A person in a blue kayak is shown in profile, paddling on a calm, blue sea. The background features a range of mountains under a soft, hazy sky. The overall mood is peaceful and serene.

*Love Letter to*  
—  
**TAÑON STRAIT**

# Tañon Strait PROTECTED SEASCAPE



---

## The Largest Marine Protected Area IN THE PHILIPPINES

---

**T**añon Strait Protected Seascape is the largest marine protected area in the Philippines, and the third largest park, nearly as extensive as the two largest terrestrial natural parks in the Northern Sierra Madre and Samar Island which protect the Philippine Eagle and other wonders. Tañon Strait is their marine counterpart, with an area of 5,182 km<sup>2</sup>, more than three times the area of the Tubbataha National Park.

The Strait is extremely narrow (27 km), long (160 km) and deep (500 m). At its widest, the Strait is only 27 km, and narrowest near the south at a mere 5 km. The deep waters which attract dolphins, whales, sharks and manta rays extend down from the surface a distance roughly half a kilometer. In Cebu City, this is equivalent to a jeepney ride between the Basilica del Santo Nino and Fort San Pedro. In Dumaguete, this is equivalent to a walk between the Dumaguete Cathedral and Silliman University. The Tañon Strait has a coastline of 450 km.

Colorful bangkas grace blue waters teeming with fish, and thatched roof nipa huts shelter families of farmers and fisherfolk all along the shorelines of Negros and Cebu. Tañon Strait was declared a protected seascape in 1998, in honor of the 14 species of whales and dolphins which live within this special place. Several of the Philippines' most ancient and endangered animals have also been sighted here, including the dugong and the chambered nautilus.

Many marine animals seek safe passage through Tañon Strait to travel between the Visayan Sea in the north and the Bohol Sea in the south. It is a migratory route for whale sharks (*Rhincodon typus*) and other giants. Coral reefs and their colorful fish residents, various species of whales and dolphins, seagrass meadows beneath nearshore waters, and diverse fisheries all can be found within this narrow corridor.

Tañon Strait is also one of the Philippines' major fishing grounds,

## *Diversity from* **SHALLOW TO DEEP**

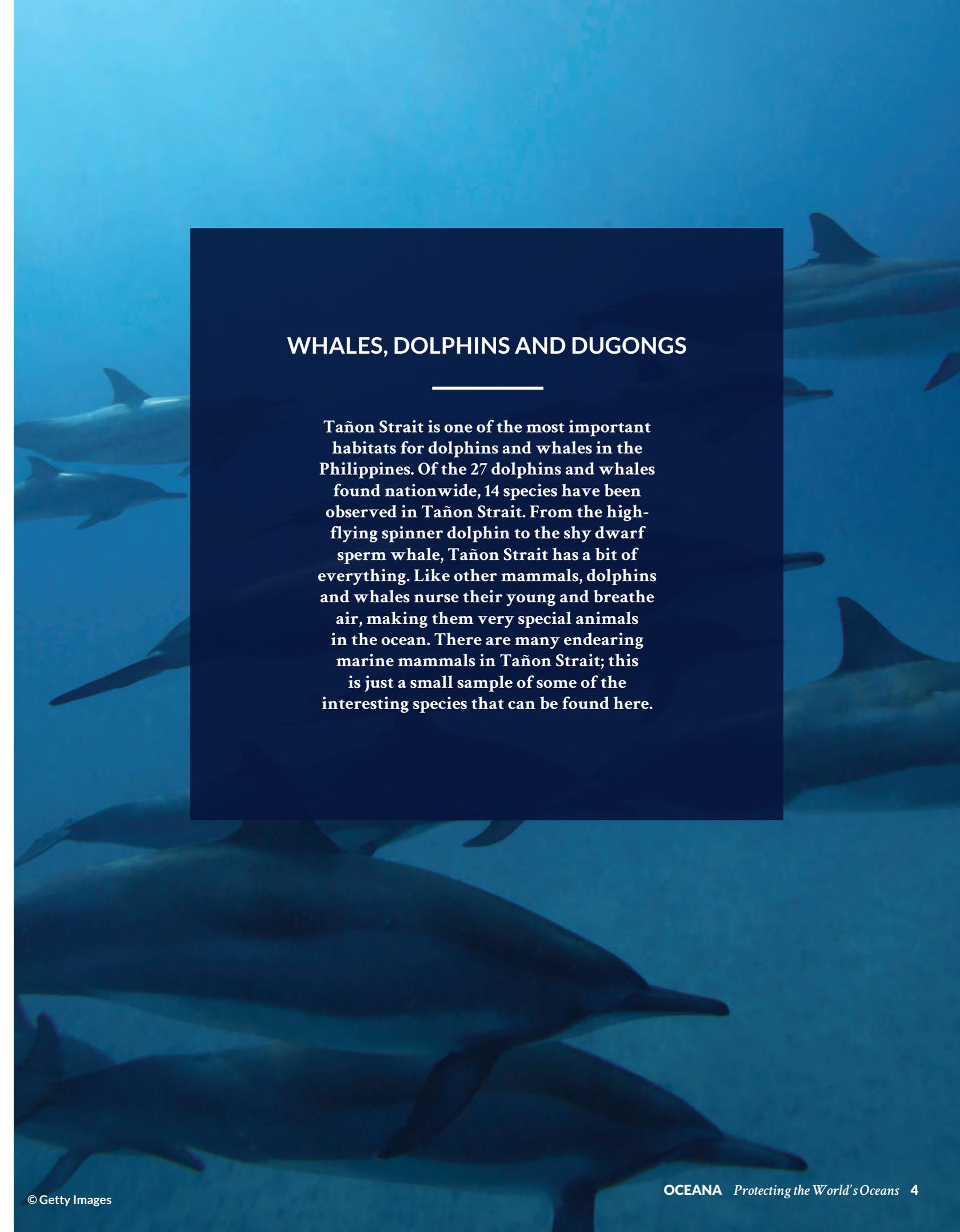
a source of food and income for many residents in Negros and Cebu. The large dalupapa or diamond back squid (*Thysanoteuthis rhombus*) is frequently caught in these waters along with several other smaller species of squid. Abundant schools of sardines are commonplace, particularly off the coast of Pescador Island. Tuna species can be found along the length of the Strait but tend to be found in higher densities in the southern portion. Fishing is a traditional form of livelihood for many residents, and an important part of the cultural heritage of the region. Large commercial vessels also seek shelter here, relying on ports within Tañon Strait to resupply for their journeys to the Sulu Sea and beyond.

However, the beauty and bounty of Tañon Strait are under threat from destructive and illegal fishing. Fisheries across the Philippines have declined severely in our lifetimes, with fisherfolk catching roughly 90 percent less for the same amount of effort as they did in the 1950s. In Tañon Strait, signs of this overfishing include the extremely small sizes of fish typically sold in the market and the use of fishing nets with relatively small mesh. We must act now to protect the seascape from destructive fishing, illegal commercial fishing and pollution. It's not too late for strong leadership, accountability and effective enforcement to stop these threats and ensure the resources of Tañon Strait continue to sustain future generations for many years to come.

---

*The beauty and bounty  
of Tañon Strait*  
**ARE UNDER THREAT  
FROM DESTRUCTIVE  
AND ILLEGAL FISHING.**

---



## WHALES, DOLPHINS AND DUGONGS

---

Tañon Strait is one of the most important habitats for dolphins and whales in the Philippines. Of the 27 dolphins and whales found nationwide, 14 species have been observed in Tañon Strait. From the high-flying spinner dolphin to the shy dwarf sperm whale, Tañon Strait has a bit of everything. Like other mammals, dolphins and whales nurse their young and breathe air, making them very special animals in the ocean. There are many endearing marine mammals in Tañon Strait; this is just a small sample of some of the interesting species that can be found here.



