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San Diego
**Wreck Alley &
Islas Coronados**

WWI Wreck
Rossarol

Red Sea
Dugongs

Ecology
Octopus

Sharks
Sand Tigers

Tech
**Christine
Slate Mine**

GRAVEYARD OF THE ATLANTIC
North Carolina

COVER PHOTO BY OLGA TORREY

THE **ZIMMERMAN** AGENCY
(continued)

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COVER PHOTO: Diver on wreck of Aeolus, North Carolina, USA
Photo by Olga Torrey (Filimage.nyc)

Playful California seals, Coronado Islands, Baja California, Mexico. Photo by Olga Torrey



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North Carolina

Wrecks & Sharks

Text and photos by
Larry Cohen & Olga Torrey

travel



LARRY COHEN

The waters off the coast of the US state of North Carolina are treacherous. Bad weather, rough seas, heavy current and inlets that are difficult to navigate are common. So why do underwater explorers consider this area to be a world-class dive destination? Because when you do get offshore, it is extraordinary.

Visibility varies but can be more than 30m (100ft). The best diving conditions

are between June and October, with late June to early August being the best.

Because of the sea conditions and the German "artificial reef program" of World War I and II, this area is nicknamed the "Graveyard of the Atlantic." More than 1,000 vessels have been confirmed in the shipwreck inventory conducted at the Outer Banks History Center on Roanoke Island. There are many more wrecks that have not been discovered or identified yet. Many of these wrecks are in diveable waters.

History

Since early colonial times, the North Carolina coast has been a shipping lane



LARRY COHEN



North Carolina

OLGA TERREY

Diver on wreck of *W.E. Hutton*, formerly known as *Papoose* (above); View of the sea from Fort Macon State Park on Bogue Banks, North Carolina (top left); Great white egret in the Theodore Roosevelt State Natural Area (left). PREVIOUS PAGE: Sand tiger shark on wreck of the *Atlas*





Manta ray makes a rare appearance on the wreck of *Caribsea*.

between northern US ports and the southern United States. Ships traveling to and from the United States to Europe, South America and Central America pass through these waters. Before better weather forecasting, radar, sonar, LORAN, GPS and other technical

breakthroughs, ships sinking due to collisions and environmental conditions was common.

War caused many ships to vanish. More than 60 vessels were lost during the Civil War. At least 15 disappeared under the waves in World War I, and approximately

90 more were lost in less than a three-year period during World War II.

All of these wrecks are now time capsules. Time stopped when they slipped below the waves. Now divers can explore these sunken museums.

Besides the historic ships, the North Carolina

Division of Marine Fisheries scuttled 42 ocean artificial reefs. The ships were sunk on purpose to attract marine life, and some of them have an interesting history.

Marine life

All of these structures are home to some astonishing marine life. Cold water, which flows down the coast from the north, collides with the warm Gulf Stream current, coursing up from the Caribbean. Both currents bring in their share of inhabitants. The longer the boat ride, the closer the diving will be in the Gulf Stream.

Marine life normally found up north, including blackfish, American goosefish and bergall, can be found on North Carolina shipwrecks. Tropical fish, including a variety of angelfish, southern stingrays, Atlantic spadefish, greater amberjacks, hogfish and barracuda, are very common—so are gigantic spiny lobsters and other

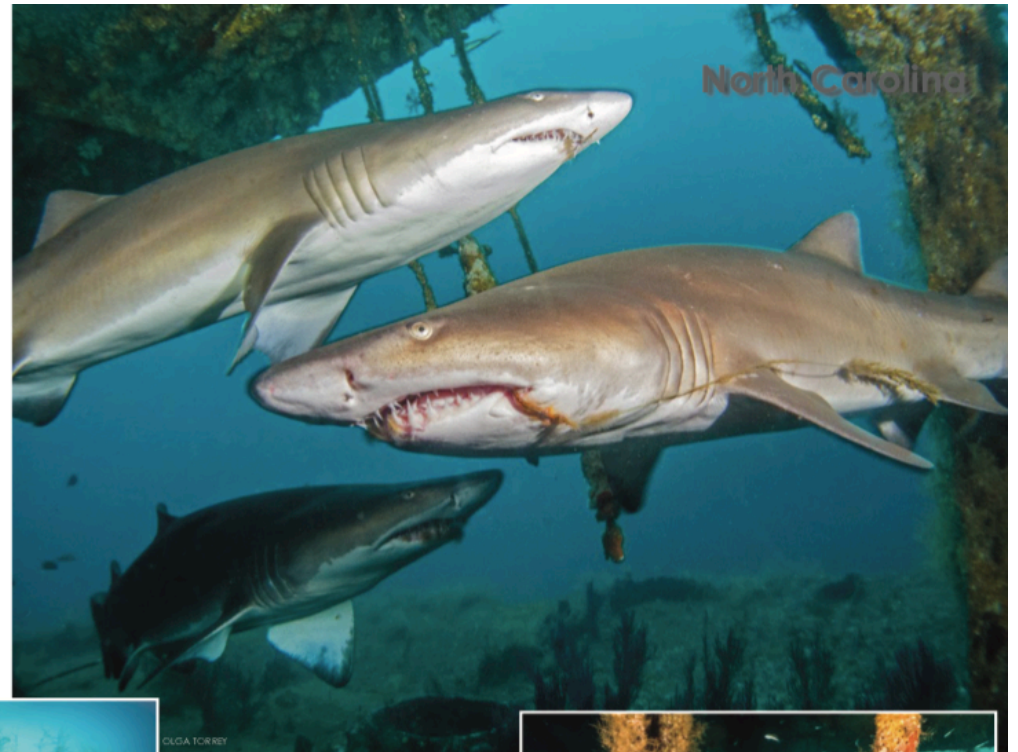


Sand tiger shark on *Caribsea* wreck





OLGA TORREY



OLGA TORREY



OLGA TORREY



OLGA TORREY

one, and the star of the show, is the sand tiger shark. Sand tigers can be found gathered on the shipwrecks. Scientists believe they are here during the summer months to mate. Sand tigers can grow as large as 3.65m (12ft). Their pointed snouts and jagged teeth, give them a terrifying look, but they are very gentle and swim slowly. Photographing these large, scary-looking sharks with a shipwreck in the background makes the perfect Kodak moment.

Aeolus

The artificial reef *Aeolus* has a history. She started life as an attack cargo ship and later became a cable repair ship. Now, she sits in 27.43 to 33.5m (90 to 110ft) of water. The ship was split into two during a powerful hur-

crustaceans. Even the occasional giant manta ray has been spotted soaring over a North Carolina wreck.

