Changing Seas

Episode Guide

Season Two

#201 No Fish Left Uncounted
A team of research divers counts the fish in Dry Tortugas National Park to measure if marine-protected areas help the regional ecosystem rebound from years of overfishing and environmental change.

#202 Sentinels of the Seas
Dolphins' charismatic smiles belie the silent threats lurking in their ocean home. Many of the animals show disturbing signs of immune system dysfunction and disease, two possible signs of contaminant exposure.

#203 Seagrasses and Mangroves
Seagrasses and mangroves may not receive as much attention as coral reefs, but they play an equally important role in the ocean's web of life. Today, both are in decline globally, threatening an ecosystem collapse that could affect the entire food chain.

#204 Sinking the Vandenberg
Off of Key West, in the Florida Keys National Sanctuary, lies the world's second largest intentionally sunk shipwreck, the USNS General Hoyt S. Vandenberg. This artificial reef now attracts fish, fishermen, divers — and scientists.

Season Three

#301 Alien Invaders
In the waters of the western Atlantic and Caribbean, a voracious alien predator has taken hold. Native to the Indo-Pacific, the invasive lionfish is a major threat to biodiversity and the health of already stressed coral reef ecosystems.

The popular aquarium fish is thought to have first been released into the wild in South Florida in the mid-1980s. With no natural predator in this part of the world, lionfish numbers have increased rapidly. Experts say that on some Bahamian reefs lionfish have reduced native fish populations by up to 90 percent in just a few years.

To combat this problem, experts are encouraging people to "eat'em to beat'em". Changing Seas joins scientists in the field to learn more about this beautiful, yet gluttonous feeder and the threat it is posing to native fish populations.

#302 Reef Revival
In the emerging science of coral reef restoration, marine biologists and resource managers are discovering naturally occurring mechanisms that promote coral growth and restore ecological balance in these gardens of the sea.

Since the late 1970s close to 98% of Staghorn and Elkhorn corals have disappeared from reefs in Florida and the Caribbean. Around the world, damage from boat groundings and other factors have placed these organisms on the "threatened" list of the Endangered Species Act. Staghorn and Elkhorn are considered principal reef building corals. In South Florida, scientists are using native sponges and spiny sea urchins in novel ways that may help attract corals to damaged sites. Can nature heal itself with a little help from marine experts? Can new technologies help restore the lost coral communities?

#303 Prescription: Oceans
The oceans are part of the new medical frontier. In Florida, scientists are studying a variety of marine invertebrates that may hold the key to unlocking the secrets of our own biology.

At Harbor Branch Oceanographic Institute in Fort Pierce, researchers are testing sea sponges for their potential anti-cancer properties. At The Whitney Laboratory for Marine Bioscience in Marineland, experts are taking a closer look at horseshoe crabs to better understand how eyes function and change with age. Scientists there are also studying sea slugs for insights into neurodegenerative disorders such as Alzheimer's and Parkinson's disease. What clues will these and other simple organisms reveal about the human body? Are there cures that lie beneath the waves?

#304 After the Spill
The catastrophic oil spill in the Gulf of Mexico in April 2010 may no longer make headline news, but the story is far from over. Oceanographers continue to study the long-term effects this disaster might have on marine ecosystems. Among them are the scientists from the College of Marine Science at the University of South Florida, who have been studying the impacts of this spill from the beginning. Experts are analyzing water and sediment samples for hydrocarbon presence and toxicity and are studying the

long-term effects the spill might have on a number of marine species. What impacts will low-level, chronic toxicity from oil and dispersants have on the environment? How long until the true extent of this disaster will be known?

Season Four

#401 Tracking Tigers
Shark experts catch and tag tiger sharks on a thrilling trip to the Bahamas. The scientists' tracking work has revealed fascinating information about the long-distance migrations of these formidable predators. The fin trade has dramatically reduced shark populations around the world, and DNA forensics can be an important tool in determining what sharks are most threatened by overfishing.