© Getty Images

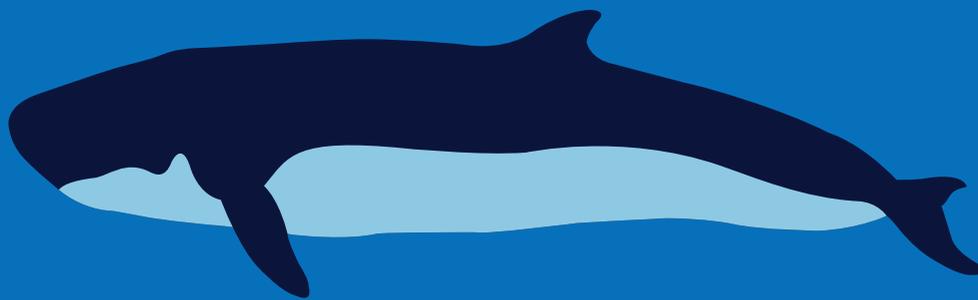
## STAR POWER: SPINNER DOLPHIN

The aptly named spinner dolphin (*Stenella longirostris*) is one of the most frequently seen inhabitants of Tañon Strait. This charismatic animal can be seen frolicking near the surface in groups, and is often the star attraction for dolphin watching enthusiasts.

The spinner dolphin lives in tropical and subtropical waters around the world. They can be found between 40°N and 40°S, roughly the band around the world between Japan and Australia. In the Philippines, the spinner dolphin can be found throughout the archipelago. Spinner dolphins are the most widely distributed marine mammal in the Philippines and are likely the most abundant. These dolphins have slender bodies with a long thin beak. Their skin is colored by a dark gray cape on

their back, light grey at their sides, and pale grey or white on the belly. A dark band runs from the eye to the flipper, bordered by a light thin line. Spinner dolphins are relatively small ranging between 1.3 and 2.4 m, similar to the length of a trike or mini-van.

Spinner dolphins are the most abundant dolphins in Tañon Strait with an estimated population of approximately 3,500 individuals. Spinners are especially social and will swim together with other animals, including spotted dolphins, short-finned pilot whales and Fraser's dolphins. These mixed schools can be seen in Tañon Strait, but pure schools of spinners-only are more common. Because it easy to see in the wild, often jumping and twirling in the air with apparent delight, the spinner dolphin attracts many people who visit Tañon Strait expressly for dolphin-watching.



## THE SHY DWARF SPERM WHALE

An estimated 670 dwarf sperm whales (*Kogia sima*) live in Tañon Strait. This is a remarkable number of whales in a small area, with a population density 15 times higher than even the neighboring Sulu Sea. Unfortunately, these whales are very difficult to observe at sea because of their flat profile and shyness. Unlike the spinner or spotted dolphins, their swimming is slow and measured at the surface and they rarely approach boats. Most sightings are reported in calm waters.

Though we usually think of whales as giants, the dwarf sperm whale is the tiniest whale in the world, reaching an average of only 2.7 m fully grown. They are even smaller than several dolphin species. At the same time, this tiny whale carries relatively hefty calves which are born already 1 m long. Dwarf sperm whales have a conical pointed snout and a small narrow distinctive lower jaw. They also have a false gill plate that resembles a fish's gill cover on the side of their head. Their pointed snout and false gill plate makes this species of whale appear shark-like. The dwarf sperm whale's body is counter-shaded, with dark grey on the back

and white on the belly. This uneven coloration disguises the whale making it difficult for predators to spot them.

Research suggests that dwarf sperm whales primarily feed on squid and octopus. Tañon Strait may attract whales because of the high density of squid. Dwarf sperm whales in the Strait associate with spinner and spotted dolphins, and remain in much shallower waters (255 m) than they do in other regions. When threatened, the otherwise mild-mannered dwarf sperm whale can squirt large volumes of liquefied solid waste at the intruder.



## MYTHICAL DUGONGS

The ancient dugongs (*Dugong dugon*), referred to affectionately as a sea cow or sea pig, were common in the Philippine Archipelago until the 1970s. Since then, dugong populations nationally have been in decline and this animal is now believed to be one of the most critically endangered mammals in the Philippines. The dugong is the only living species in the dugong family since the only other member, Stellar's sea cow, has been extinct since the mid-1700s. Some believe the dugong, and its relative the manatee, were the original inspiration for mermaids and sirens for seafarers thousands of years ago.

This relative of the elephant has a vegetarian diet and looks similar to the manatee. Its behavior resembles that of a cow in that dugongs spend their time grazing on seagrasses, both in the day as well as in the evening. Although dugongs spend time in pairs and alone, they can

also be found in groups, called a herd. In the Philippines, dugong sightings average about five individuals, but can be as large as a group of 15-24 animals.

Dugongs have a very different body shape than other cetaceans. Their brownish-gray skin is sparsely covered with hair, with flippers similar to paddles and no dorsal fin. The lower part of the body ends in a fluked tail similar to that of a dolphin, but the lower part of the body is flattened.

Historically, it is estimated that almost every island in the Philippines harbored dugongs. Specific to Tañon Strait, there have been sightings in the Northern region, particularly near Estancia on the western side of the Strait. However, with loss of seagrass, the dugong's preferred food, due to pollution and other issues, the dugong population in Tañon Strait is under threat.



### A RARE SIGHT: THE PYGMY KILLER WHALE

The pygmy killer whale (*Feresa attenuata*) is considered rare throughout the world, but has been spotted in the depths of Tañon Strait. Contrary to its name, the pygmy killer whale is actually a dolphin, found in waters between 40°N and 35°S worldwide.

Very little is known about this mysterious “pygmy whale” — it remains a mystery where it lives, what it eats, and how large its population is. Since the first recorded discovery of a pygmy killer whale skeleton by scientists in the

1820s, and then again in the 1870s, no new information regarding the pygmy killer whale was collected for 80 years. Finally a live pygmy killer whale was sighted in 1954. To this day, the pygmy killer whale is still regarded as the most enigmatic of the world’s oceanic dolphins.

Pygmy killer whales have a slender body with a round blunt head. They are grey to black in color and their lips and snout are edged in white. Pygmies can grow to over 2.6 m in length and weigh up to 170 kg. In the waters around the Hawaiian Islands, a small population of pygmy killer whales has been studied closely, and it is estimated that they swim in

schools of 10 to 15 individuals. Recently off the coast of Australia, a school of 20 – 30 pygmies were sighted. While this species is considered to be naturally rare, groups of 50 individuals or more have been documented. Pygmy killer whales primarily live offshore and will only come closer to the coast in areas with unusually clear deep waters.

The steep walls and clear waters is why Tañon Strait is one of the very few places in the world where pygmy killer whales may be sighted. This species that is naturally rare in the world’s oceans is attracted to these special conditions which make Tañon Strait a suitable home.



© Getty Images

### THE SPOTTED DOLPHIN

As its name suggests, the spotted dolphin (*Stenella attenuata*) is known for the spots

that speckle its body as an adult. Newborn dolphins are unspotted and only begin to show spots on their undersides and paler speckling on their backs as they mature.

The spotted dolphin also has a grey cape extending from its head, sweeping low on the flank and ending between the dorsal (back) fin and the tail.

The spotted dolphin is widely distributed with a similar range to the spinner dolphin, inhabiting tropical and subtropical waters of the world between 40°N and about 40°S latitude. These relatively small dolphins are less than 2 m long. Their slender sleek bodies allow them to swim at speeds between 22 and 28 km per hour, the rate of a fit cyclist. Similar to spinner dolphins, spotted dolphins exhibit a wide variety of aerial behavior and juveniles are well known for their high leaps.

The sociable spotted dolphin will form schools that can range between less than 100 individuals to over 1,000. In the Tañon Strait, there is an estimated 640 spotted dolphins that will form average schools of 35 individuals, often schooling with spinner dolphins. Their aerial antics are also a draw for tourist to Tañon Strait, adding to the magic of these waters.

## *A Cornucopia of FISH*

---

An astounding diversity of fish species can be found among the 7,107 islands of the Philippines, the world's center of marine biodiversity. The humble sardine, malalangi or tuloy, surrounds itself with massive schools which dance in silver flashes off Pescador Island. Visayan reefs glow with brightly decorated parrotfish. The shimmering open waters of Tañon Strait and the nearby Sulu Sea conceal silent giant tunas, sharks, even an occasional visit by the mola mola, or ocean sunfish. Tañon Strait in particular is known for a wide variety and density of fish living in the strait or passing through seasonally.