Many different species of sharks, including lemon, bull, tiger, white dusky, sandbar, spinner and thresher sharks, can be found in North Carolina waters. The most common



LARRY COHEN

THIS PAGE: Scenes from the *Aeolus* wreck; Sand tiger sharks on *Aeolus* wreck (top left and right); Grouper on *Caribsea* wreck (right)





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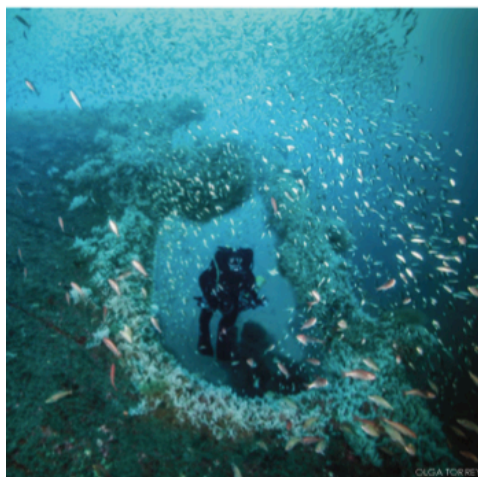
Diver (above), black sea bass (right) and ocean spade fish (below) on the wreck of the *Caribsea*

ricane, and the stern is sitting upright but is intact. The stern has a ceiling but no longer the sides; the decks are mostly open. There are usually four to a dozen sand tiger sharks in this area of the wreck. Many divers call this area "Club *Aeolus*," or the shark ballroom.



Caribsea

The *Caribsea* is a wreck with history that is also a great place to observe sand tiger sharks. The *Caribsea* was a cargo freighter. On 11 March 1942, the ship was on a voyage from Santiago, Cuba, to Norfolk, Virginia. It was carrying a cargo of manganese. At 2:00 a.m., two torpedoes struck her on the starboard side. The torpedoes were fired by the German submarine U-158. Only seven of the 28-crew members survived. They spent ten



Diver and schools of fish on *W.E. Hutton (Papoose)* wreck

hours in the water. The freighter *SS Narlindo* rescued the survivors. Now, the ship sits in 21.34 to 27.43m (70 to 90ft) of water. The boilers, engine and bow are the highest point of the wreck and divers will find those areas the most interesting. Visibility on this wreck could be low. Besides sand tiger sharks, it is not unusual to see Atlantic spadefish, flounder, grouper and greater amberjacks.

Papoose/W.E. Hutton

There are still new discoveries to be made on dive sites that have been visited for years. The wreck which was known to be the *Papoose* is now believed to be the *W.E. Hutton*. This wreck is 36 nautical miles from shore and sits right in the Gulf Stream; visibility of 30m (100ft) is not unheard of here. The wreck is upside down in 36.5m (120ft) of water. It is 132.5m (435ft) long. Between the structure, visibility and marine life, this is a spectacular dive, both inside and outside the wreck. The highest part of the wreck is at the stern. The rudder area rises





Sand tiger shark on the wreck of the *W.E. Hutton* (Papoose)

about 9.14m (30ft) from the bottom. In 2014, the rudder blade broke away from the stern and fell into the sand, but the rudder is still a remarkable subject for photos.

USS Schurz

The *USS Schurz* had a split personality. In 1894, the ship was constructed in Wilhelmshaven, Germany. She started life as the German gunship *SMS Geier*. At the outbreak of World War I in 1914, the *Geier* was docked in Honolulu, Hawaii, undergoing repairs. This was before the USA entered the war. She was held by the United States where she remained in dock for over two years. When the United States entered World War I in 1917, the

US Navy took over the ship and renamed her the *USS Schurz*. Now the ship served as a United

States gunboat fighting against the country where she was built. On the night of 18 June 1918,



Amberjack on the wreck of the *W.E. Hutton* (Papoose)



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OLGA TORREY



LARRY CCHEN

THIS PAGE: Scenes from the wreck of the USS *Schurz*; Anchor of the *Schurz* (lower right)

Schurz. The SS *Florida* was seriously damaged but did not sink. The *Schurz* sunk in 33.5m (110ft) of water, three hours after the accident. On the bridge, one sailor was killed and the commander was injured. Nearly 210 sailors survived.

Nowadays, the upper sections of the hull have collapsed, spilling the innards of the ship out onto the sand on the port side. A large pile of heavy gauge chain in the middle of where the foredeck once stood marks the location of the anchor chain locker. Off to the port side, a pair of large

approximately 28 nautical miles from the North Carolina coast, the merchant ship SS *Florida* was running without lights to avoid being torpedoed by German U-boats when she plowed into the USS

5-inch guns lie atop one another. The four boilers and engine are the highest parts of the wreck. Some days, the bait-fish is so dense that you cannot see the wreck through the school of fish.

U-352

The story of the German U-boat, U-352, is legendary. German U-boats were sinking so many merchant ships off the US coast that the German navy called this "The happy Times." The U-352 was not so lucky. She never made one kill. The U-352 was a type VIIC U-boat that was built in Flensburg, Germany, in 1941. The U-352 left for the United States at the beginning of April 1942. It cruised at a slow speed, and crewmen reported that they had been able to sunbathe on deck. Once, the sub was spotted and had two bombs dropped on her, but she escaped without damage.

The U-boat cruised the North Carolina coast looking for merchant ships to sink. Around 4:00 p.m. on 9 May 1942, the crew spotted what they thought was a merchant vessel. Commander

Hellmut Rathke eagerly ordered a torpedo to be fired at the ship. Unfortunately, the torpedo missed. It turned out that this was not an unarmed merchant ship but the Coast Guard cutter *Icarus*. Realizing his mistake, Commander Rathke brought the U-352 to the sea bottom at 29m (95ft). This was not deep enough to avoid the barrage of depth charges deployed by the *Icarus*.

Knowing that the damage was too extensive to escape, Rathke gave the order to abandon the sub. When it returned to the surface, the *Icarus* immediately opened fire with 50-caliber and 30-caliber machine guns. The Coast Guard ship then fired a 76mm (3-inch)