#402 Mysterious Microbes
They are some the ocean's tiniest inhabitants. On coral reefs, microorganisms are copious creatures. Throughout Florida, scientists painstakingly work to identify key players within this microbial community and directly link a devastating coral disease to a human pathogen. With corals under immense stress, experts are using advanced genetic tools and a former aquarium "pest" to better comprehend a world that's invisible to the naked eye.

#403 Grouper Moon
Travel to the island of Little Cayman in the Caribbean to witness the mystery of the "Grouper Moon." Normally a solitary species, during the winter full moons Nassau grouper travel, sometimes over great distances, to "group" together and spawn. While most of these known spawning sites have been fished out over the years, the west end of Little Cayman is home to one of the last great reproductive populations of this endangered species.

#404 Coastal Carnivores
The southern edge of the Florida Everglades is home to the predators of Shark River. Scientists studying bull sharks and alligators there have made some perplexing discoveries. The sharks are living upstream where gators should thrive, and gators are swimming out to the open ocean to feed. Discover how experts are monitoring the movements of these amazing animals and what they are learning in the process.

Season Five

#501 Coral Hybrids
While Elkhorn and Staghorn corals have undergone a drastic decline in the Caribbean, their hybrid, "Fused Staghorn," is increasing in numbers in parts of the region. One

scientist is studying the animals in Belize to see if the hybrid might be better equipped to deal with environmental stressors than its parents.

#502 Sunken Stories
In the Florida Keys, divers from around the country learn how to map shipwrecks and apply their skills on a mysterious 18th Century slave ship. When diving isn't possible, professional explorers use high-tech tools to scan objects buried beneath the seafloor.

#503 Creatures of the Deep
In the cold, deep waters of the Gulf of Mexico, little-known animals spend their entire lives far removed from our human world. Until now, little research has been conducted on these creatures of the deep, keeping much of their lives a mystery.

#504 Reefs of Rangiroa
A co-production with the Khaled bin Sultan Living Oceans Foundation. Scientists with the Global Reef Expedition are on a six year mission to study remote coral reefs around the world. While in French Polynesia, the experts conduct extensive habitat mapping to create one of a kind seafloor atlases. Scientists also assess the health of the reefs to compare and contrast the resilience of reef systems over a large geographical area.

Season Six

#601 Living Fossils
In the deep, dark waters off the coast of Roatan, Honduras, strange flowerlike animals flourish. These sea lilies and feather stars, known as Crinoids, have been around in various forms since before the age of dinosaurs. Experts from Nova Southeastern University and the University of Michigan are working together to gather basic information about the life history of crinoids, such as how long they live and how fast they grow. To gain access to the animals, they brave the ocean depths onboard “Idabel”, a submersible based in Roatan’s West End. Sub builder and pilot Karl Stanley has extensive knowledge of the areas he can access with “Idabel,” making it possible for the scientists to return to the same spots year after year to study the animals. This ability to study crinoids over an extended time period will result in new knowledge about these mysterious animals that flourish far removed from our human world.

#602 Biggest Fish in the Sea
Each summer, the world’s largest known aggregation of whale sharks occurs just off the coast of Cancun, Mexico. Hundreds of these gentle giants come to the area to feed on plankton, giving experts the opportunity to learn more about the largest fish in the sea. Despite their enormous size, still relatively little is known about the animals. Scientists from the Georgia Aquarium, together with their partners from Blue Realm, tag the

animals to learn more about their movements. The experts also want to protect the animals from ship strikes while they are feeding at the ocean surface, so they have installed a special device that can monitor ship traffic in the area. They plan to correlate that information with data they have collected on the whereabouts of the animals, to make recommendations for safer shipping lanes in the future.

#603 Galápagos: Windows into the Future
The unique oceanic conditions of the Galápagos Islands serve as a perfect natural laboratory to study how climate change may impact corals in the future. Naturally high levels of carbon dioxide in the water, as well as unusually warm sea temperatures during El Niño years, provide a glimpse into the conditions expected in other areas as the oceans continue to acidify and coral bleaching events increase. Scientists from various institutions spent a month in the archipelago to conduct research as part of the Khaled bin Sultan Living Oceans Foundation's Global Reef Expedition. Among other things, they are studying how corals, which have experienced severe bleaching events in the past, have recovered in the various pH conditions found around the archipelago.