## A Cornucopia of Fish



© Getty Images



© OCEANA | Keith Ellenbogen



© Getty Images

### POWERHOUSE TUNAS

Tunas are some of the most economically important fish for both municipal fisherfolk and commercial businesses on the islands of Negros and Cebu, providing food and income for many. Within the Philippines, Tañon Strait is also home to tunas and their relatives, the mackerels and bonitos.

Tunas are large, powerful swimmers of the open ocean that roam throughout the planet's tropical and subtropical waters. Tuna migrate huge distances, including the Pacific bluefin tuna (*Thunnus orientalis*) which swims between the waters of Japan and California, effortlessly crossing the Pacific Ocean.

Tunas come in many different sizes – the largest and most coveted species, bluefin tuna, will grow more than 2 m long, while the little eastern tuna (*Euthynnus affinis*) stays less than a meter. Tunas are among the most valuable seafood, with high-priced fish exported for sushi and many more sold at local markets or canned for everyday meals. In the Philippines, there are six species of tuna frequently caught in fishermen's nets. Of these commonly caught species, yellowfin tuna (*Thunnus*

*albacares*), skipjack tuna (*Katsuwonus pelamis*), bullet tuna (*Auxis rochei*), and frigate tuna (*Auxis thazard*) are frequently seen in the Tañon Strait.

Tunas have a unique body shape that makes them fast swimmers and powerful predators. Each tuna's sleek, torpedo-shaped body and crescent-shaped tail are built for speed and endurance. Yellowfin tunas, for example, are capable of reaching speeds of up to 75 km per hour. This species of tuna is black to dark blue in color with a yellow or silver belly. Nearing the tail, tiny finlets run down the lower and top side of their bodies. Their bright yellow fins and finlets give this species its name. Yellowfin tuna can grow to up to 2 m and live to be 6.5 years old in Philippine waters. This species will form schools with other types of tunas and also swims with spotted dolphins. Their spawning peaks during the summer in batches, and it is common for schools to be caught in nets near the surface.

Skipjack tunas are a medium-sized member of the tuna family. This fast-growing species matures in its first year of life at 40 cm and grows to a maximum of 110 cm. Skipjack tunas can easily be distinguished from other tuna species

BOTTOM LEFT: Parrotfish  
TOP LEFT TO RIGHT: Dried Fish in Carbon Market, Cebu; Tuna targeting prey; Juvenile snapper in Sibulan Market, Negros Oriental; Whale shark



© OCEANA | Charlotte Grubb



© OCEANA | Carlos Suárez

by three to six distinct dark horizontal stripes which mark their sides. These tunas are almost scaleless with only a thin line of scales running along the length of their bodies. They are a common sight in Tañon Strait. The eggs of skipjack tunas are released in several portions as they spawn throughout the year in the tropics.

The bullet and frigate tunas are also medium-sized species and commonly mistaken for one another as juveniles. In both species their backs are blue fading to dark purple or black on the head. On their backs, between the back fin and tail, there is a scaleless area which has a zig-zag pattern of dark lines. Despite the similarities, these species can be distinguished as adults by their size. Bullet tunas are smaller, reaching a length of 50 cm. The slightly larger frigate tunas can grow up to 60 cm.

## A MEDLEY OF COLOR: THE REEF FISHES

Coral reefs pepper the coastlines of Cebu and Negros, and are home to a dazzling array of fishes. In addition to their beauty, reef fish help maintain the health of the corals. Many reef fishes are eaten by fisherfolk and their families, and these catches also contribute income to

households along Tañon Strait. Here is just a small sample of the interesting reef fish in Tañon Strait.

### *Gender-bending Parrotfish*

Parrotfish are a common sight on coral reefs in Tañon Strait, and across the Pacific and Indian oceans. These bright green, blue, pink and yellow fish can be seen picking at algae that grow on coral, rocks, and the seafloor. By eating algae they keep the coral clean and prevent them from being overgrown, providing an important service on the reef. Their tightly packed teeth form a solid row attached as one to their upper and lower jaw. From the outside these rounded jaws look like a beak, and this beak-like smile gives the parrotfish its name.

Parrotfish have remarkable lifestyles. Each night, many parrotfish prepare a kind of sleeping bag made of their own mucus. The mucus layer blocks their scent from passing predators. Parrotfishes begin life as females, and males come from individuals which change sex as they grow older, accompanied by a change in color. Only one species of parrotfish, the marbled parrotfish (*Leptoscarus vaigiensis*), found across the Philippines does not

change sex. Interestingly, parrotfishes also form groups that are entirely female with only one male. When a group of female parrotfish lose the male, the largest of the females will change sex. This marvel of nature can help give parrotfish an evolutionary advantage to produce a large amount of offspring.

### *Maya-maya marvels*

Snappers are an important food fish in the Philippines and in tropical and subtropical countries around the world. Some of the snapper species found in Tañon Strait are: checkered snapper (*Lutjanus decussatus*), bigeye snapper (*Lutjanus lutjanus*), mangrove red snapper (*Lutjanus argentimaculatus*), five-lined snapper (*Lutjanus quinquelineatus*), and dory snapper (*Lutjanus fulviflamma*), just to name a few.

All snappers tend to have a similar body shape with medium-to-large scales and a spiny back fin. Many species can grow quite large up to 1 m long. Snappers reproduce several times during the year, and as a result, can be found year-round in Tañon Strait. One of the reasons snappers are such popular fish to catch is that they crowd together in large aggregations to spawn. During these seasonal gatherings,

---

*An astounding diversity of*  
**FISH SPECIES CAN BE FOUND**  
**AMONG THE 7,107**  
*islands of the Philippines.*

---

snappers are especially vulnerable to overfishing. Snappers are active predators that feed mainly at night. Fish is their main choice of food but they will also eat crabs and shrimp.

***Lapu Lapu: from Mactan to the Plate***

Groupers and snappers are some of the most popular food fish on the reef, in the Philippines and in tropical and subtropical countries worldwide. Several grouper species are locally known as lapu-lapu, named after a native hero, chieftain of Mactan Island.<sup>1</sup> Groupers can grow quite large, in some cases more than a meter long. Fisherfolk and divers recognize groupers by their downturned mouths and stout bodies. Many groupers also have rounded tails and large mouths that can extend outward to catch their prey. Groupers ambush smaller fish, hiding and waiting until their target swims near enough for a stealth attack.