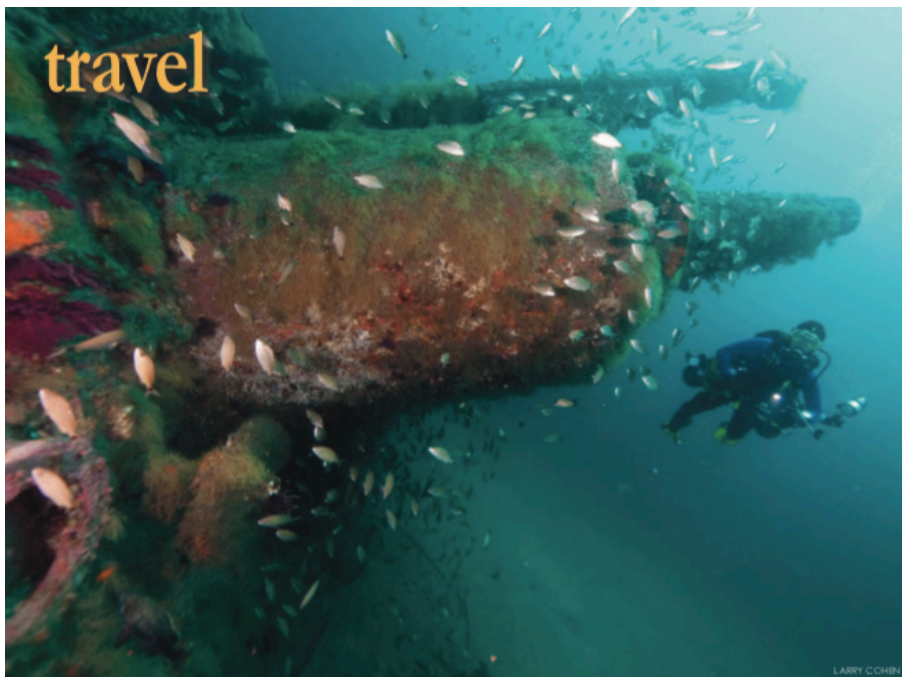


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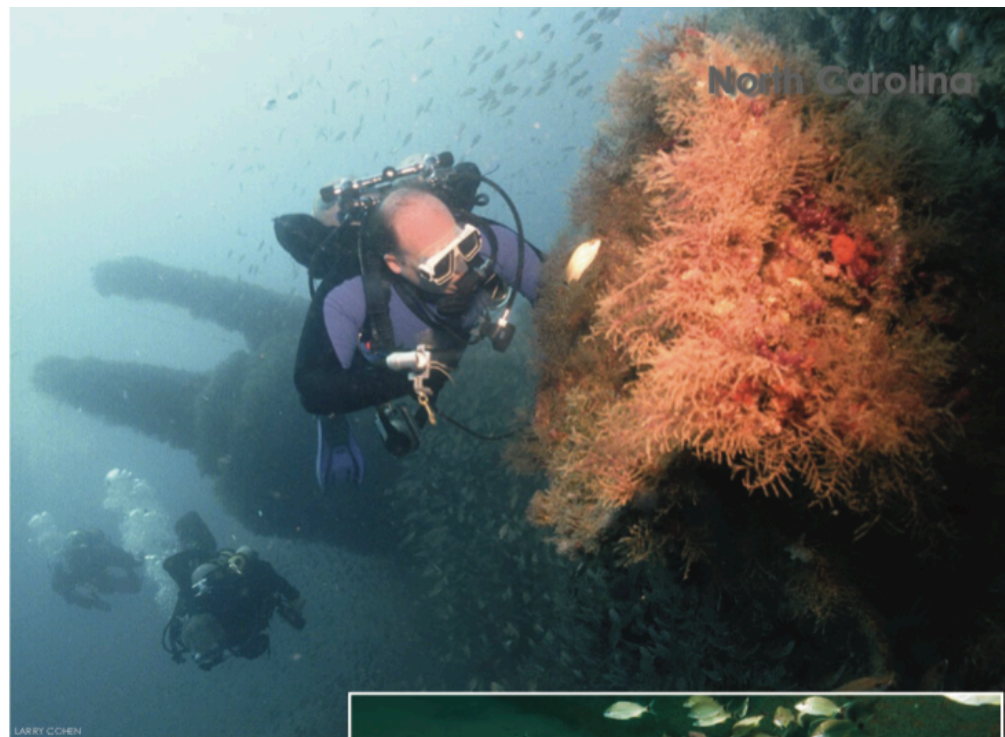
gun on what was left of the conning tower. This forced men who were clinging to the conning tower to jump into the water. At around 5:14 p.m., the U-352 slipped under the sea in 33.5m (110ft) of water.



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THIS PAGE: Scenes from the wreck of the German U-boat, U-352: Diver at conning tower of U-352 (above)



LARRY COHEN

The *Icarus* changed locations for approximately an hour while waiting for instructions on how to proceed. They then returned to the site and rescued 33 survivors, one of whom past away while on board. The survivors of U-352 were later questioned and were held in several prisoner-of-war camps until the end of the war. During questioning, the German sailors did not admit to seeing the US coast, but they were able to listen to American radio programs. Reportedly, they enjoyed listening to jazz.

Olympus Dive Center founder, George Purifoy, and several friends discovered the U-352 in 1974. Diving the 66.5m (218ft)-long wreck feels like taking a

time machine back in time. While diving the U-352, which sits upright with a 45-degree list to starboard, it is impossible not to think about the drama that took place that fateful day on 9 May 1942.

The outer hull has deteriorated, but the sub is otherwise intact. The top of the conning tower is the highest point and sits at 27.5m (90ft). During a dive, you can see the forward torpedo tubes where the bow has cracked, a gun mount and the conning tower. Even though the interior can be accessed through the galley hatch, the U-352 is a war grave and penetration is illegal. The wreck attracts schools of baitfish some-

times so thick you cannot see the wreck. Amberjacks as well as a variety of smaller fish, sponges and some corals can be seen.

The story of the U-352 does not stop with its sinking. In September 1985, Olympus Dive Center hosted a reunion of the survivors. During that reunion, the "Funkmeister" (radio operator) Kurt Kruger came to Purifoy with a request. Kruger described in great detail the location of his personal locker on board and told Purifoy that there was a coat, camera and pistol in his locker. He requested Purifoy to bring up the contents of his locker on a future dive.



LARRY COHEN

Purifoy agreed and brought up the contents of the locker.

Most clothing in the locker were destroyed by seawater, but the coat remained intact. Kruger identified it as his because of the radio operator patch sewn on

the coat. Purifoy also salvaged the camera and pistol. It is likely those items also belonged to the radio operator but they could not be positively identified. Kruger asked Purifoy to keep on permanent display his personal

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items at the Olympus Dive Center. Now everyone visiting can admire these treasured artifacts.

These are just a few of the wrecks that can be explored when visiting the Morehead City area of North Carolina. Due to weather, being blown out is a real possibility. Fortunately, there are many other activities to do besides diving.

Topside activities

The North Carolina Aquarium at Pine Knoll Shores is worth visiting on a rainy day when the boats

stay in port. There is even a large tank with local marine life and a realistic model of the U-352 wreck. Other highlights include a touch pool and a large shark jaw. The hurricane simulator is fun for children and immature adults!

Other indoor activities for a rainy day include the North Carolina Maritime Museum where, you can learn about Blackbeard the Pirate. Artifacts of his ship, *Queen Anne's Revenge*, are on display. Exhibits about the early US Lifesaving Stations, which is the predecessor of the US Coast



OLGA TORREY



OLGA TORREY

Guard, is extremely interesting.

Visiting downtown Beaufort is like taking a stepping back in time. Visitors can explore nine historic buildings, accompanied by tour guides in period costumes. Highlights include the 1796 Carteret County Courthouse (the oldest wooden courthouse in North Carolina), the 1829 "Old Jail," an 1850 doctor's office and apothecary shop (with adjoining

North Carolina Aquarium at Pine Knoll Shores (far left); Havelock, home to the world's largest Marine Corps air station (above); Corn fields (right); Artifact from 1916 on display at Olympus Dive Center (right)

herb garden), and the 1732 Russell House, which is the site of the oldest art gallery in North Carolina.

