Blacktip shark), Galeocerdo cuvier (Tigre shark). Jardines de la Reina is one of the few places in the Caribbean where sharks can be observed every day, mainly Nurse, Silky, Caribbean reef and Lemon sharks.



Eagle ray (Aetobatus narinari):

It is one the “flying” rays since it spends most of its time swimming. As other rays, Eagle ray has greatly enlarged pectoral fins (to 8-foot from tip to tip), providing it propulsion for swimming much like birds use their wings for flight. Adult Eagle rays are often spotted on reef crest and channels of Jardines de la Reina, while juveniles roamed in flats. This species jumps acrobatically out of the water giving to the observers a wonderful experience. It is considered Vulnerable by IUCN.

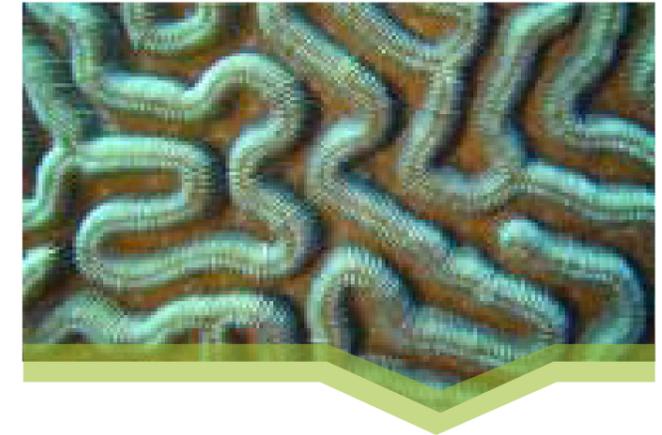


CORALS



Acropora corals (Elkhorn coral, Acropora palmata) and Staghorn coral (Acropora cervicornis):

Though there are several hundred species of Acropora throughout the Indo-Pacific, Elkhorn coral and Staghorn coral are the only two species described within the Caribbean. They are fast growing, branching species and major reef-building corals, contributing significantly to reef growth, island formation, coastal protection and fisheries habitat. The open structural framework of these densely populated Acropora thickets provides essential habitat for fishes, turtles, lobsters, crabs, echinoids and gastropods. Acropora corals have declined 80-90 % since the 1980s throughout the Caribbean and are listed as Critically Endangered by IUCN. Acropora corals are presumably recovering in Jardines de la Reina



Black corals (Anthipates sp.):

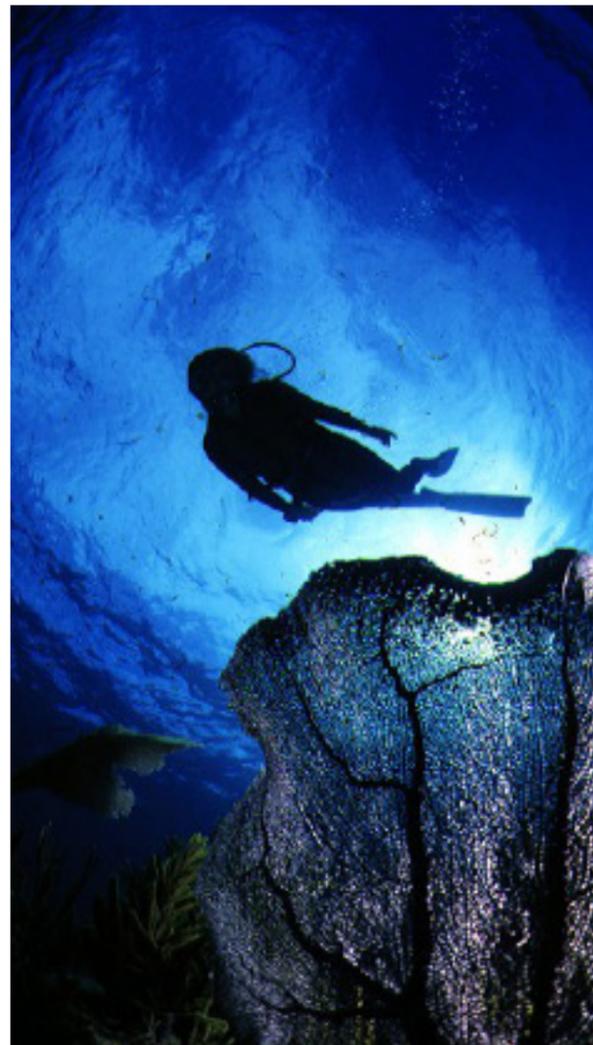
There are approximately 15 species of Black corals in the Caribbean that can be found within safe SCUBA diving depths. Few species attain considerable size and their branches are collected, cut, fashioned, polished and sold by jewelers as a semiprecious material. The value of these trinkets comes more from propaganda of rareness and the danger associated with deep diving to collect branches, than from any innate property of the material. Unfortunately, these species are rare throughout their range of distribution due to overharvesting. Jardines de la Reina is one of the few places in the Caribbean where you can enjoy Black corals in almost every SCUBA dive. It is included in the Appendix II of Resolution 161/11.





Pillar coral (*Dendrogyra cylindrus*):

It is one of the most magnificent coral species in the Caribbean. Colonies form numerous, heavy cylindrical spires that grow upward from an encrusting base mass that name the species. Inhabit flat and slightly sloping bottoms. Polyps are normally extended during the day (most of the other corals show their polyps during night), giving colony a fuzzy appearance. Occasional to rare throughout its range of distribution, Pilar coral is frequent in Jardines de la Reina. It is included in the Appendix II of Resolution 161/11.