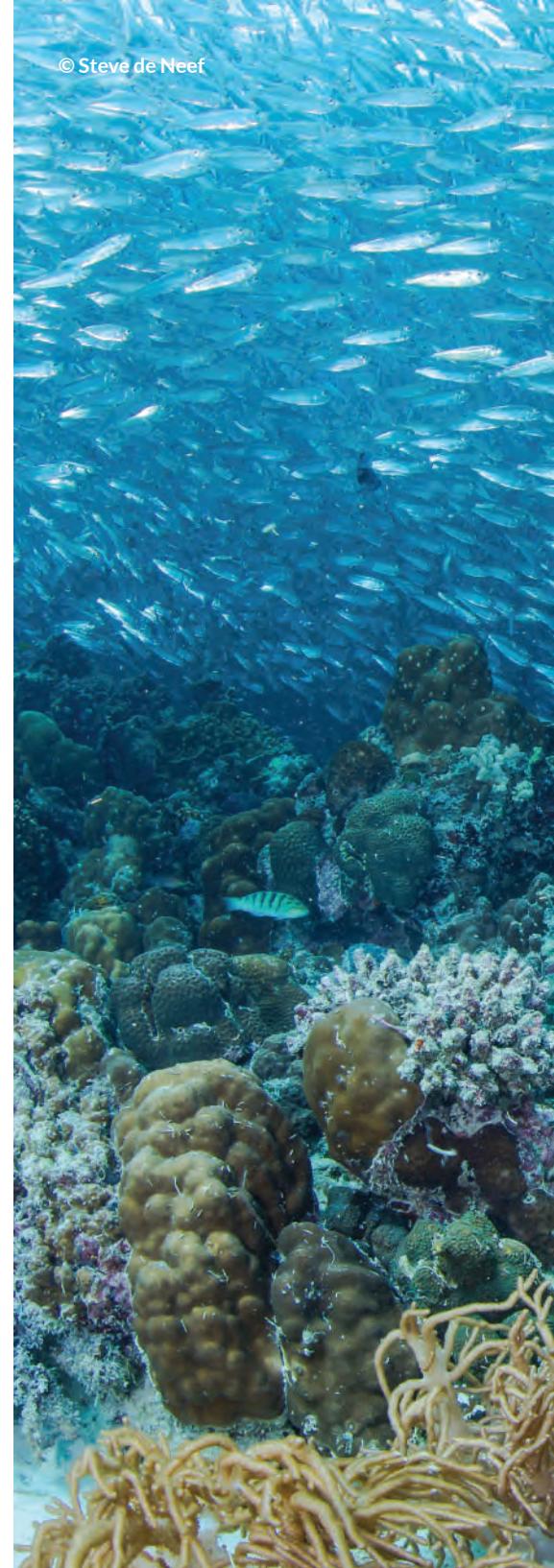
Many species of groupers can be found in Tañon Strait, including the coral grouper (*Epinephelus corallicola*), halfmoon grouper (*Epinephelus rivulatus*), honeycomb grouper (*Epinephelus merra*), orange-spotted grouper (*Epinephelus coioides*) to name a few. Groupers play an important role as a predator in the coral reef ecosystem, and are an important indicator of a healthy reef.

***Sardine eclipse***

Sardines are one of the world's most productive species of fish. They form massive schools which eclipse the sun as they swim by, with hundreds of thousands of silvery sardines traveling together. Sardines are marine fishes, with the single exception of tawilis (*Sardinella tawilis*), which is the only freshwater species in the world, found in Taal Lake, Batangas on the island of Luzon. They are an important food fish and promoted as one of the most sustainable seafood options. In the Philippines, the exact number of sardines species found has not been conclusively established. Some scientists have reported as many as nine species, while others suggest only six. Despite the actual number of species present, sardines have been the most widely caught fish in the Philippines for the past two decades.

Sardines are fast growing fish with many species reproducing as early as one year old. These small fishes (measuring around 14 cm) are an important part of the Tañon Strait ecosystem. They are food for top predators such as dolphins and sharks. Sardines are also consumed by a variety of other species such as tunas, mackerel and barracudas.

Sardines also migrate to areas with abundant food when they are ready to spawn. These migrations are commonly



called "sardine runs." Sardine migrations are a sight to be marveled at, as large numbers of sardines swim in one shimmering cloud. Near Moalboal on the western side of Cebu, the uninhabited Pescador Island is famous for its sardine run. Similar to the sardine run in South Africa, the sardine run on Pescador Island attracts predators such as schools of jacks, tuna, mackerel, and sometimes thresher

---

<sup>1</sup> Lapu-Lapu, the chieftan of Mactan, is celebrated for contributing to the end of the Spanish colonial rule through the death of Magellan at the Battle of Mactan.

LEFT: Sardine run on Moalboal

Strait. Whale sharks are indeed sharks, and the name “whale” refers to their sheer size. Unlike other sharks, the whale shark eats fish eggs and larvae, small shrimp, squid, and other tiny animals swimming or floating in the water. To feed, whale sharks will swim with their mouths wide open filtering out their tiny food, they are harmless to humans.

Whale sharks have skin colored in various shades of grey and speckled with pale yellow spots and stripes. This speckling is unique to each individual and scientists often use these markings to identify and name each animal in a group. Whale sharks are slow-growing animals and it is estimated that they can live between 60 – 100 years, a similar range to humans. In the Tañon Strait, whale sharks can be seen swimming in groups or individually, and on land they are featured prominently on the P100 note.

### **DALUPAPA: SHIP-SINKING MONSTER OR LUNCH?**

The dalupapa, or the giant squid, as it is commonly known in the Tañon Strait, is a very large species of squid. This species (*Thysanoteuthis rhombus*) can reach up to 100 cm in length and average around 20 kg in weight. The life span of the dalupapa is estimated to be about one year, and animals mature between 6 to 8 months. The dalupapas form pairs of a male and female of the same size and they probably remain together throughout their lifetimes. The dalupapa can be easily identified by its bright red color and fins that run the full length of its head (mantle) giving it a diamond shape. This species is known as the diamondback squid in English.

In the Tañon Strait there is a thriving dalupapa fishery. Fisherfolk will often ply the waters at night in hopes of landing one of these giants. While the dalupapa is very large and intimidating, it is not a member of the official giant squid family that reaches 13 meters in length. Seafarers can rest assured that the imaginary kraken, a many-tentacled, ship-sinking monster seen in movies and inspired by the real world giant squid, will not appear in Tañon Strait.

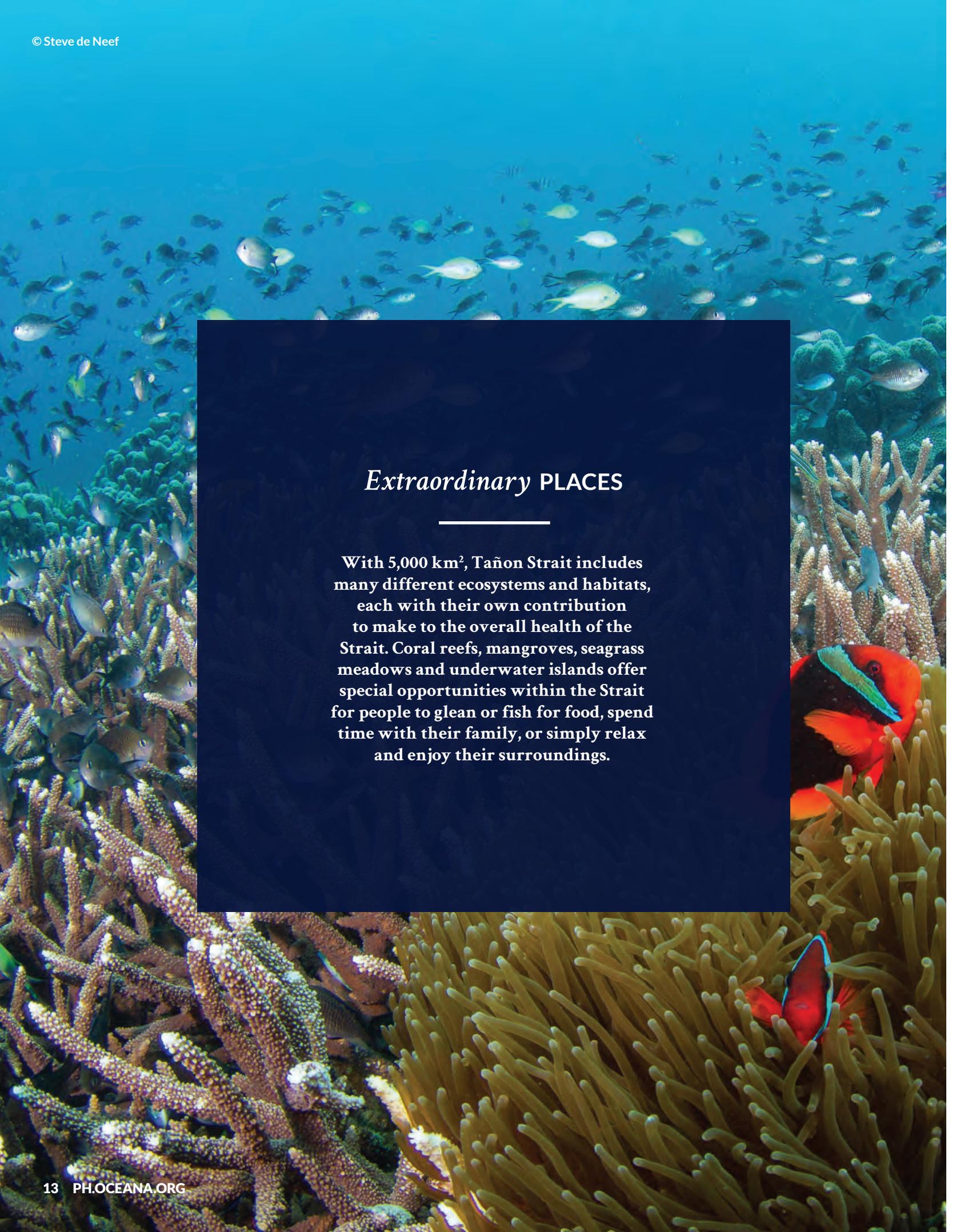
sharks. This annual migration happens roughly every July in the Philippines.