Offentimes, the sun is shining, but the wind is blowing so strong that diving is out of the question. On those days, there are plenty of outdoor places to explore. Taking a hike in the Theodore Roosevelt State Natural Area is a delight. This area is behind the North Carolina Aquarium at Pine Knoll Shores and includes a maritime forest with shrubs and salt marsh. Here, birds, including white ibis and painted bunting, can be observed.

Even when the wind is too

strong for dive boats to get off-shore, the ferries from Beaufort still run to the uninhabited island of Shackleford Banks State Park. Here, you can comb the beaches and search for wild horses. These horses' ancestors are said to date back to the 16th century when European ships wrecked on the beaches. The horses then became stranded. Although wild, they are rather tame and make great photo subjects with the ocean in the background.

Another way to get wet is to take a paddleboard lesson with Carolina Kitesurfing in Emerald Isle. Even when the ocean is wild, the backwaters can be calm—the perfect place for a relaxing paddle.

North Carolina



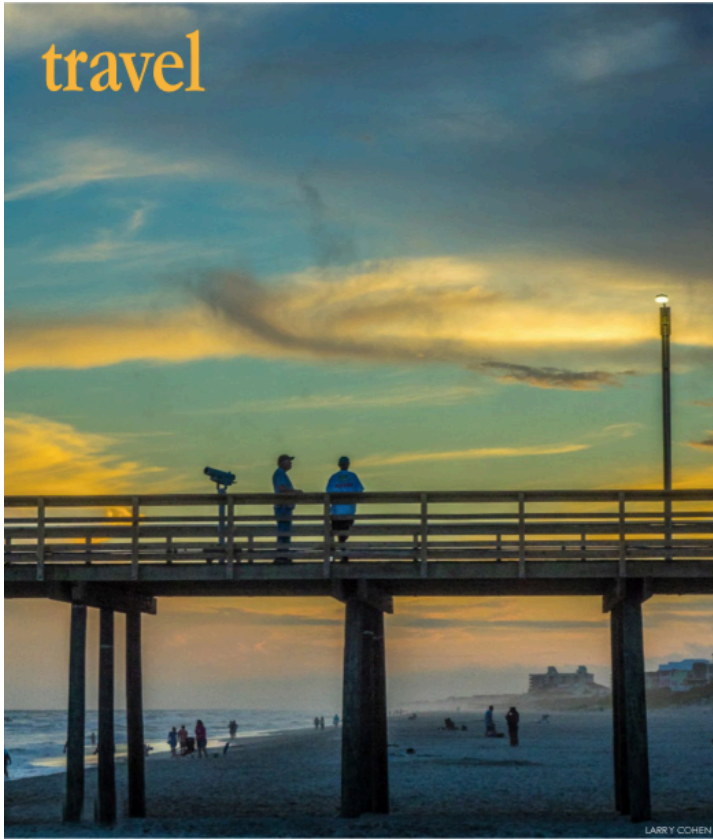
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Olga Torrey paddle boarding

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Bogue Inlet Fishing Pier (left); Canon at Fort Macon (center); Kayaking (top right); Wild horse at Shackleford Banks State Park (right)

Fort Macon State Park is a picturesque historic landmark on the ocean. Construction began in 1826. In the 1840s, Robert E. Lee initially engineered a system of erosion control. He later became the general of the Confederate Army. At the beginning of the Civil War, North Carolina seized the fort from Union forces. The fort was later attacked in 1862, and it fell back into Union hands. For the duration of the Civil War, the fort was a coaling station for US Navy ships.

Nowadays, the fort is home to

the Coastal Education Center. There is a large exhibit hall featuring numerous exhibits about the natural history of the park, barrier island ecology and the interaction of natural and cultural history associated with the Fort. Museum rooms located in the fort casemates have displays about the fort's history. Restored quarters give visitors a look into the lives of the soldiers. The beach in front of the fort is a great place to go swimming (There is no swimming on the inlet side due to strong, dangerous currents) or to fish.

natural and cultural history associated with the Fort. Museum rooms located in the fort casemates have displays about the fort's history. Restored quarters give visitors a look into the lives of the soldiers. The beach in front of the fort is a great place to go swimming (there is no swimming on the inlet side due to strong dangerous current) or to fish.

After a busy day of diving or exploring the area's many attractions, a sunset stroll on the Bogue Inlet Fishing Pier is a great way to end the day. The people are

friendly, and it is fun to see the ocean and watch the locals fish.

Afterthoughts

A dive trip to North Carolina is an adventure. Conditions can be difficult to deal with, but the rewards are worth the trouble. Exploring the historic shipwrecks and spectacular marine life is worth the effort. When diving is not possible, there are still plenty of activities to enjoy. ■

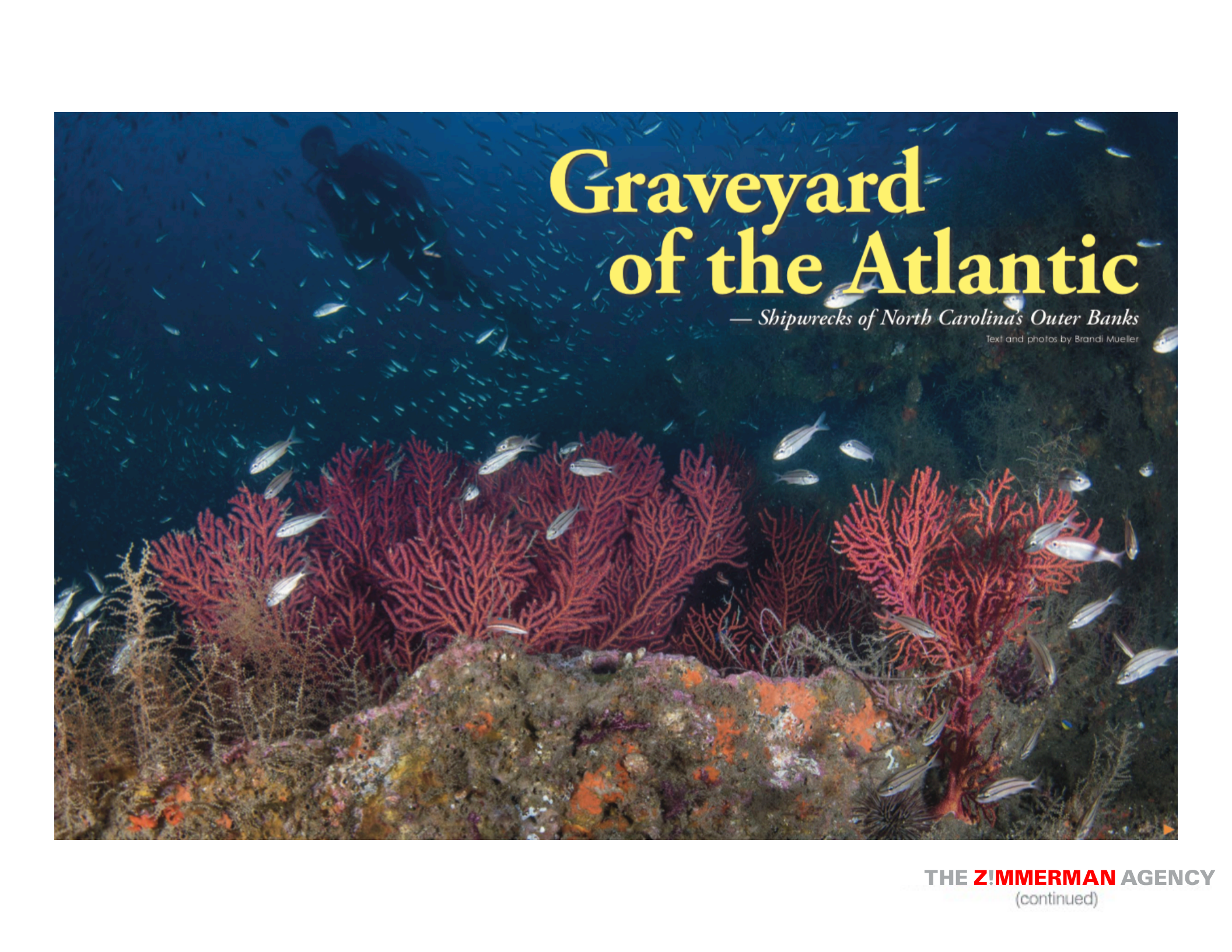
Thanks go to Atlantis Charters and Olympus Dive Center.