#604 Saving Sawfish
Strange and prehistoric-looking, Smalltooth Sawfish were once coveted by anglers as popular trophy fish. But habitat loss and overfishing have greatly reduced the animals' range and landed them on the endangered species list in 2003. Historic records report sightings of the fish as far north as New York and west to the Texas-Mexico border. Today, the animals, which are related to the sharks, skates and rays, are limited to South Florida. Now scientists are conducting research to save the species. Little was known about Smalltooth Sawfish when they became endangered, so experts are conducting basic research about their life history, as well as tracking their movements using satellite and acoustic tags.

Season Seven

#701 Sea Turtles: The Lost Years
After sea turtle hatchlings emerge from their nests, they vanish into the sea. Until recently, their journey was largely shrouded in mystery. Now, as technology advances, researchers are beginning to understand where turtles go during their so-called "lost years."

#702 Grand Cayman's Famous Stingrays
Each year, thousands of tourists interact with the tame southern stingrays that congregate in the shallow waters of Grand Cayman's North Sound. Famous marine artist and scientist Dr. Guy Harvey has assembled a research team to study what impact the ecotourism might have on the wild fish.

#703 Billfish: Battle on the Line?
The unique oceanographic conditions of the eastern tropical Pacific make the area one of the best spots in the world for big game anglers to hook billfish. But intense pressures from commercial fishing operations have taken their toll on the numbers of sailfish and marlin in the region. Researchers are studying the animals to provide the data necessary to protect the fish populations from further decline.

#704 The Secret Sex Life of Fish
Most people are familiar with the pretty tropical fish found in aquariums, but few realize that some of these animals are capable of changing sex. Discover the unique ways of how some fish species do this and why they likely evolved this way.

Season Eight

#801 Sponges: Oldest Creatures in the Sea?
Shows how recent DNA research has cast doubt on the theory that sponges were the first animals to branch off the "Animal Tree of Life," a kind of family tree for all living and extinct animals on earth. Recently, some scientists are suggesting that ctenophores, also known as comb jellies, are an older lineage.

#802 Manatees: Conserving a Marine Mammal
Every winter, hundreds of manatees aggregate at Crystal River, Florida. This sanctuary is also a treasure for scientists, who take advantage of these manatee gatherings to study them. From decades of visual ID studies to the most cutting-edge DNA research, experts hope that science will help conserve this beloved marine mammal.

#803 Maug's Caldera: A Natural Laboratory a co-production with Open Boat Films.
This episode takes viewers into an area of the remote Pacific, the islands of Maug. Formed by an ancient volcano, shallow hydrothermal vents are found close to coral reefs inside the submerged caldera. These vents emit levels of CO2 that can be expected in the world's oceans by the end of the century, making these waters a natural laboratory for scientists studying the impacts of ocean acidification on coral reefs.

#804 Beneath the Bridge
The Blue Heron Bridge in Riviera Beach, Florida is known as one of the best shore dives in the United States. Even though at first it appears as an unlikely dive site, it is home to a rich variety of marine life, ranging from tiny nudibranchs to manta rays. Underwater photographers are documenting what lives beneath the bridge, and a scientist is studying how two species of octopus co-exist there.

Season Nine

#901 The Future of Seafood
It is estimated there will be two billion more people on the planet by mid-century. To feed this booming world population, more fish will need to be farmed than ever before. One way to increase fish production in a sustainable way is to move aquaculture operations offshore – where there is plenty of available space and strong currents flush out the pens to avoid polluting sensitive ecosystems.

#902 Toxic Algae: Complex Sources and Solutions
Lake Okeechobee was once the blue heart of Florida, pumping fresh water down to the Everglades and beyond. But now that a dike and canal system control its flow, water releases from the lake periodically create putrid mats of blue green algae. Scientists think water pollution is to blame, and if something isn't done about it there could be irreparable damage to the environment, the local economy and people's health.