MARINE MOLLUSKS



Queen conch (*Strombus gigas*):

This is one of the largest and most beautiful marine mollusks in the Caribbean. Shell has short conical spire with blunt spikes. Shell's exterior is orangish and aperture is rosy-pink. Inhabit seagrass beds and sand flats, often around patch reefs. Queen conch has become uncommon in many areas because of over-harvesting. Jardines de la Reina has the healthiest population of Cuba and perhaps of the Caribbean. It is considered Vulnerable by IUCN.



Helmet conchs (*Cassis* sp.):

These are among the largest and most beautiful marine mollusks in the Caribbean. Exterior shell in shades of reddish-brown in a wavy, netted pattern. Shell aperture is rosy-pink-purple. Inhabit seagrass beds and sand flats, often around patch and fringing reefs. During day usually burrow in sand with only small part of upper shell exposed. Hunt in open at night for sea urchins, which they attack with surprising speed. Helmet conchs have become uncommon in many areas because of over-collecting. Jardines de la Reina has a healthy population of Helmet conchs. They are considered Vulnerable by IUCN.



CRUSTACEANS



Caribbean Spiny lobster (*Panulirus argus*):

It is the largest, most beautiful and most colorful of the Cuban marine crustaceans. Besides, it has the highest economical importance of Cuban fisheries resources. Caribbean Spiny lobster fishery is the only one allowed inside the Marine Reserve, since its sustainability. Jardines de la Reina and surroundings contribute with the 10 % of total Cuban landings of Caribbean Spiny lobster.

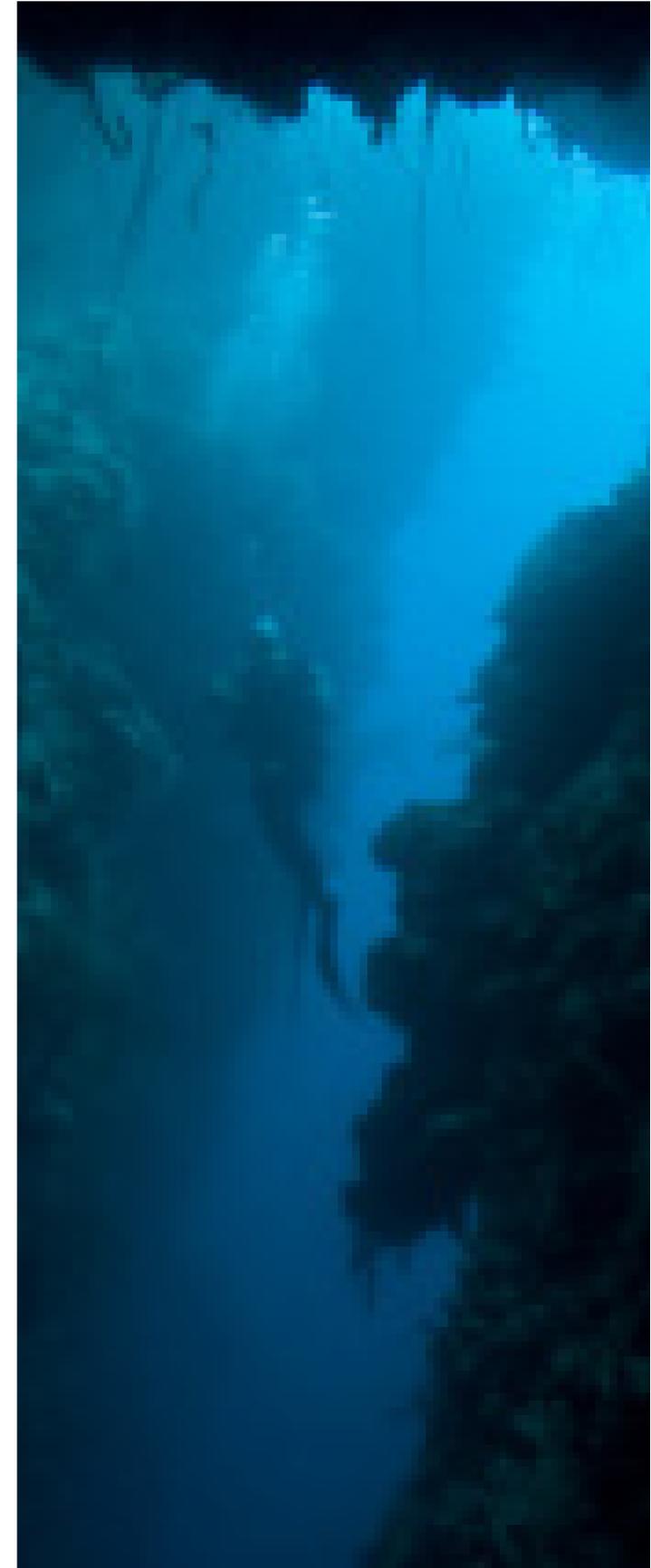


ECHINODERMS



Long-spined urchin (*Diadema antillarum*):

It has numerous long, thin, sharp spines. Usually all black but young have black and white banded spines. Long-spined urchin is a keystone species in Caribbean coral reef controlling the abundance of algae on them. It suffered a massive die-off by the beginning of the 1980s causing a shift baseline of Caribbean coral reef from corals-dominated to algae-dominated ones. Long-spined urchin is recovering slowly since then. Jardines de la Reina is one of the few places in the Caribbean showing a strong recovery of Long-spined urchin population. It is included in the Appendix II of Resolution 161/11.