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An underwater photograph showing a vibrant coral reef. The foreground is dominated by large, branching red coral structures. Numerous small, silver fish are swimming around the coral. The background is a deep blue, with a faint silhouette of a diver visible in the upper left. The overall scene is rich in marine life and color.

Graveyard of the Atlantic

— *Shipwrecks of North Carolina's Outer Banks*

Text and photos by Brandi Mueller

travel



Sand tiger shark on the *Atlas* wreck (above). PREVIOUS PAGE: Diver and colorful sea fans and sponges on the *Atlas* wreck

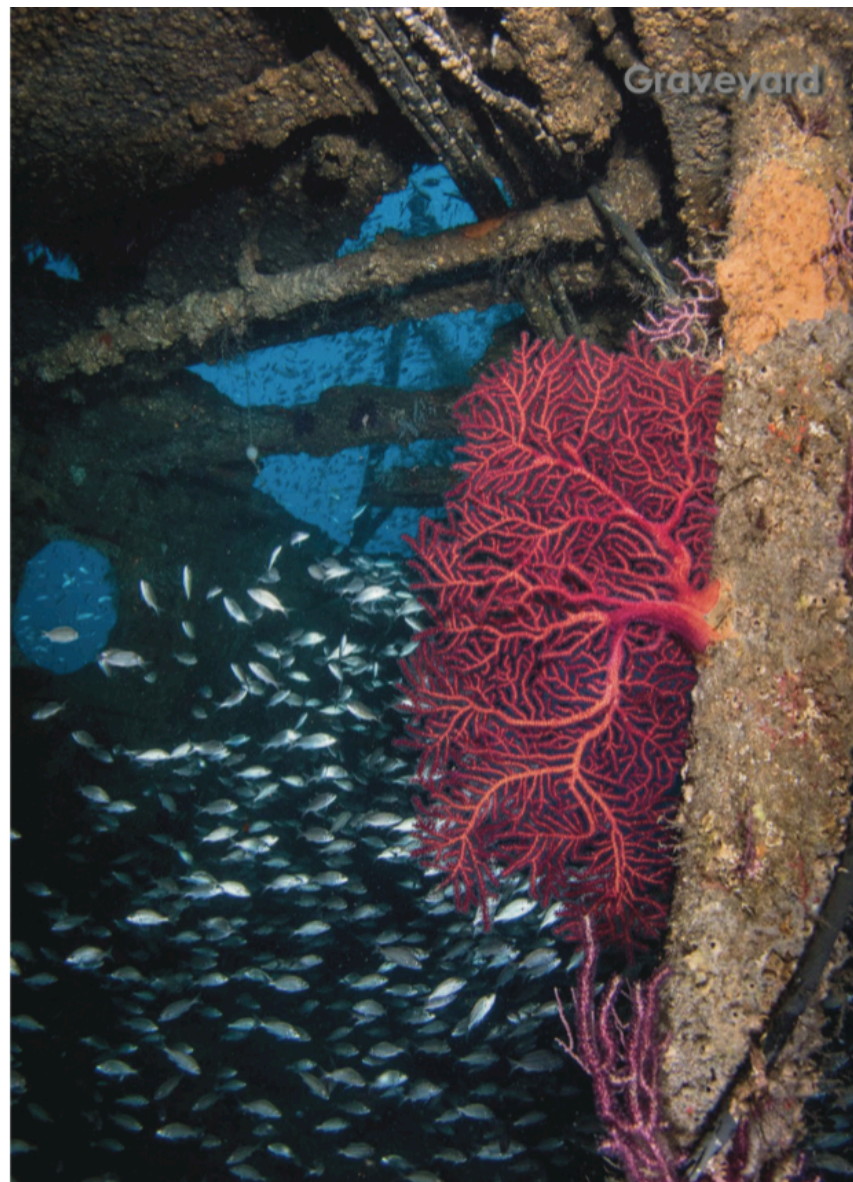
One of the problems with the proverbial bucket list is that whenever you tick a dive trip off the list, it seems that you add at least three more destinations to it. This is exactly what happened to me. I had never considered North Carolina as a dive destination, much less one of the top wreck diving locations in the world. But, after running across other wreck diving enthusiasts who frequented the "Graveyard of the Atlantic," yet another destination was added to my list.

Wreck diving is one of my favorite types of diving because I love the history of how the wrecks came to be underwater, and North Carolina has plenty of that. The history of more than 2,000 wrecks lie in the waters off this eastern state and the stories range from pirates, the Civil War, World Wars, hurricanes, storms and other maritime mistakes that took down good ships. The Graveyard extends along the entire North Carolina coast.

How the ships went down
Over time, the coast of North Carolina has literally produced the "perfect storm" for captains and crew. The beautiful barrier islands, including the Outer Banks, sit offshore of the continent, along with shallow shoals that create sandbars miles off

the coast. The flat islands and moving sandbars became (and still are) navigational hazards to sailors, particularly during the frequent bad weather and extreme storms common to the area. Underwater, strong currents run close to shore, which sailors would often take advantage of to increase speed, but this contributed to the risk of running aground on those islands and shoals. These conditions led to the demise of many ships and still do today.