### **THERE GOES A WHALE SHARK**

A growing number of whale shark-watchers fill tour boats operating in Tañon Strait, attracted to this unusual shark's docile nature and impressive size. Yet not too long ago whale sharks in the Visayas were hunted for their fins

and meat. Thankfully, this practice has stopped and these animals now contribute to the local economy of the Strait in a different way.

There are very few animals as majestic as the whale shark (*Rhincodon typus*) as it glides smoothly near the surface. Despite reaching the size of a large bangka, between 9 and 12 meters in length, this slow moving giant is one of the most graceful animals in Tañon



## *Extraordinary* PLACES

---

With 5,000 km<sup>2</sup>, Tañon Strait includes many different ecosystems and habitats, each with their own contribution to make to the overall health of the Strait. Coral reefs, mangroves, seagrass meadows and underwater islands offer special opportunities within the Strait for people to glean or fish for food, spend time with their family, or simply relax and enjoy their surroundings.

## TECHNICOLOR CORAL REEFS

Tañon Strait is home to a wide range of hard and soft corals found on the 200 km<sup>2</sup> of coral reefs bordering the islands of Negros and Cebu. In Tañon Strait, corals form fringing reefs, which extend seaward like a shelf directly from the shore. As a part of the Coral Triangle region with the highest diversity of coral worldwide, Philippine waters contain almost 500 species of coral with 27,000 km<sup>2</sup> of tropical reefs.

Coral reefs are actually built by millions of tiny animals which attach to the seafloor and then to each other in giant colonies that form a reef, together with coralline algae and sponges. Corals grow in many different shapes and sizes, some soft and others hard, some form reefs while others chose to be solitary. Hard corals are known for having a firm skeleton made from calcium carbonate, the same chalky substance found in the shells of clams and oysters, rocks, and even eggshells. Hard corals are the basic building blocks of coral reefs and their colonies often look like boulders or mounds, flowers, cups, and even brains. In contrast, soft corals do not have a hard skeleton and can be easily recognized as colorful fans, spirals and plumes swaying in the water.

Sometimes called “rainforests of the sea” for their exuberant concentration of life, coral reefs are globally one of the most productive and diverse kinds of ecosystems in the world. The many nooks and crevices on the reefs give young fish a place to hide from predators, and are used as nursery areas by many species to raise their young. The importance of coral reefs to replenish and sustain fish populations is one of the reasons why corals are a major component of marine reserves.

### *Mantalip Reef*

The Mantalip Reef is a 1 km<sup>2</sup> marine

protected area on Negros Oriental. This reef is located in Tañon Strait 2 km off of the shore of Bindoy and can easily be reached by boat, about 30 minutes off of Domolog pier. This reef has an island guard station that is also used as a base for marine research and sometimes receives visitors from local families ready for a day of snorkeling. Like many reefs in Tañon Strait, Mantalip contains an abundant display of colorful reef fish. A wide range of juvenile fishes, shoals of snappers, groupers, breams and parrotfishes can all be seen. Stunning bright blue starfish, (*Linckia laevigata*) adorn the top of the reef platform and schools of fish hide beneath the guard station.

## MANGROVE FORESTS

Mangrove forests line the shores of many municipalities of Negros and Cebu. The Philippines contain nearly half of the world’s 65 species of mangroves and is ranked in the top 15 most mangrove-rich countries. These woody trees thrive in muddy tidal areas and are able to tolerate saltwater unlike other trees. They form forests along the shoreline and serve as a buffer between land and sea. Mangroves shelter the coast from storms, lessening the impact of typhoons on beaches, homes and people. The trees form a physical barrier which buffers near-shore areas from strong winds, storm surges, and floods. At the same time, their tangled roots protect the reef from being covered by sediment which washes into the ocean during the rainy season.

The fisheries derived from mangroves provide an essential source of food for residents along the length of Negros and Cebu, especially for the poorest fisherfolk who do not have access to a bangka. Filipino elders recall “when the kitchen is empty, we go to the mangrove.” Throughout the year, mangrove forests are important to food security, especially when storms prevent people from fishing offshore. Mangroves

---

“*When the kitchen is empty, WE GO TO THE MANGROVE.*”

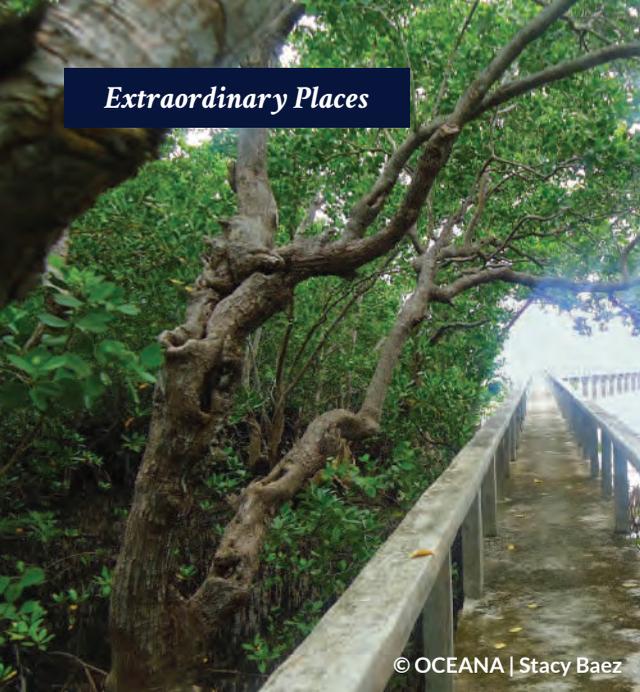
---

allow intertidal areas to stay intact, where community members can glean to obtain a wide range of fish, invertebrates and seaweeds to either feed their families, or sell to earn money. Oysters are often shucked, and sometimes even the shells are sold as souvenirs in Cebu.

Every corner of a mangrove forest spills over with a staggering diversity of life. Just below the surface, mangroves teem with fish and shellfish hiding between tree roots. Similar to coral reefs, mangroves serve as nursery area for young fish. These little fishes begin life among the web of roots until they are big enough to evade predators and move into the sea. Crabs, shrimp, lobsters, clams and other species all find a home in this leafy labyrinth. Above the surface, in the canopy of the forest, solitary kingfishers and other birds sit in wait to catch the next meal. Elegant in white with slender legs, the egrets pace back and forth, lifting its feet as if to keep them free of mud.

### *Talabong Mangrove Forest*

The Talabong Mangrove Forest and Bird Sanctuary is located in Bais, 45 km north of Dumaguete, near the Manjuyod white sand bar. A series of walkways, constructed by local residents, wind through the forest, inviting visitors to explore. These paths provide a platform for bird-watching, tourism and education about the natural wealth of Tañon Strait. The 13 mangrove species (dominated by the *Rhizophora* genus) that extend



© OCEANA | Stacy Baez

ABOVE: Walkway on Talabong Mangrove Forest  
RIGHT: Horned Seastar (*Protoreaster nodosus*)  
resting among seagrasses

their gnarled roots here offer animals refuge from the sun and predators. The mangrove forest provides visitors with a unique experience at the intersection of ocean and land-based ecosystems.