REPTILES



American crocodile (*Crocodylus acutus*):

It lives from freshwater to saltwater, from US Florida, many Caribbean islands, Central America to Venezuela and Peru. American crocodile lives around 60 years, reaches 4 m of length and 200 kg of weight, although there are reports of 7 m individuals in South America. Its abundance has presumably increased in Jardines de la Reina due to protection. American crocodile is considered Vulnerable by IUCN.



Marine turtles (hawksbill turtle (*Eretmochelys imbricata*), green turtle (*Chelonia mydas*), loggerhead turtle (*Caretta caretta*),

leatherback turtle (*Dermochelys coriacea*):

All these species have seen depleting their population due to over-harvesting to the point that hawksbill and leatherback are considered Critically Endangered and green and loggerhead are considered Endangered by IUCN. The four species of marine turtles occur in Jardines de la Reina, though hawksbill and green are the most common ones, primarily the hawksbill. Jardines de la Reina is the most important nesting area for hawksbill in Cuban waters with 65 % of the reported nationwide. It is known that most of hawksbill turtles spend most of their life cycle in Cuban waters. Hawksbills nest year around, mainly from September to January with the high rate between October and December, later than in other Western Atlantic areas. Hawksbills prefer to nest in the vegetated zone closest to shoreline. Green turtles use Jardines de la Reina as reproductive and feeding grounds but also as migratory corridors. Green turtles of Jardines de la Reina are strongly connected with Grand Cayman population.



Iguana (*Cyclura nubila nubila*):

It is the largest terrestrial reptile of Cuba and an endemic subspecies. Iguana is

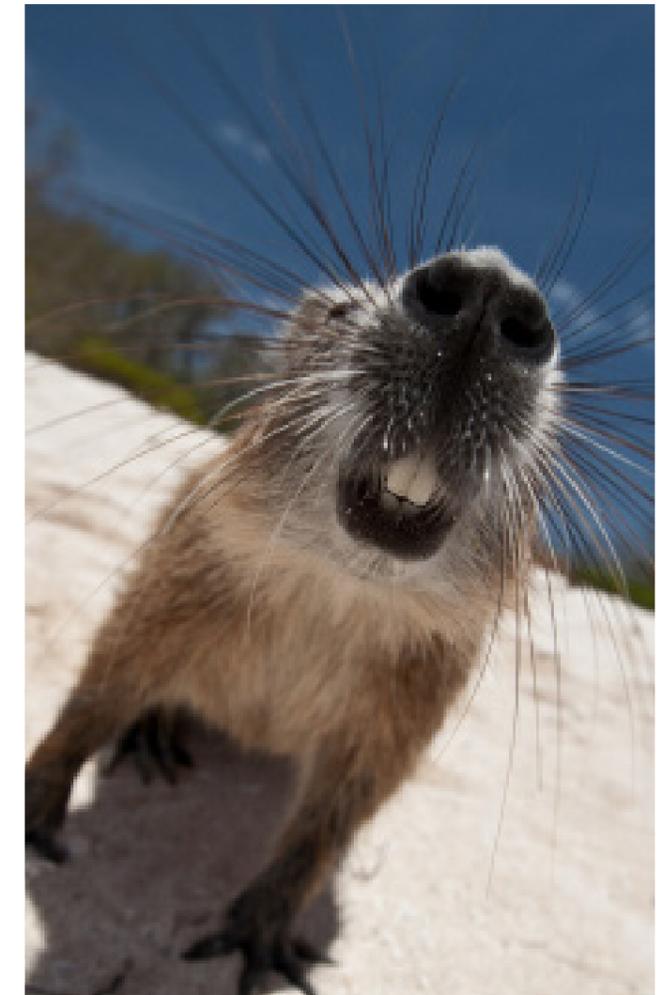
found in the coastal areas of most of the Cuban islands though its populations have decreased and is considered Vulnerable by IUCN. It is considered a keystone species because accelerate germination rate of seeds, provide nutrients to the soil through feces and disperse seeds in its habitats. Iguana is very vulnerable before hurricanes and drought.

TERRESTRIAL MAMMAL



Jutía conga (*Capromys pilorides doceleguas*):

It is a subspecies restricted to Jardines de Reina of the Cuban endemic species. Jutía conga is the largest of rodents found in Cuba, reaching around 70 cm and weighing up to 6 kg (13 pounds). Its population is abundant in the islands and cays but due to its restricted distribution the species considered Critically Endangered by IUCN.



BIRDS



Cuban Pewee (*Contopus caribaeus*):

Common permanent resident in Cuba, Isle of Youth and some cays. It is an Cuban endemic subspecies represented by two distinct populations restricted to Jardines de la Reina archipelago: *C. c. nerlyi* and *C. c. florentinoi*. Cuban Pewee reaches 16 cm long and its distinct features are: a broad and flattened bill with a fleshy-colored lower mandible and a white half-circle behind eyes. It can be found along the insular group: Bretón, Alcatracito, Alcatraz, Grande, Caballones, Anclitas, Boca Piedra Piloto, Cruces, Juan Grin, Caguama and Cabeza del Este.