#903 The Fate of Carbon
For millennia, the exchange of CO2 between the oceans and atmosphere has been in balance. Now, with more anthropogenic carbon-dioxide in the atmosphere, the oceans are taking up more CO2 as well. This additional CO2 is negatively impacting sensitive ecosystems through a process called ocean acidification, and scientists worry how changes to the ocean environment will affect the way carbon is cycled through the seas.

#904 Majestic Mantas
The remote Revillagegdo Archipelago off Mexico's Pacific coast is a hotspot for giant mantas that interact with awe-struck scuba divers. Scientists are studying the local population using photo ID techniques and acoustic tags which track the movements of these mysterious fish. They are also conducting experiments to see if the filter-feeding rays are impacted negatively by microplastics, tiny pieces of toxic trash that float in the ocean.

Season Ten

#1001 Dolphins: Breaking the Code
Dr. Denise L. Herzing has dedicated her career to studying a community of free-ranging Atlantic spotted dolphins that live in the shallow, crystal clear waters of the Bahamas Through non-invasive, in-water observation; she researches the animals' social structure, behaviors and communication. Now modern technology is making it possible to correlate the dolphins' sounds and behavior, bringing Herzing and her collaborators closer to decoding dolphin communication.

#1002 Cryptic Critters
Deep underwater, on a shipwreck near Key West, lives a tiny potential new threat. Being in the right place at the right time, one expert spotted it and immediately knew that it didn't belong. Researchers want to know where this new species came from, and whether its sudden appearance spells disaster for the delicate coral reef ecosystem in the Florida Keys.

#1003 Lords of the Wetlands
While American crocodiles are recovering in parts of their range, their future looks bleak in Jamaica. Habitat loss and poaching for meat have led to a drastic decline in the population. Dedicated scientists and conservationists are working to save the species through research, education, and conservation initiatives.

#1004 Fishing the Flats for Science
Flats fishing is popular with recreational anglers in the Caribbean and the Florida Keys. But until recently, little was known about tarpon, bonefish and permit – the species most coveted by sports fishermen. Now scientists are studying the fish to better understand their movements, habitat, and spawning behaviors.

Season Eleven

#1101 The Cordell Bank: A National Treasure
California's north-central coast is famous for its natural splendor. Only fifty miles northwest of San Francisco's Golden Gate Bridge, yet light years away from the hustle and bustle of the human world, lies a magical underwater island few people have ever heard of. Protected inside a National Marine Sanctuary, the Cordell Bank is a hotspot for marine life. Cold, nutrient-rich waters welling up from the deep fuel the base of the marine food chain in the region, which in turn feeds birds, sea turtles, and marine mammals who travel from thousands of miles away. And while the sanctuary is actively protecting local resources, it still faces global stressors that might threaten the area in the future. Scientists are studying the potential impacts of ocean acidification and lowered dissolved oxygen levels caused by climate change.

#1102 Toxic Waters
Florida experiences many types of harmful algal blooms, some of them annually. Several species of algae, like sargassum, aren't toxic, but can cause economic and environmental stress when they pile up on beaches and clog up coastlines. Others, like red tide and blue-green algae, release neurotoxins, causing massive wildlife kills and affecting beachgoers. While residents demand answers from their local and state officials, scientists are studying what causes the blooms in the first place and what needs to be done to stop them. Experts are also uncovering alarming evidence that some of these harmful algal

blooms have serious impacts on human health, making their research more critical than ever.

#1103 Corals in Crisis
Florida's fragile coral reefs are in crisis. Once vibrant cities of the sea, these biodiverse ecosystems have declined over the past few decades. Fishing pressures, pollution, development, and climate change have all left their mark. Now, a new ailment known as "Stony Coral Tissue Loss Disease" may be the last nail in the coffin. This disease is infecting over half of the reef-building corals at an unprecedented scale, killing most of the corals that get sick. But all hope is not lost. Experts of varying backgrounds are working diligently to figure out what is causing the disease, while simultaneously developing techniques to treat outbreaks and restore the sunshine state's coral reefs to their former glory.