## MEADOWS OF SEAGRASS

Seagrasses are close relatives of grasses which grow on land, and are found in relatively shallow waters where they can reach toward the sun. There are 11 species of seagrasses in the Philippines. They typically grow in patches, and it is not uncommon to find a carpet of lush green seagrass just below the surface near the coast throughout Tañon Strait, including near river mouths and other areas where fresh and marine waters mix.

Seagrasses are essential to maintaining healthy fish populations. A variety of fish species use seagrass beds as nurseries during their first months or years of life, digging into the sand for food or eating other juvenile fish smaller than themselves. Young fish will remain on seagrass beds until they are large enough to leave behind the blades of grass which conceal them from their predators. Many species of crabs and lobsters live on the seagrass beds, and while the grasses are not commonly eaten, the endangered dugong (*Dugong dugon*) and sea turtle (*Chelonia mydas*) rely on seagrass for food.

© Getty Images



Following the cycles of the moon, the prized danggit, or rabbitfish, gather together to spawn in seagrass beds all around Cebu and Negros. This widely popular fish in the Philippines is often sold in markets salted and marinated. Danggit are severely overfished, to the point where this popular breakfast fish is served at increasingly smaller sizes. It is common for juvenile danggit to inhabit near-shore areas such as seagrass beds, rocky substrate, and lagoons, but move offshore to coral habitat as adults.

Seagrass meadows form essential natural infrastructure, protecting the coast, improving water clarity and reducing waves in Tañon Strait. They act as a second filter after the mangrove for sediments from land into the sea. By catching debris and fine particles, seagrass beds ensure that nearby coral reefs are not blanketed by sediment. Seagrasses' interconnected root system also forms a dense mat which

holds together the surface of the seafloor, slowing coastal erosion during periods of heavy rainfall.

## Balamban Seagrasses

The combined value of all the ecosystem services provided by seagrasses has never been fully assessed on Tañon Strait. On Balamban in Cebu, residents weave baskets using seagrass. This practice of basket weaving has improved the standard of living for many families. A form of alchemy takes place as people transform the seagrass, or lampakanay, from otherwise useless dead seagrass into beautiful and useful woven baskets. For some companies, these are even used as a replacement for rattan. From stabilizing seafloors to sourcing baskets for homes, the seagrasses of Tañon prove they are more than a handy hiding place for fish. Seagrasses are critical for maintaining healthy fisheries and coastal economies, and add to the cultural fabric of the Tañon Strait.

© OCEANA | Rob Stewart



LEFT: Chambered Nautilus  
 ABOVE: Hammerhead sharks swimming



© Getty Images

## BELOW THE SURFACE

While the diversity of life in shallow waters is a more familiar sight, the deep waters of Tañon Strait also hold a suite of remarkable animals. Underwater mountains, seamounts, add another layer to the biodiversity of this region. The “Sunken Island” off of Cebu is a well-known dive site and one of Tañon Strait’s seamounts. Rising 165 feet above the seabed, this pinnacle is home to a wide

variety of corals including sea fans, sea whips, and even barrel sponges than are human-sized. Here it is common to find schools of large pelagic fish, small bait fish and coral fish. During certain times of the year, this sunken island also serves as a home for whale sharks as well as manta rays and hammerhead sharks. At the border of Tañon Strait, the sunken island of Monad Shoal off of Malapascua Island also attracts thresher sharks every morning before dawn.

The deepest waters of Tañon Strait are home to the chambered nautilus, an animal older than the dinosaurs. The peculiar nautilus, related to the squid and octopus, has lived on this planet for millions of years. Unfortunately, only a few nautilus species have survived to the present day. This unusual resident of the Strait is highly prized for its shell and its population is believed to have been overfished since the 1970s. While sightings are rare, research suggests that the chambered nautilus may still be found in Tañon Strait.

Anyone spending time in the Strait while fishing or just observing its beauty at the surface may miss the millions of animals that live in the deep. However, at night many of these animals make their way to the surface waters to feed or reproduce. These secret visits to the surface occur every night for some animals, including those animals that can only be seen with a microscope. Fast on their tails are hungry species of fish, octopus and squid trying to catch a meal. Each night these nighttime dramas unfold deep in the waters of the Strait, while the rest of us are asleep.



## *Key* THREATS

---

Guarding the largest marine protected area in the Philippines is a challenging task. Today the Tañon Strait lacks sufficient enforcement, and destructive fishing, illegal fishing and pollution jeopardize the food security of the thousands of people living along its shores.



© Len Garces

### ILLEGAL COMMERCIAL FISHING

The resources of Tañon Strait are protected by law to ensure continued use by fisherfolk using passive fishing gear. Commercial fishing with purse seines and other large vessels over three gross tons is illegal in Tañon Strait because of its designation as a protected seascape. In addition, the majority of its waters are reserved for municipal fisheries by the Fisheries Code. However, local residents report that illegal commercial fishing is a serious problem seasonally, when vessels that usually operate in the Sulu Sea catch fish within the Strait in defiance of the law.

### DESTRUCTIVE FISHING

Most fishers use non-destructive methods to minimize damage to the catch, the seafloor, juvenile and spawning fish. Unfortunately, Tañon Strait is threatened by indiscriminate fishing using destructive gears which are banned by law, including hulbot-hulbot, or the modified Danish seine, dynamite fishing and the capture of endangered species such as seahorses.

### JUVENILE FISH CATCH

When fisheries are in severe decline, the catches begin to shrink as we bring home smaller and smaller fish. Unfortunately,

some of Tañon Strait's most iconic fish are now caught as juveniles before they have a chance to reproduce and replenish their populations. Many of the danggit/rabbitfish, reef fish and tuna commonly sold in the markets of Cebu and Negros are below the minimum size recommended by scientific experts.

### LACK OF ENFORCEMENT AND ACCOUNTABILITY

Inconsistent enforcement and accountability for illegal fishing activities exacerbate the impacts of overfishing throughout Tañon Strait. Despite isolated initiatives by local leaders, the need for reliable enforcement of existing laws remains one of the greatest challenges to a sustainable economy and environment in Tañon Strait.

### POLLUTION AND CLIMATE CHANGE

Overfishing and the lack of accountability also erode the ability of communities in Tañon Strait to adapt to the increasing pressures of pollution and climate change. Given the already noticeable increase in severe storms, crop failures, coral diseases and other impacts of climate change on the Philippines, it is even more important to ensure we have healthy fish and fisheries in Tañon Strait.

© Rebecca Weeks Marine Photobank





## Solutions

**We must work together to save Tañon Strait from illegal commercial fishing, destructive fishing and pollution.**

### **STRONG LEADERSHIP**

We need strong leadership at all levels to save Tañon Strait. The Protected Area Management Board (PAMB) has a clear mandate to responsibly manage our fisheries, including establishing a comprehensive plan for protection. The governors of Cebu, Iloilo, Masbate and Negros Occidental came together in 2014 to protect our natural resources in the Visayan Sea, and we need continued leadership to build on this effort for Tañon Strait. Finally, the leadership of key mayors responsible for municipal waters throughout the Strait will be critical to protect our fisherfolk, our coral reefs and our future.

### **EFFECTIVE ENFORCEMENT OF THE FISHERIES CODE**

We can build a model for the Philippines by improving enforcement of the Fisheries Code within Tañon Strait. We need consistent, meaningful enforcement against individuals, companies and local government units who engage in illegal fishing. Effective enforcement will require increased monitoring of fishing activity at sea and in port, increased resources for interception, and strengthening the judicial process. Cooperation between authorities is also essential, which may include the deployment of complementary

enforcement resources by the PAMB, Department of Environment and Natural Resources (DENR), Bureau of Fisheries and Aquatic Resources (BFAR), local government units, the Philippine National Police and Philippine Coast Guard.

### **SPECIAL PROTECTIONS WITHIN THE SEASCAPE**

In addition to the national Fisheries Code, additional measures may be needed to more fully protect Tañon Strait. We urgently need a management plan which includes regulations specific to the unique needs of the seascape.