Tawny-shouldered Blackbird (*Agelaius humeralis* ssp):

Common permanent resident in Cuba and several larger cays in both coasts. It is considered a Cuban endemic subspecies with a potential new population inhabiting Jardines de la Reina cays. Tawny-shouldered Blackbird reaches 20 cm long. Its distinct features are: entirely black plumage with a brownish-orange spot on shoulders and tail forked with rounded tip feathers. Distribution range comprises several cays such as: Grande, Caballones, Anclitas, Boca Piedra Piloto, Boca Piedra Chica, Boca Grande, Cruces, Cachiboca, Boca Seca, Boca Rica, Campo Santo, Juan Grin, Caguama, Cabeza del Este.



Cuba Green Woodpecker (*Xiphidiopicus percussus* ssp):

Common permanent resident in Cuba, Isle of Youth and some cays in both coasts. It is one of the seven Cuban endemic genera and represented in Jardines de la Reina by potential subspecies. Cuba Green Woodpecker reaches 23 cm. Its distinct features are: green-olive back, light yellow belly with dark brown stripes, red spot on the throat base and upper part of chest. It is the only woodpecker that makes a peculiar sound with wings when approaching the nest as an acoustic sign ritualizing the nest care replacement between parents. It has been recorded in Grande, Caballones, Anclitas, Boca Piedra Chica, Cruces, Boca Seca, Caguama, Cabeza del Este.



Red-Legged Thrush (*Turdus plumbeus* ssp):

Common permanent resident in Cuba, Isle

of Youth and many cays in both coasts. It is thought to be a potential subspecies in Jardines de la Reina. Red-Legged Thrush reaches 27 cm. Its distinct features are: gray, eye ring and leg red-orange, peak orange or black, throat black. Its known distribution range barely includes few central cays of the Laberinto de las Doce Leguas (Grande, Caballones, Anclitas). In addition, its occurrence has not been recorded in the last 15 yrs despite several surveys have been conducted in aforementioned localities, so it's plausible to think that it would have undergone a local extirpation. Based on external features of one specimen collected from Caballones in 1930 and deposited at the Smithsonian Institution, this population may have represented an intergraded form between the two known populations (*T. p. rubripes* and *T. p. schistaceus*) occurring in Cuba.



Peregrine Falcon (*Falco peregrinus*):

Common winter resident and transient in Cuba, Isle of Youth and some northern cays. It reaches 46 cm long. Its distinct features are: upperparts gray to dark brown, black head, underside whitish brown-barred, and a variable facial vertical black stripe, tail long narrowing to its tip and slightly barred from underneath. Peregrine Falcon is considered as a rare species in Jardines de la Reina, only recorded in Anclitas and Caguama cays. It is included in

the Appendix I of Resolution 161/11.



Merlin (*Falco columbarius*):

Common winter resident and transient in Cuba, Isle of Youth and some larger cays. It reaches 30 cm long. Its distinct features are: Upperparts blue-dark grayish (male), or brown with grayish uppertail coverts (female), cinnamon-colored underparts with brown streaks, poorly defined vertical stripe below eye, tail boldly banded in light gray and black with a white tip. Merlin has only been documented in cayos Grande, Caballones and Anclitas. It is included in the Appendix I of Resolution 161/11.



Common Barn-Owl (*Tyto alba*):

Common permanent resident in Cuba, Isle of Youth and some cays as well as a very rare winter resident. It reaches 38 cm. Its distinct features are: upperparts yellowish-cinnamon brown, underparts white or pale beige with

sparse and minute brown spots. Its occurrence in Jardines de la Reina was formerly known from anecdotal references until a single individual was sighted in the coastal mangroves of Boca Piedra Piloto cay in June 2005. Common Barn-Owl is included in the Appendix I of Resolution 161/11. Where??



Cuban Black-Hawk (*Buteo gallus gundlachii*):

Common resident in Cuba, Isle of Youth and cays and it is considered a Cuban endemic species. It reaches 53 cm. Its distinct features are: dark-chocolate brown with broad, rounded wings with a white patch at base of primaries clearly visible in flight, tail short with broad white-black bands, base of bill and legs. Cuban Black-Hawk is observed along Jardines de la Reina (Bretón, Cinco Balas, Alcatraz, Alcatracito, Grande, Caballones, Anclitas, Cruces, Cachiboca, Boca Seca, Caguama and Cabeza del Este). The Cuban common name comes from its sound: ba-tis-ta. It is included in the Appendix I of Resolution 161/11.



Red-Tailed Hawk (*Buteo jamaicensis*):

Common and widely distributed permanent resident in Cuba and cayo Coco. It reaches 56 cm. Its distinct features are: upperparts brown, underparts whitish underside with brown spots across the belly, long, broad and rounded wings with distinct dark bar and wrist patch on leading edge, entirely rufous tail (adults) or brown barred (immatures). Red-Tailed Hawk has been only recorded in Anclitas, Caguama, and is included in the Appendix I of Resolution 161/11.