The date of the first recorded shipwreck in these waters is debated but records go back as far as the 1500s. Early on, pirates frequented the area, attacking ships transporting goods. Probably the most popular pirate ship discovery in the world was *Queen Anne's Revenge*—Blackbeard's famed ship. The ship ran aground in



Colorful sea fan inside the Hardees wreck





Diver and sand tiger shark on the *Atlas* wreck (left); A queen angelfish (lower left) on the *Atlas* seems out of place this far north, but warm currents from the Gulf Stream bring Caribbean fish.



facts are on display at the North Carolina Maritime Museum. Much of the museum is dedicated to the discovery and salvage of the ship. It is nothing short of incredible to walk around and gaze at artifacts from the late 1600s and early 1700s.

In the past, not all the residents of the area had the sailor's best interest in mind. There were men known as "wreckers" who would walk horses with lanterns on their neck along the beach, thus causing an up-

and-down motion of the light. This would confuse sailors to think there was clear water ahead and the captain would run his ship

and-down motion of the light. This would confuse sailors to think there was clear water ahead and the captain would run his ship

aground, then the wreckers would steal goods from the ships.

Heading out to dive the Graveyard of the Atlantic with Olympus Dive Center, we visited

War

Humans also played direct roles in the sinking of these ships through war. Shipwrecks from the Civil War and both World Wars can be found (and are still being found) in



Toadfish on the *Atlas* wreck





Sheepshead and moray eel on the *Ashkhabad* wreck



Swarming fishlife on the *Ashkhabad* wreck

the Graveyard of the Atlantic. During WWII, German U-boats sat off the coast of North Carolina and looked at the lights on the shoreline. They would spot freighters going by when the ships blocked out the shore lights, and because so many ships were torpedoed, the area became known as Torpedo Alley.

Atlas. We dived several WWII wrecks including the *Atlas*, which was a tanker torpedoed by the German U-boat 552 in 1942, and the *Caribsea*, which was also sunk by a torpedo in 1942. These two ships swarm with bait fish and are popular ships on which to see sand tiger sharks, which were numerous during the course of our dives.

Ashkhabad. We also visited

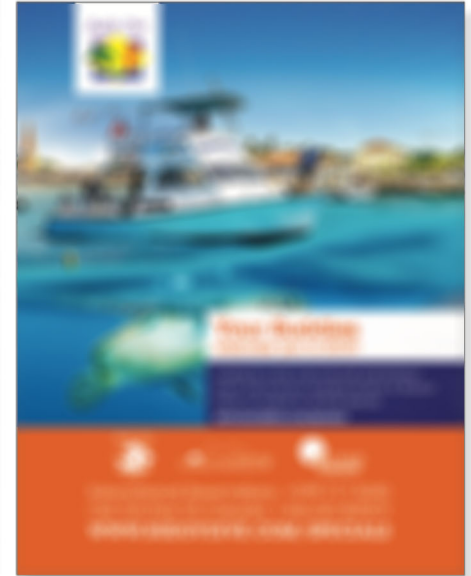
the *Ashkhabad*, a Russian freighter sunk by a German torpedo in 1942. Most of the *Ashkhabad* has been reduced to debris in the sand, but the life it has attracted is incredible. The warm waters from the Gulf Stream push north past offshore North Carolina, bringing with them many unexpected Caribbean reef fish. I didn't expect to see arrow crabs, toadfish, and even a few queen angelfish on this wreck, along with sheepshead, triggerfish, and black sea bass, but there they were. The dive is quite shallow (20m/60ft), allowing for a long bottom time exploring the wreckage and seeing the fish life.

Artificial Reefs

Wrecks continue to be sunk to this day, both accidentally and

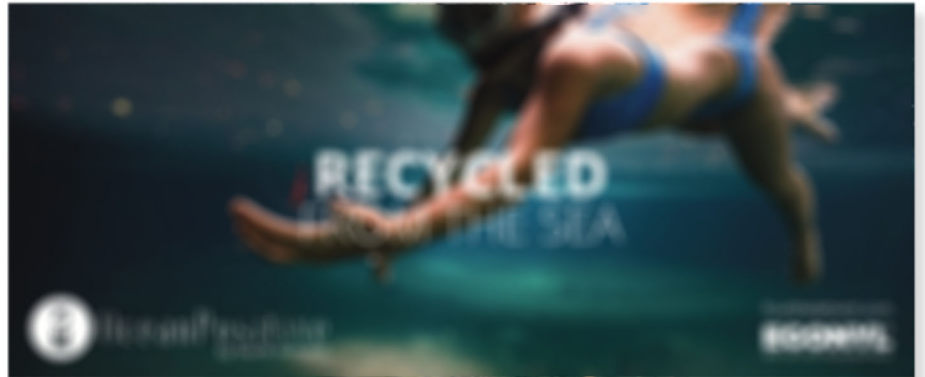


Colorful soft corals and sponges (top center) growing on the remains of the *Ashkhabad* wreck (above)





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Black sea bass on the Ashkhabad wreck (left); Sunk as an artificial reef, the Hardees wreck seems to be doing a good job attracting fish (right); Divers on the bow of the Hardees wreck (below)



Invasive lionfish, seen here on the Ashkhabad wreck, have reached as far north as North Carolina. Divers hunt them from the wrecks.

on purpose. The Graveyard is also home to many wrecks sunk as artificial reefs, the most recent of which was sunk on 22 August 2018. The tugboat *Fort Fisher* joined 26 other vessels that have either been sunk by using explosives or by cutting holes throughout the vessel and having water pumped in. These ships are first cleaned up by having all pollutants removed before being sunk to serve as a home for marine life. Often, corals and sponges will take over the structure of the wreck, and fish will begin to amass around the ship, which of course then attracts larger fish. The artificial wrecks are popular with both fishermen and divers.

Hardees Wreck. During one of my dives, we visited the Hardees Wreck (Hardees helped fund the project to sink the ship). The beautiful wreck was covered in corals and sponges, and because it was sunk artificially and cleaned up prior to sinking, there were some easy penetrations to get inside



the wreck. Many small fish take refuge inside the ship and beautiful purple fans grow on the walls inside the ship.