### **ACCOUNTABILITY WHEN TRANSITING A PROTECTED SEASCAPE**

Although commercial fishing is banned in Tañon Strait, commercial vessels transit through the Strait regularly. When commercial fishing vessels come to port in Tañon Strait, they must be held accountable for the origin and legality of their catches. We need commercial fishing vessels to report to the authorities when transiting through a protected seascape. Commercial fishing activity must be monitored continuously by the authorities.

## ACKNOWLEDGEMENTS

We would like to thank Oceana staff, local chief executives, and officials from the Department of Environment and Natural Resources and the Bureau of Fisheries and Aquatic Resources for their advice. We also thank the many Non-Governmental Organizations, People's Organizations and other stakeholders of Tañon Strait for their continued support.

## REFERENCES

### Introduction

Aragones, L.V., L. Talaue-McManus, M.A.A. Roque, A.K.S. Amor and E.O. Keith. 2013. Dolphin watching in the southern Tañon Strait protected seascape, Philippines: Issues and Challenges. *Science Diliman* 25.

Green, S.J., J.O. Flores, J.Q. Dizon-Corrales, R.T. Martinez, D.R.M. Nunal, N.B. Armada and A.T. White. 2004. The fisheries of Central Visayas, Philippines: Status and trends. Coastal Resource Management Project of the Department of Environment and Natural Resources and the Bureau of Fisheries and Aquatic Resources of the Department of Agriculture, Cebu City, Philippines.

### Whales, Dolphins and Dugongs

Alava, M.N.R., M.L.L. Dolar, E.R. Sabater, M.T.R. Aquino and M.D. Santos (eds). 2012. Red List Status of Marine Mammals in the Philippines. Bureau of Fisheries and Aquatic Resources-National Fisheries Research and Development Institute.

Aragones, L.V., L. Talaue-McManus, M.A.A. Roque, A.K.S. Amor and E.O. Keith. 2013a. Dolphin watching in the southern Tañon Strait protected seascape, Philippines: Issues and Challenges. *Science Diliman* 25.

Aragones, L.V., G.E. Laule, B.G. Espinos (eds). 2013b. 2nd Ed. Marine mammal stranding response manual- A guide for the rescue, rehabilitation, and release of stranded cetaceans and dugongs in the Philippines. A Wildlife in Need (WIN) and Ocean Adventure Publication. Subic Bay, Freeport. pp 133.

Brownell, R.L., C-J. Yao, C-S. Lee, M.-C. Wang. 2009. Worldwide review of pygmy killer whales, *Feresa attenuata*, mass strandings reveals Taiwan hot spot. U.S. Department of Commerce. Paper 141.

Dolar, M.L.L., W.F. Perrin, B.L. Taylor, G.L. Kooyman and M.N.R. Alava. 2006. Abundance and distributional ecology of cetaceans in the central Philippines. *Journal of Cetacean Research and Management*. 8(1):93-111.

Hines, E., K. Adulyanukosol, L.V. Aragones, et al. 2012. Dugongs in Asia. In: E. Hines et al. (eds), *Sirenian conservation: Issues and strategies in developing countries*, 58-76. University Press of Florida. Gainesville, FL, USA.

Jefferson, T.A., M.A. Webber and R.L. Pitman. 2008. *Marine mammals of the world*. Elsevier, Amsterdam.

Jefferson, T.A., S. Leatherwood and M.A. Webber. 1993. *FAO species identification guide. Marine mammals of the world*. Rome, FAO. Accessed at: <http://www.fao.org/docrep/009/t0725e/t0725e00.htm>

Life, E. 2014. Pantropical spotted dolphin. Accessed at: <http://www.eoearth.org/view/article/155129>

Perrin, W.F. 2001. *Stenella attenuata*. *Mammalian Species*, no. 683. 1-8.

Perrin, W.F. 2009a. Spinner dolphin: *Stenella longirostris*. In: *Encyclopedia of marine mammals* (Perrin, W.F., Würsig B., Thewissen J.G.M., eds.) 2nd ed. Academic Press, Amsterdam, pp. 1100-1103.

Perrin, W.F. 2009b. Pantropical Spotted Dolphin: *Stenella attenuata*. In: *Encyclopedia of marine mammals* (Perrin, W.F., Würsig B., Thewissen J.G.M., eds.) 2nd ed. Academic Press, Amsterdam, pp. 819-821.

McSweeney, D.J., R.W. Baird, S.D. Mahaffy, D. L. Webster, and G.S. Schorr. 2009. Site fidelity and association patterns of a rare species: Pygmy killer whales (*Feresa attenuata*) in the main Hawaiian Islands. *Marine Mammal Science* 25:557-572.

Owen, K. and D. Donnelly. 2014. The most southerly worldwide sightings of pygmy killer whales (*Feresa attenuata*). *Marine Biodiversity Records* 7.

Taylor, B.L., R. Baird, J. Barlow, S.M. Dawson, J. Ford, J.G. Mead, G. Notarbartolo di Sciara, P. Wade, and R.L. Pitman. 2008. *Feresa attenuata*. The IUCN Red List of Threatened Species. Version 2014.3. <[www.iucnredlist.org](http://www.iucnredlist.org)>. Downloaded on 12 December 2014.

UNEP. 2002. *Dugong: Status report and action plans for countries and territories*. Cambridge, United Kingdom.

### A Cornucopia of Fish

Alava, M.N.R., E.R.Z. Dolumbal, A.A. Yaptinchay and R.B. Trono. 1997. Fishery and trade of whale sharks and manta rays in the Bohol Sea, Philippines. In *Elasmobranch Biodiversity, Conservation and Management: Proceedings of the International Seminar and Workshop on Sharks and Ray Biodiversity, Conservation and Management*, Sabah, Malaysia, Jul 1997. Fowler, S.L., T.M. Reed and F.A. Dipper (eds). IUCN SSC Shark Specialist Group. pp. 132-148.

Allen, G.R. and D.R. Robertson. 1994. *Fishes of the tropical eastern Pacific*. University of Hawaii Press, Honolulu.

Barut, N.C., M.D. Santos, L.L. Mijares, R. Subade, N.B. Armada and L.R. Garces. 2003: Philippine coastal fisheries situation. In: 67th Worldfish center conference proceedings. pp. 1120.

Barut, N.C., M.D. Santos and L.R. Garces. 2004. Overview of Philippine marine fisheries. In: *In turbulent seas: The status of Philippine marine fisheries*. DA-BFAR. Department of Agriculture- Bureau of Fisheries and Aquatic Resources. Coastal Resources Management Project of the Department of Environment and Natural Resources, Cebu City, Philippines. 378p.

Boustany, A.M., R. Matteson, M. Castleton, C. Farwell, and B.A. Block. 2010. Movements of Pacific bluefin tuna (*Thunnus orientalis*) in the Eastern North Pacific revealed with archival tags. *Progress in Oceanography* 86:94-104.

Bureau of Fisheries and Aquatic Resources (BFAR) and Western and Central Pacific Fisheries Commission (WCPFC) 2012. *Philippine Tuna Fisheries Profile*. Cebu City, Philippines.

Carpenter, K.E. and V.G. Springer. 2005. The center of the center of marine shore fish biodiversity: the Philippine Islands. *Environmental biology of fishes* 72:467-480.

Coleman, F., C. Koenig, G. Huntsman, J. Musick, A. Eklund, J. McGovern, G. Sedberry, R. Chapman, and C. Grimes. 2000. Long-lived reef fishes: the grouper-snapper complex. *Fisheries* 25:14-21.

Collette, B. and C. Nauen. 1983. *Scombrids of the world—an annotated and illustrated catalogue of tunas, mackerels, bonitos and related species known to date*. FAO Special Catalog 2. pp. 137

Collette, B., A. Acero, A.F. Amorim, A. Boustany, C. Canales Ramirez, G. Cardenas, K.E. Carpenter, S.-K. Chang, N. de Oliveira Leite Jr., A. Di Natale, D. Die, W. Fox, F.L. Fredou, J. Graves, A. Guzman-Mora, F.H. Viera Hazin, M.