Osprey (*Pandion haliaetus*):

Common as winter resident and transient (*P. h. carolinensis*) in Cuba, Isle of Youth and cays, but permanent resident populations are more rare and represented by a local subspecies (*P. h. ridwayi*), restricted to surrounding archipelagos and cays. It

reaches 58 cm. Its distinct features are: upperparts dark brown, white underparts. In flight, the long wings have a conspicuous black patch on wrist and black tips. Stripe through the eye broad dark in migrant individuals or paler in residents. Ospreys feed on fish. It is included in the Appendix I of Resolution 161/11. It is widely represented along Jardines de la Reina cays, whose distribution range comprises Bretón, Cinco Balas, Alcatracito, Alcatraz, Grande, Caballones, Anclitas, Boca Piedra Piloto, Boca Piedra Chica, Cruces, Cachiboca, Boca Seca, Juan Grin, Caguama and Cabeza del Este.



Double-crested Cormorant (*Phalacrocorax auritus*):

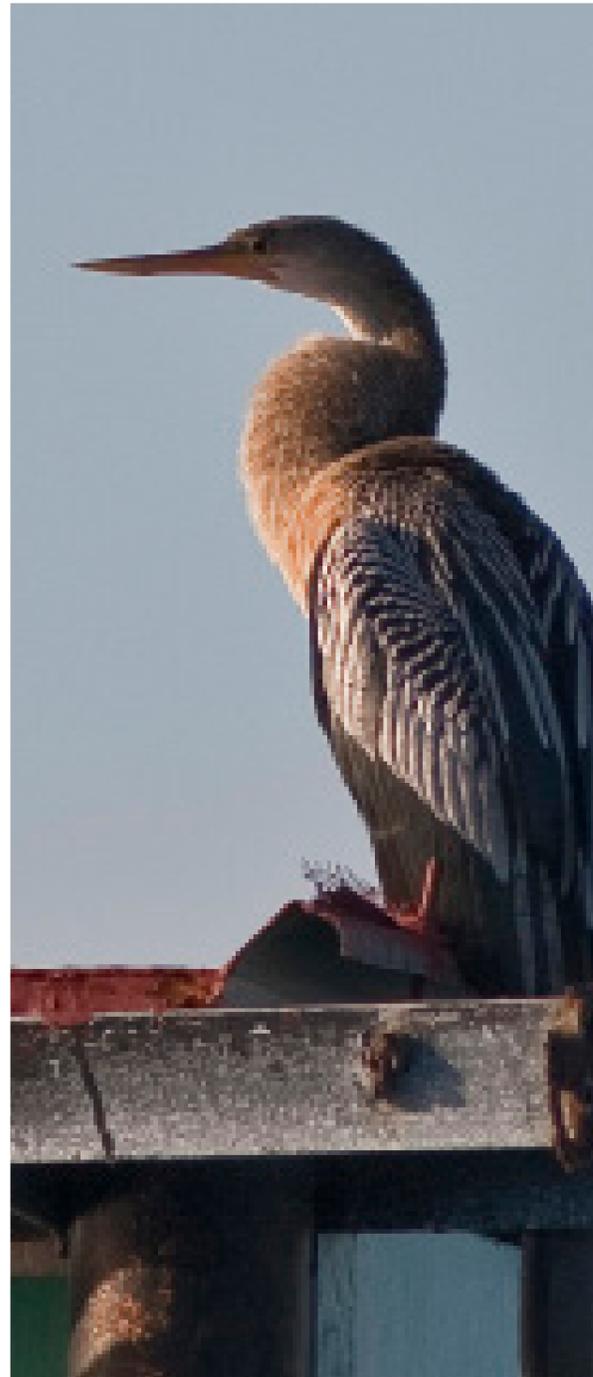
Common permanent resident and rare winter resident in Cuba, Isle of Youth and some cays. It reaches 81 cm long. Its distinct features are: black overall with a green metallic sheen evident in good light, bare facial skin and rounded orange throat pouch. Double-crested Cormorant is an excellent swimmer-diver which feeds on fish. This coastal-marine bird and colonial-breeder shows a very wide distribution and represented by large populations being reported in most cays of Jardines de la Reina (Bretón, Cinco Balas, Alcatracito, Alcatraz, Grande, Caballones, Anclitas, Boca Piedra Piloto, Boca Piedra Chica, Largo, Boca Grande, Cruces, Cachiboca, Boca Seca, Juan Grin, Caguama, Ca-

beza del Este). Double-crested Cormorant is included in the Appendix II of Resolution 161/11.



Anhinga (*Anhinga anhinga*):

Common permanent resident and rare winter resident in Cuba, Isle of Youth and some cays. It reaches 89 cm. Its distinct features are: blackish-brown with green iridescence (male), head, neck and chest pale brown (female), large silvery white areas on upper wing long neck, yellow bill, tail long with white tip. Anhinga is an excellent swimmer and feed on fish. It inhabits shallow waters along the entire archipelago being reported in many cays (Bretón, Cinco Balas, Alcatraz, Grande, Caballones, Anclitas, Boca Piedra Chica, Cruces, Boca Rica, Juan Grin, Caguama, Cabeza del Este) Anhinga is included in the Appendix II of Resolution 161/11.



TERRESTRIAL REPTILES



Leiocephalus carinatus cayensis (Perrito de costa):

It is a local endemic subspecies restricted to the cayos Grande, Caballones, Anclitas, Boca de la Piedra Piloto, Las Cruces, Cachiboca and Juan Grin. It is included in the Appendix II of Resolution 161/11.