#1104 Mystery of the Humpback Whale Song
Each year, approximately half of the North Pacific humpback whale population migrates roughly three thousand miles from its feeding grounds in Southeastern Alaska to its breeding grounds in Hawai'i. While there, the male humpbacks perform their elaborate and haunting song. But what does it mean? And what is the purpose of this beautiful display? To find out, scientists are conducting research on the leeward side of Maui, inside the Hawaiian Islands Humpback Whale National Marine Sanctuary. They collect data on the amplitude of an individual's song, as well as his size and testosterone levels, to determine if there is a correlation between the quality of the song and the fitness of an individual whale. The scientists are also deploying acoustic suction cup tags on humpback whales to learn how the animals spend their time throughout the day.

Season Twelve

#1201 Florida's Blue Holes: Oases in the Sea
Reports of large aggregations of fish in the Gulf of Mexico led divers to discover deep holes opening down into the seafloor. These submerged sinkholes and springs, more commonly called blue holes, attract a diversity of marine life in an otherwise ocean desert. A group of scientists and technical divers collaborate to better understand these ecological oases in the sea. The experts begin by exploring Amberjack Hole – a sinkhole located 20 miles off the coast of Sarasota, Florida, that opens at 115 feet below the surface and extends down to over 350 feet.

Do these blue holes connect to mainland Florida? What organisms are found at the bottom of the hole? What effects do these holes have on the surrounding Gulf of Mexico? Join scientists as they search for answers and explore these never before studied environments.

#1202 A Decade After Deepwater
Ten years after the Deepwater Horizon oil rig disaster, scientists are still studying the devastating impacts on the Gulf of Mexico. The resulting spill became one of the largest environmental catastrophes in U.S. history. Where did the oil go? Have the deep sea corals recovered from the "dirty blizzard" which fell to the seafloor during the spill? Did widely applied dispersants help or hurt the oil-eating bacteria they are meant to assist? As researchers work to answer these questions and others, they also look ahead to what may happen next, and use lessons learned to prepare for the next big spill.

#1203 Peru's Desert Penguins
Peru's arid coastline is home to one of the world's great natural spectacles. Where the desert meets the sea, the seabirds reign. It is amidst this explosion of life - these hundreds of thousands of Guanay cormorants, Peruvian pelicans and Peruvian boobies - that another, slightly clumsier, species of bird lives as well.

The adorable Humboldt penguin needs the other seabirds' guano to build its nests. Named after the cold current that provides nourishment for this incredibly vibrant ecosystem, these penguins can safely nest and rest inside Peru's national reserve network of 33 islands and peninsulas.

Their time spent feeding is a different story. While these flightless birds are highly adapted for life at sea, they compete with the fishery for anchovies, and the penguins can get entangled in fishing nets.

Dedicated scientists monitor Peru's penguin populations and study the animals' interactions with fisheries to provide managers with the data needed to better protect the animals in the future.

#1204 American Samoa's Resilient Coral Reefs
Far out in the South Pacific, there's a tropical island paradise. Known as the "Islands of Sacred Earth," the territory of American Samoa is one of the United States' most remote outposts. Its waters are home to stunningly beautiful coral reefs, including two of the world's oldest and largest coral colonies on record. Many of these sites are protected inside America's only National Marine Sanctuary and National Park south of the equator.

Coral reefs around the world are in serious decline, but American Samoa's reefs have so far been relatively resilient in the face of local and global stressors. To better understand and protect the corals, the National Marine Sanctuary of American Samoa's science team is setting up a multi-faceted monitoring program to document the reefs' condition and any changes that might occur over time.

Together with their partners from the Coral Reef Advisory Group and the National Park of American Samoa, the scientists are trying to figure out what makes the territory's coral reefs more resilient than others, and how lessons learned locally might help corals that are in decline elsewhere.

Season Thirteen

#1301 Recreational Shark Fishing: Collaborating for Conservation
Shore-based, catch and release shark fishing is a popular past time in Florida. But is it having a negative impact on sensitive shark populations? Scientists have teamed up with anglers to study the survival rates of the fish and conduct outreach on best practices.

#1302 At the Water's Edge: The Salt Marsh
Along scenic coastlines in the South, waves of mesmerizing green and golden grass stretch to the horizon. This is the salt marsh - a part liquid, part solid landscape that is teeming with life. How do scientists study the salt marsh? And how resilient is it to climate change?