Hinton, M. Juan Jorda, C. Minte Vera, N. Miyabe, R. Montano Cruz, E. Masuti, R. Nelson, H. Oxenford, V. Restrepo, E. Salas, K. Schaefer, J. Schratwieser, R. Serra, C. Sun, R.P. Teixeira Lessa, P.E. Pires Ferreira Travassos, Y. Uozumi and E. Yanez. 2011. *Thunnus albacares*. The IUCN Red List of Threatened Species. Version 2014.3. <[www.iucnredlist.org](http://www.iucnredlist.org)>. Downloaded on 16 December 2014.

De Mitcheson, Y.S., A. Cornish, M. Domeier, P. I. Colin, M. Russell and K.C. Lindeman. 2008. A global baseline for spawning aggregations of reef fishes. *Conservation Biology*, Volume 22, No. 5, 1233–1244.

Froese, R. and D. Pauly. Editors. 2014. FishBase. World Wide Web electronic publication. [www.fishbase.org](http://www.fishbase.org), (11/2014).

Glass, D. 2010. Fishes That Change Sex? A Moment of Science: Indiana Public Media. <http://indianapublicmedia.org/amomentofscience/fish-change-sex/>

Grutter, A.S., J.G. Rumney, T. Sinclair-Taylor, P. Waldie and C.E. Franklin. 2011. Fish mucous cocoons: the “mosquito nets” of the sea. *Biology Letters*. 7:292–294.

Langerhans, R.B. 2007. Evolutionary consequences of predation: avoidance, escape, reproduction, and diversification. In Elewa, A.M.T. ed. *Predation in organisms: a distinct phenomenon*. Heidelberg, Germany, Springer-Verlag. pp. 177–220.

Lieske, E. and R. Myers. 1999. *Coral Reef Fishes*. 2nd edition. Princeton University Press.

Nigmatullin, C.M. and A.I. Arkhipkin. 1998. A review of the biology of the diamondback squid, *Thysanoteuthis rhombus* (Oegopsida: Thysanoteuthidae). In: Okutani, T. Contributed papers to International Symposium on Large Pelagic Squids, July 18–19, 1996, for JAMARC’s 25th anniversary of its foundation. pp. 155–181

Padin, J. I. M.T., T.R.N. Santos, P.M. Sienes, J. Utzurum and F. Ginzel 2011. Fishes of the Dumaguete public market, Negros Oriental, Philippines. Federation of Institutions for Marine and Freshwater Sciences (Philippines) 45th Annual Meeting. Conference paper

Palomares, M.L.D. and D. Pauly. Editors. 2014. SeaLifeBase. World Wide Web electronic publication. [www.sealifebase.org](http://www.sealifebase.org), version (11/2014).

Pauly, D. 2002. Growth and mortality of the basking shark *Cetorhinus maximus* and their implications for management of whale sharks *Rhincodon typus*. In *Elasmobranch Biodiversity, Conservation and Management: Proceedings of the International Seminar and Workshop on Sharks and Ray Biodiversity, Conservation and Management*, Sabah, Malaysia, Jul 1997. Fowler, S.L., T.M. Reed and F.A. Dipper (eds). IUCN SSC Shark Specialist Group. pp. 199–208.

Quilang, J. P., B.S. Santos, P.S. Ong, Z.U. Basiao, I.C.K. Fontanilla and E.P. Cao. 2011. DNA Barcoding of the Philippine endemic freshwater sardine *Sardinella tawilis* (Clupeiformes: Clupeidae) and its marine relatives. *Philippines Agricultural Science* 94:248–257.

Salmon, A., A. Vitsky. 2011. The Philippines: bait balls, much and more. *Alert Diver*. Stevens, J. D. 2007. Whale shark (*Rhincodon typus*) biology and ecology: A review of the primary literature. *Fisheries Research* 84:4–9.

Tandog-Edralin, D.D., E.C. Cortez-Zaragoza, P. Dalzell and D. Pauly. 1987. Some aspects of the biology and population dynamics of Skipjack (*Katsuwonus pelamis*) in Philippine waters. In: Report of the Second Meeting of Tuna Research Groups in Southeast Asia Region, 25–28 August, Manila.

Willette, D.A., E.D.C. Bognot, T.M. Mutia, and M.D. Santos. 2011. *Biology and Ecology of sardines in the Philippines: A review*. NFRDI Technical Paper Series, Vol 13.

## ***Extraordinary Places***

BFAR. Bureau of Fisheries and Aquatic Resources. 2006. Comprehensive National Fisheries Industry Development Plan (CNFIDP). Bureau of Fisheries and Aquatic Resources of the Department of Agriculture Cebu City, Philippines.

Cabanban, A., I. J. Tajonera, M. L. D. Palomares. 2014. A short history of gleaning in Negros and Panay Islands, Visayas, Philippines from Palomares, M.L. D., D. Pauly (eds) 2014 *Philippine Marine Fisheries Catches: A Bottom-up Reconstruction, 1950–2010*. The Fisheries Centre, University of British Columbia 22:1

Calumpang, H. P. 1992. Vegetation of the Talabong Mangrove Forest Reserve: suggestions for rehabilitation. *Silliman Journal* 36:123–128.

Carpenter, K.E. and V.G. Springer. 2005. The center of the center of marine shore fish biodiversity: the Philippine Islands. *Environmental biology of fishes* 72:467–480.

Cinches, V.A., J.E. Kho, F.A. Penetrante, G.O. Pogoy, R.T. Salgado and J.L. Sayson. 2013. *Tañon Saga: A Guidebook for Environmental Activism and Empowerment*. Central Visayas Fisherfolk Development Center, Inc., Cebu City, Philippines.

Das, S., A. Crépin. 2013. Mangroves can provide protection against wind damage during storms. *Estuarine, Coastal and Shelf Science*. 134: 98–107

Dizon-Corrales, R.T. Martinez, D.R.M. Nunal, N.B. Armada and A.T. White. 2004. The fisheries of Central Visayas, Philippines: Status and trend. Coastal Resource Management Project of the Department of Environment and Natural Resources and the Bureau of Fisheries and Aquatic Resources of the Department of Agriculture, Cebu City, Philippines.

Fortes, M.D. 2012. Historical review of seagrass research in the Philippines. *Coastal Marine Science* 35: 178–181.

Garcia, K.B., P.L. Malabrigo Jr and D.T. Gevaña. 2014. Philippines’ mangrove ecosystem: Status, threats and conservation. *Mangrove Ecosystems of Asia*. Springer. pp 81–94. Green, S.J., J.O. Flores, J.Q.

Gwaldis, M. 2014. Whale sharks and more: diving Cebu’s Sunken Island. Scuba Diver’s Travel Network: [http://www.sdtm.com/dive\\_resources/travel\\_articles/whale-sharks-and-more-diving-cebus-sunken-island#.VLAu3NLF\\_uQ](http://www.sdtm.com/dive_resources/travel_articles/whale-sharks-and-more-diving-cebus-sunken-island#.VLAu3NLF_uQ)

Licuanan, W.Y. and E.B. Capili. 2004. New records of stony corals from the Philippines previously known from peripheral areas of the Indo-Pacific. *The Raffles Bulletin of Zoology* 52:285–288.

Meñez, E.G., R.C. Philips, H.P. Calumpang (1983). *Seagrasses from the Philippines*. Smithsonian Institution Press, Washington, DC, United States.

Mumby, P.J., A.J. Edwards, J.E. Arlas-Gonzalez, K.C. Lindeman, P.G. Blackwell, A. Gall, M. I. Gorczyńska, A. R. Harbone, C. L. Pescod, H. Renken, C.C.C. Wabnitz, G. Llewellyn. 2004. Mangroves enhance the biomass of coral reef fish communities in the Caribbean. *Nature* Vol: 427 Lacamiento, G.M. 2013. “Balamban locals earn from seagrass baskets.” *The Philippine Star*. 23 September, 2013.