Leiocephalus cubensis *paraphrus* (Bayoya):

It is a Cuban endemic species with a local subspecies restricted to Jardines de la Reina. It have been observed in the cayos from Anclitas to Juan Grin. It is included in the Appendix I of Resolution 161/11.



Ameiva auberi galbiceps (Cu-lebrina o Correcosta):

It is a local endemic subspecies restricted to the cayos from Grande to Caguama which abundant populations.



Cubophis cantherigerus ssp. (Jubo de sabana):

Potential subspecies of Jardines de la Reina, located in the cayos Bretón, Grande, Caballones, Anclitas, Las Cruces and Cachiboca. It is the only snake in the archipelago.

TERRESTRIAL MOLLUSK



Cerion sp:

Species which taxonomy is imprecise yet. Cerion is the genus of terrestrial mollusks of highest diversity on Earth with about 600 “forms” described due to their morphological diversity. They inhabit several bushes and herbs habitats along Jardines de la Reina, living on plants and soil, sometime in very high densities. They are considered Vulnerable by IUCN.

TERRESTRIAL PLANTS



Silver Palm (*Coccothrinax littoralis*):

Endemic of Central-Eastern Cuba. It is found everywhere in Jardines de la Reina.



Copernicia macroglosa:

Endemic of Central Cuba. It is found in Cayo Caguamas.



Helitrope (*Heliotropium myriophyllum*):

Endemic of Central-Eastern Cuba. It is found in Cayo Grande. It is included in the Appendix I of Resolution 161/11.

MARINE MAMMALS



Bottlenose dolphin (*Tursiops truncatus*):

Among the dolphin group, this the commonest and most studied species. It may reach 4 m and 500 kg and lives up to 60 years. It has an echo system to locate food and may work in groups to hunt. Bottlenose dolphin plays often with boats and swimmers. It is observed in Jardines de la Reina year around. Bottlenose dolphin is included in the Appendix II of Resolution 161/11.



Spotted dolphin (*Stenella frontalis*):

As its name indicates, spots cover the entire body of this dolphin but its dorsal fin. It may

reach 2.3 m and 140 kg. Spotted dolphin is very active at the surface, swimming just below it and jumping above while traveling. It is common in Jardines de la Reina. It is included in the Appendix I of Resolution 161/11.



Sperm whale (*Physeter macrocephalus*):

It is cosmopolitan and the largest teeth-whale (18 m and 57 tons). Sperm whale head accounts for a third of body length. It has several records on Animal Kingdom such as the deepest (2 800 m) and the longest (90 minutes) apnea dive. Sperm whale is spotted often in Jardines de la Reina. It is considered Vulnerable by IUCN.



Humpback whale (*Megaptera novaeangliae*):

It may reach 17 m, 40 tons and live 80 years. Its 5 m long pectoral fins is the distinctive feature of Humpback whales. In winter, it migrates to tropical and subtropical waters to reproduce. Humpback whales are friendly and curious animals not afraid of boats and people and well known by their jump and songs. To feed on krill and small fish, Humpback whales produce "bubble net" to concentrate prey on surface. It is spotted often in Jardines de la Reina. Humpback whale is included in the Appendix I of Resolution 161/11.



HABITATS

Although some variations occur from place to place along the archipelago, this general scheme shows the position of each element (zone) of the Jardines de la Reina profile from North to South:



A- Northern Fore Reef

The Northern Fore Reef extends seaward and downward from the cayos. It is the most complex of the reef zones, owing to the large depth gradient over which it occurs (5–10 m). In many areas, the fore reef is organized into a set of en-echelon reef promontories and sand channels, termed “spur-and-groove” topography though narrower (10-15 m) and less structurally complex than Southern Fore Reef and usually is formed by medium-large sizes patch reefs (100s m²). This zone is dominated by hard coral *Montastraea annularis* (Boulder Start Coral) colonies up to 3 m wide and several species of octocorals up to 2 m tall. This is the Northern habitat of highest abundance of large specimens of fish such as *Lachnolaimus maximus* (Hogfish) *Lutjanus jocu* (Dog Snapper), *L. cyanopterus* (Cubera Snapper), *Mycteroperca venenosa* (Yellowfin Grouper), *M. bonaci* (Black Grouper) and *Epinephelus itajara* (Goliath Grouper).

B- Northern Colonized Pavement

Northern Colonized Pavement extends like a narrow band (10 – 30 m) landward from Northern Fore Reef to the cayos. This is a limestone-coral low relief pavement dominated by octocorals such as *Pseudopterogorgia americana* (Slimy Sea Plume), *Eunicea* sp (Knobby Sea Rod), *Plexaura* sp. (Sea Rod) with few coral colonies mainly of *Siderastrea radians* (Lesser Starlet Coral), *Dichocoenia stokesii* (Elliptical Star Coral), *Diploria clivosa* (Knobby Brain Coral) and *D. strigosa* (Symmetrical Brain Coral). Fish are medium size grunts, mainly *Haemulon plumieri* (White Grunt) and *H. flavolineatum* (French Grunt).