#1303 Alvin: Pioneer of the Deep
The deep-sea submersible Alvin has brought explorers to extraordinary places for more than 50 years. Now, as Alvin is poised to continue its revolutionary scientific work, a new set of upgrades will take it deeper than ever before. A co-production with the Woods Hole Oceanographic Institution.

#1304 Habitats: The Key to Florida's Fisheries
Tarpon and snook are two of Florida's most iconic game fish. Both species rely on mangrove creeks and ponds when they are juveniles. With half of the state's mangroves lost to development, scientists employ creative solutions to restore and reconnect some of these important habitats to secure the future of the fisheries.

Season Fourteen

#1401 Vanishing Whales
The humpback whale population that migrates between Hawai‘i and Alaska is considered a conservation success story. When sightings of the animals suddenly dropped, people became concerned. Scientists in both locations are trying to understand what happened to the whales and why.

#1402 Humpback Health
How does the body size and overall health of humpback whales change across their migratory cycle? A team of researchers studying the animals, which spend part of the year feeding in Alaska and a few months fasting while in their Hawaiian breeding grounds, is making remarkable discoveries.

#1403 Kelp: Hidden Treasure of the Salish Sea
The kelp forests of the Puget Sound have long played an essential role in the local ecosystem as a habitat and food source. Today, this foundational species is in decline, but resource managers, scientists, tribal citizens, and advocates are working together to solve the mysteries of conserving and restoring kelp forests.

#1404 Saving Florida's Starving Manatees
Florida's iconic sea cows are dying in record numbers. Years of declining seagrass beds have eliminated one of the gentle giants' primary food sources. Now wildlife managers have taken the unprecedented step of feeding the animals, while scientists are in a race against time to restore the lost seagrass.

Season Fifteen

#1501 Mollusks: More than a Shell
Seashells, with their beautiful shapes and colors, have inspired humans since the dawn of time. Equally fascinating are the animals which make them, and their unique place in the web of life.

#1502 Sharks in Belize: Jaguars of the Sea
Catching and tagging sharks along the Belize Barrier Reef, local fishers leverage their generational knowledge to help marine scientists and fisheries managers keep shark populations healthy for all.

#1503 Bermuda: Life at Ocean's Edge
As the shipwreck capital of the world, Bermuda is known for its treacherous reefs. But these uniquely resilient corals may offer clues to protecting the islands from the accelerating impacts of a changing climate.

#1504 Life in the Dark: The Polar Night
At the northernmost research station in the world, scientists brave the cold and darkness to solve an ocean mystery. They are trying to understand how some of the tiniest animals survive at a time of year when their main food source is not available.

Season Sixteen

#1601 Ancient Adriatic: Croatia's Sunken History
Archaeologists and conservators along Croatia's Dalmatian Coast meticulously uncover and document an ancient Roman ship. Submerged in sediment for nearly 2000 years, the preserved wooden hull and recovered artifacts offer invaluable insights into the region's maritime history and cultural heritage.

#1602 Eagle Rays: Soaring on Spotted Wings
Despite its designation as globally "endangered," relatively little is known about the whitespotted eagle ray's ecology and life history. Now Florida scientists are combining cutting-edge technology with creative approaches to gain deeper insights into the movement and diet of this elegant fish - allowing them to experience the world from a ray's point of view for the first time.

#1603 Maui Aloha 'Āina: From Mauka to Makai
Dedicated scientists, land restorationists, and volunteers are drawing upon the ancient wisdom of the Hawaiian people to revive Maui's cherished ecosystems. Even amidst profound loss in the wake of recent wildfires, these resilient islanders are committed to reconnecting waterways from Mauka to Makai —from the mountains to the ocean— to heal their island home.

#1604 California Sea Otters: Life on the Edge
Adored by many for its cuddly appearance, the threatened southern sea otter is a voracious predator that needs to eat the equivalent of 25% of its body weight a day to survive. Once nearly hunted to extinction, this endearing marine weasel has made a slow comeback on California's central coast, demonstrating its role as an ecosystem engineer in the process.