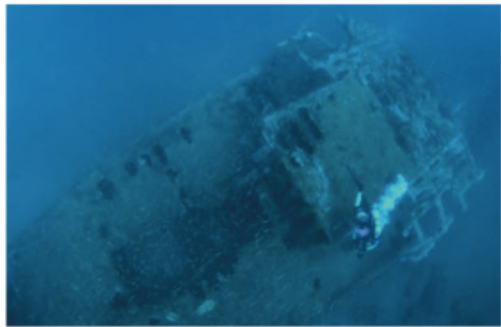
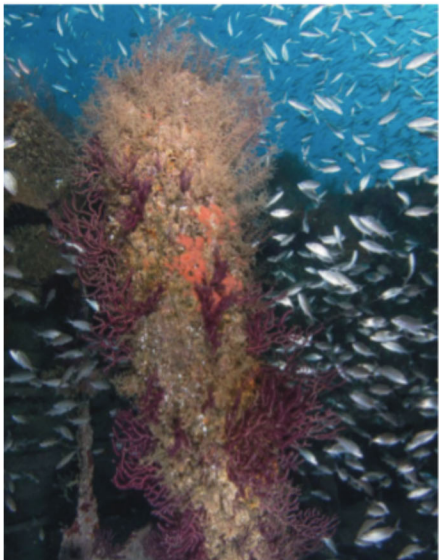
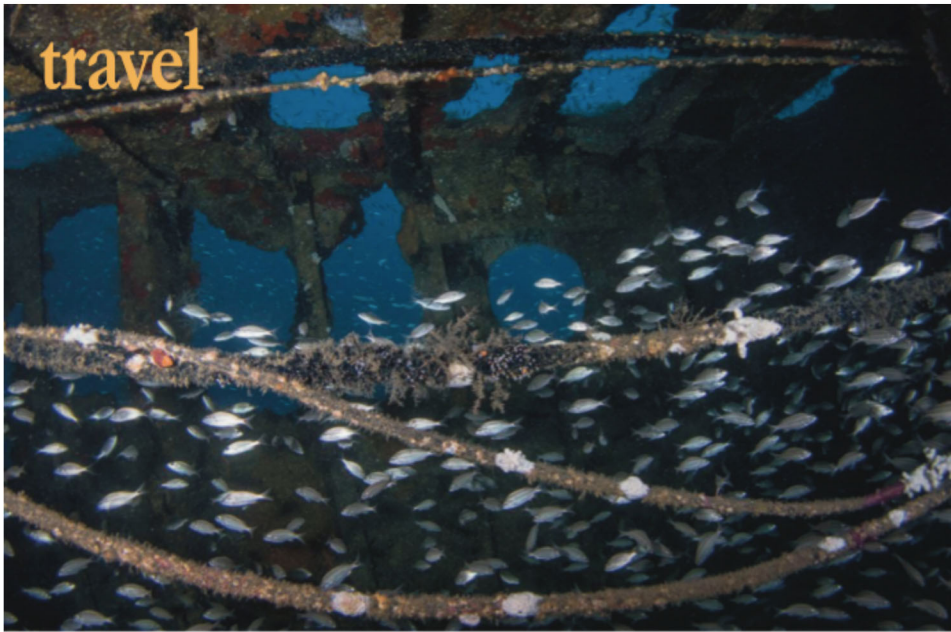
Dive conditions

The problem with North Carolina diving is also probably what adds to some of its attraction. I had been told over and over that conditions were variable—and not just some of the conditions, pretty much *all* of the conditions. My friends told me

to expect everything from rough seas, strong wind and rain to bad visibility, extreme currents, and, of course, the wildlife (like the famed sand tiger sharks) not showing up.

However, the long weekend I spent diving with Olympus Dive Center and exploring the wrecks proved them all wrong. The conditions were perfect: The sea was like glass, the sun was shining, the water temperature was 28°C (82°F), the bait balls of tiny fish were swarming, and there were dozens of monster-





Sunk as an artificial reef, the Hardees wreck (above) seems to be doing a good job attracting fish (above and left); Sand tiger shark on the Portland wreck (right)

size sand tiger sharks gliding over the wrecks. But apparently, I was very, very lucky. That being said, our trusted captain and crew chose the wrecks we dived based on condition reports from other sites. (Always trust the captain.)

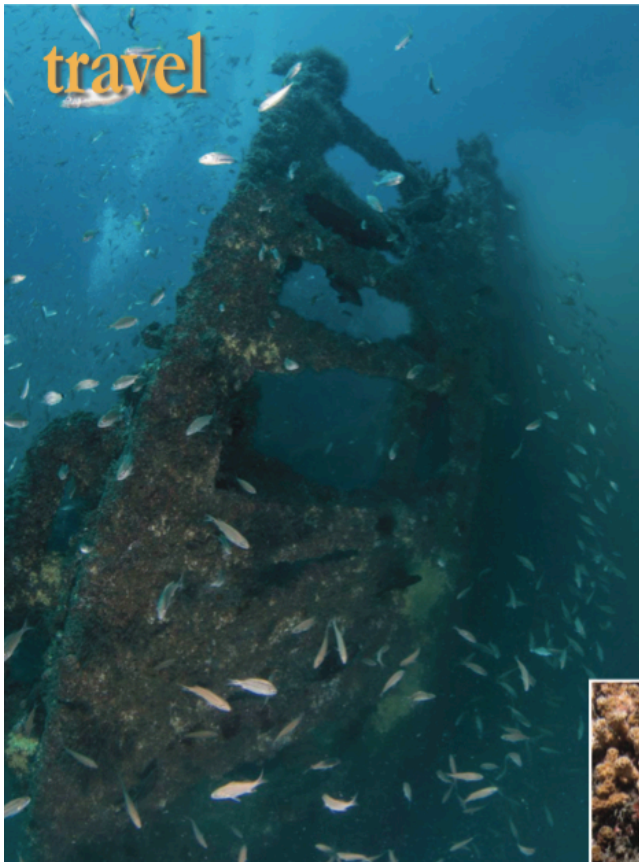
We did not go to the U-352 German submarine because the visibility had been less than 15ft. The wrecks they chose had much better visibility of 20m+ (60+ft), and sometimes even better. There are also many options for

technical divers looking to dive deeper wrecks or just stay longer on the shallower wrecks (Many are in the 100 to 130ft range, which is fine for short recreational dives). Olympus offers special tech trips for those certified,

and they can help divers get certified in technical diving.

Not just wrecks

In the event of a rough day at sea where the dive boats do not go out (for



Fishlife on the *Portland* wreck(left); Wild mustangs on Shackleford Banks (above); School of spadefish over the *Portland* wreck (top right); Sunset on the North Carolina coast, a perfect end to a day diving wrecks (right)

diver safety), there are plenty of other things to do in the nearby area. The day before I flew out and could not dive, I took the ferry to Shackleford Banks, an island with a wild mustang population, as well as a very popular place for shelling, fishing, camping and just relaxing on the beautiful coast of North Carolina.

The 20-minute ferry ride from Beaufort dropped us off right on the beach, and as I started walking in the sand, I noticed two women taking photos into the

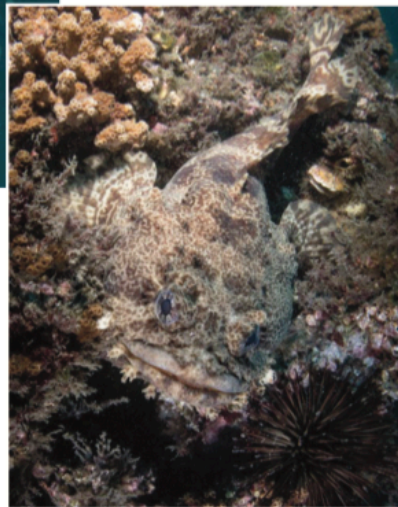
brush. Getting closer, I saw two copper-colored wild horses grazing on the grasses. After snapping a few pics, we all moved on to give them some space. Continuing on my walk, it was not long before I came on two more horses laying on the beach. Before I left two hours later, I had seen at least eight of these beautiful wild horses.