C- Northern Seagrass Beds

Northern Seagrass Beds cover extensive

areas landward from Northern Colonized Pavement to the cayos. Mainly dominated by *Thalassia testudinum* (Turtle Grass), density and size of sea grass are lower and smaller than that in Internal Lagoons. Patchy reef crest and small patch reef (10s m²) are found on this habitat. Northern Reef Crest is peculiar since reef crests do not form long and large formations like Southern Reef Crest but round and smaller ones. On the other hand, Northern Patch Reefs are small coral formations up to 10s m². This habitat is dominated by *Millepora* sp (Fire Corals), *Acropora cervicornis* (Staghorn Coral), *A. prolifera* (Fused Staghorn), *Porites astreoides* (Mustard Hill Coral) and *P. porites* (Finger Coral). *Acropora palmata* (Elkhorn Coral) is also presented but most of the colonies are death. More abundant fish are *Haemulon sciurus* (Bluestriped Grunt), White Grunt and French Grunt. Large fish observed are *Lutjanus analis* (Mutton Snapper), Dog Snapper and Cubera Snapper.

D- Mangrove Forests

From shoreline to inner part of the cayos, mainly northern part of the cayos, Mangrove Forests dominate the landscape. Closer to the sea *Rhizophora mangle* (Red Mangrove) is dominant with a succession to *Avicennia germinans* (Black Mangrove), *Laguncularia racemosa* (White Mangrove) and *Conocarpus erectus* (Buttonwood) toward the interior of the cayos as the influence of saltwater decreased. There is patchy death of Red Mangrove of unknown cause throughout Jardines de la Reina. Mangrove Forests are very important for marine and terrestrial flora and fauna, providing shelter, feeding and nesting grounds for a variety of plants and animals.

E- Internal Lagoons

Most of the cayos have internal lagoons.

AVALON FLEET I



These are dominated by dense and tall seagrass beds, mainly Turtle Grass, with smaller areas cover by patch reefs and milestone habitats. Internal Lagoons are fringed by Mangroves Forests and are important feeding, nursery, shelter and resting grounds for hundreds species, mainly birds, fish and crustaceans.

F- Vegetation in Southern Part of the Cayos

Southern areas of the cayos are typically the “solid part” of them where sand is the dominant substrate although there are places where milestone is. Coastal Shrubs over Sand is the main habitat in the cayos. It extends parallel to beaches. More conspicuous plants are *Coccothrinax litoralis* (Silver Palm), *Metopium toxiferum* (Poison tree), *Erithalis fruticosa* (Blacktorch), *Chrysobalanus icaco* (Coco Plum), *Coccoloba uvifera* (Seagrape), *Thrinax radiata* (Thatch palm) and *Crossopetalum rhacoma* (Maidenberry). This vegetation is up to 5 m high. Shrub stratum covers 80 to 95 % reaching up to 2.5 m high. More abundant species of the shrub stratum are Blacktorch, Silver Palm and *Plumeria obtuse* (Frangipani). Terrestrial fauna use Coastal Shrubs over Sand as the main habitat. Another habitat observed in Jardines de la Reina is Coastal Vegetation Complex over Sand, which is found in patches inside Coastal Shrubs over Sand habitat. The commoner species of plants are *Schizachryrium maritimum* (Little Bluestem), *Paspalum caespitosum* (Blue Crowngrass), *Mallotonia gnaphalodes* (Sea Rosemary), *Euphorbia mesembryanthemifolia* (Coastal Beach Sandmat), *Borrichia arborescens* (Tree Seaside Oxeye) and *Canavalia maritime* (Baybean). In the areas where milestone is the substrate Coastal Shrubs over Milestone or Coastal Vegetation Complex over Milestone are the habitats found. Coastal Shrubs over Milestone grow in relatively large milestone platforms, reaching around 0.7 m. More abundant species is Pride-of-big-Pine. Occas-



sionally, Silver Palm emerges up to 2 m high. Coastal Vegetation Complex over Milestone is located close to seashore. It is dominated by herbs no more than 0.2 m high such as Blacktorch, Buttonwood and Little Bluestem.

G- Southern Back Reef and Reef Lagoon

The lagoon includes the seagrass beds, shallow water flats, mangrove formations, patch reefs. This is an important nursery zone with high productivity waters. Nutrients, food, larvae, are carried all over the area in different movement patterns determined by the geography of the flats, tides, currents and weather conditions. A whole system of complicated relationships and movements of fish populations occurs in this zone. The seagrass beds and mangroves also work as a huge filtering system for the water that goes to the reef with the outgoing tide. These are feeding grounds for Bonefish (*Albula vulpes*), Tarpon (*Megalops atlanticus*) and Permit (*Trachinotus falcatus*). The export of plant detritus and faunal biomass to support offshore consumers is an important function of mangrove swamps, which is a strong argument for their conservation. Mangroves provide refuges for adult and larval stages of fishes and crustaceans, many of which are commercially important. Small patch reef are found in this habitat. They are sanctuaries of life in the middle of the desert Reef Lagoon. In Jardines de la Reina, main corals in this habitat are Mustard Hill Coral, Elliptical Star Coral, Symmetrical Brain Coral, Finger Coral and Lesser Starlet Coral. Among octocorals, dominate *Plexaura homomalla* (Black Sea Rod) and *Eunicea mammosa* (Swollen-knob Candelabrum) and grunts, wrasses and surgeonfish are the commonest fish.

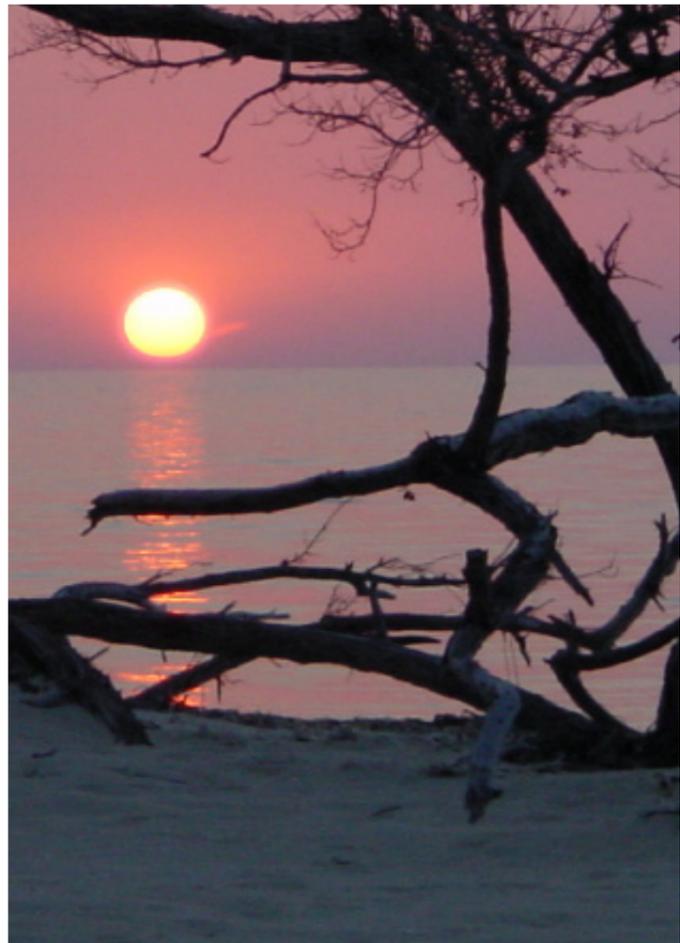
TORTUGA

Floating hotel



H- Southern Reef Crest

The crest of the reef generally emerges at low tide, but may be below the surface. The seaward edge of the reef crest takes the brunt of the incoming wave energy. The reef can reduce incoming wave energy by up to 97%. As waves break, water is washed across the reef crest and into the lagoon, driving lagoon circulation. Because of the modification of wave forces across the reef crest, the back reef is an environment of totally different physical processes, ecology and sediment characteristics. Sediments and rubble from the reef crest are dumped behind the crest, widening the back reef flat through time. Jardines de la Reina reef flats have only recently reached sea level and are narrow. There is a general transition from branching corals *Acropora* (Horn Corals) and the hydrozoans *Millepora* (Fire Corals) near the front of the crest to sand flats and seagrass landward. The shallow back reef may have a shallow *Porites* (hard coral species) reef flat imme-



diately behind the crest and numerous small patch reefs in a sand apron. The corals are generally well adapted to the high levels of sedimentation to which they are regularly subjected. In Jardines de la Reina, main coral species are Elkhorn Coral (most colonies are dead) and Fire Corals and the dominant octocorals are *Plexaura kuenthali*, *Briareum asbestinum* (Corky Sea Finger) and *Gorgonia flabellum* (Venus Sea Fan). The commonest fish are surgeonfish and grunts although large species such as Tarpon, *Scarus guacamaia* (Rainbow Parrotfish), Dog snapper and *Mycteroperca tigris* (Tiger Grouper) are observed often. This is a nursery habitat for young *Eretmochelys imbricata* (Hawksbill Turtle).

I- Southern Colonized Pavement

Southern Colonized Pavement extends seaward from the Southern Reef Crest to the Caribbean Sea. It is 50-200 m wide. This is a limestone-coral low relief pavement dominated by octocorals, mainly Venus Sea Fan, being Mustard Hill Coral the dominant hard coral. Fish are scarce due to absence of shelter.

J- Southern Fore Reef

Southern Fore Reef extends seaward and downward from the Southern Reef Crest. It is the most complex of the reef zones, owing to the large depth gradient over which it occurs (6 to 25 m). In many areas, the fore reef is organized into "spur-and-groove" topography of higher structural complexity and wider (up to 50 m) than Northern Fore Reef. The fore reef slope is the least consistent of any of the reef zones, in either its occurrence or character. Where a fore reef slope is present, the deep area usually occurs as a well-defined ridge near

the platform margin. Otherwise, it is simply a down-dip extension of the fore reef. When occurring separate from the shallower reef zones, the location of the deep fore reef is probably controlled by both the break in slope and the existence of an antecedent high left by a previous reef. Main coral species are Mustard Hill Coral, Lesser Starlet Coral, Boulder Star Coral and *Agaricia humilis* (Lowrelief Lettuce Coral), while octocorals are dominated by Slimy Sea Plume, Bipinnate Sea Plume, *Eunicea flexuosa* and Corky Sea Finger. This is the habitat with highest abundance and biomass of medium and large sizes fish such as snappers, groupers, rays, sharks not only in Jardines de la Reina and Cuba but also of the Caribbean and similar to the best preserved isolated areas of Central Pacific.

K- Southern Reef Wall

Perhaps the most dramatic feature of the deep fore reef is the "Reef Wall". At depths ranging from 30 to 50 meters, the fore reef slope rolls over to a vertical or, in some places, overhanging precipice. This is spawning area for most of the Cuban ichthyofauna.