The Beaufort Waterfront is also known for its excellent food options (particularly seafood

and is a great place to sit and watch boats come in and out. I visited the

North Carolina Maritime Museum, which had an incredible amount of artifacts from Blackbeard's ship, *Queen Anne's Revenge*; and just a few miles down the road was the North Carolina Aquarium at Pine Knoll Shores, where I got to see a few more sand tiger sharks before leaving.

With over 2,000 wrecks just offshore, a diver could spend the rest of her life exploring the ships. Not to mention, more ships are being discovered and more are being artificially sunk. I cannot wait to go back and tick more wrecks off my (now even longer) diving bucket list. ■



Toadfish on the *Portland* wreck



Special thanks to Crystal Coast Tourism Authority and Olympus Dive Center.

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Sand Tiger Sharks

of North Carolina

Text and photos by Brandi Mueller

feature



Sand Tiger Sharks

Sand tiger sharks have dark gray bodies with spots (top left), and bright white bellies (above)

There I was, off the coast of North Carolina at a depth of about 20m (60ft) when the shadowy shape of the WWII wreck *Caribsea* came into view—but it looked almost as if it was moving! Upon closer inspection, it turned out to be a cloud of tiny bait fish completely covering the wreck. As they moved, the ship seemed to move with them; and then, out of the swarm, a massive, tank-like, gray silhouette emerged. It moved at one speed and in one direction, not altering its course an inch. I smiled so much my mask began to leak—it was a sand tiger shark.

Sand tiger sharks (*Carcharias taurus*) look mean but in reality, they are quite docile. As I watched, at least 12 sharks crisscrossed the *Caribsea* wreck; they almost seemed to be in a perfect state of Zen. Easily identifiable by their pointy, cone-shaped heads (and also by their jagged and fierce-looking teeth, which show even when their mouths are closed), the tops of their bodies are a dark gray with darker colored spots, and their undersides are bright white. Their tails also have the unique characteristic of a notched upper lobe. At first glance, I thought perhaps the shark had a bite taken out of its tail, but I was wrong, they all have that.

The sharks, which can grow longer than 3m (10ft) and weigh up to 150kg (330lb), seemed to emerge out of the shadows, or out of a blindingly dense bait ball, moving in a straight line at the same depth, not diverting in any way. They would just traverse the wreck, almost like



Sand tiger shark on the *Caribsea* wreck off North Carolina (above); A diver photographs a sand tiger shark on the *Atlas* wreck (previous page)



Notched upper lobe of sand tiger tail fin





feature

THIS PAGE: Sand tigers on the *Caribsea* wreck off North Carolina. These sharks can grow more than 3m (10ft) in length and weigh up to 150kg (330lb).

and we all ran to the port side of the dive boat. We could see a large shadow departing the surface, and it did not return. Our captain informed us that it was actually a sand tiger coming to the surface because these sharks have swim bladders. They are the only shark species that comes to the surface for breaths of air, which help them control their buoyancy underwater. These gulps of air help them to maintain their motionless movement, which makes them look so cool underwater, as they move so stealth-like; they almost look as if they are not moving at all.

Sand tigers, similar to most shark species, can detect electric currents through receptive pores under their snouts. Prey (and divers) emit electrical signals that the sharks can sense in the water column, alerting the sharks of our presence. This helps the sharks to hunt in bad visibility, although sand tigers also have considerably good vision; they can see in low-light conditions and can detect the difference

rubber toys on some sort of conveyer belt—albeit, very large rubber toys. Maybe a better description would be a semi-truck slowly moving directly towards you, and you better get out of its way.

Sand tigers can be found in warm or temperate waters around the world, but often in deep waters inaccessible to divers. North Carolina is a rare place where divers can consistently see them at recreational diving depths. This population seems to have taken up an interest in wreck diving (just like me) and many of the Graveyard of the Atlantic's wrecks are populated with sand tiger sharks. The most popular wrecks on which to see them include the *Caribsea*, *Atlas*, *Papoose*, *Spar* and *Aeolus*.

About the shark

Sand tigers have several other com-

mon names in different places, including gray nurse sharks and ragged-tooth sharks (or "raggies," due to their rows of intimidating, jagged, ragged teeth). The shark's name is often a source of confusion as it is not actually a tiger shark; and its scientific name directly translates to "bull" shark, although it is not a bull shark either (bull sharks are *Carcharhinus leucas*).

There are three additional species of sand tiger sharks: *C. tricuspidatus*, *C. ferox* and *C. noronhai*—all of which are generally found only in very deep water and rarely seen by divers. Even *C. taurus* can range in depth to almost 200m (656ft), making North Carolina a very unique place to be able to recreationally dive with them.

On my second day of diving, we ventured to the *Atlas* wreck, another WWII shipwreck. Upon arriving at the wreck, another diver yelled, "Dolphin!"



feature



Sand tiger shark in a baitball of fish on the *Atlas* wreck (top left); Sand tiger on wreck of the *Caribsea* (above and left); Despite their menacing appearance and sharp ragged teeth, sand tiger sharks are not aggressive towards humans.

between light and dark objects. Nighttime is usually when sand tigers hunt, and they prey on small

fish, crustaceans, skates and squid. They have been known to group hunt as well, and hunting usually

occurs close to the sea floor. Despite their big teeth and ferocious expression, sand tigers are not aggressive towards people. No documented cases of human deaths have been recorded, although incidences of human attacks have been recorded in association with spear-fishing and shark-feeding. They are sometimes known to be aggressive when trying to steal fish or bait from fishing lines.

A few times underwater, I heard a large cracking noise, which was the almost sonic-boom-like sound of a sand tiger diverting its path. Whether it was from an attempt to catch some bait fish for dinner or because they were startled by something (one time, it was two

sharks colliding into each other), the lightning speed of these sharks moving sounded like a thunder boom, which I think I could feel in my chest.

Reproduction

Things get quite interesting when we look into the reproduction of sand tiger sharks. Due to their success in surviving captivity and aquariums, the reproduction of sand tigers is well known. In some sand tiger populations, including those from South Africa and Australia, a migration is associated with reproduction. Many will travel over 1,000km (620 miles) to mate in shallow waters during the winter and give birth in warmer waters in the summer. Young sharks are

not seen on the migration, and it is thought that they may stay in deeper waters until maturity. Male sharks mature after five to seven years, and female sharks mature after seven to ten years.

Courtship has been seen in aquariums. When females are ready to mate, they are seen hovering just above the bottom, "shielding" themselves to help prevent unwanted approaches from males from underneath. Males compete with one other to see who can get closest to the female, with the largest, alpha male usually winning. He will intimidate the others by snapping his tail and trying to drive them away from the female. Courting can take several days of the male



feature



Since sand tiger sharks survive well in captivity, much research has been done on the species. They can be seen on display in the North Carolina Aquarium at Pine Knoll Shores (above). Sand tiger shark on the *Atlas* wreck (left)



Females usually only breed every two to three years, and the gestation period is around nine months. Usually, 15 to 25 eggs are fertilized internally. An egg yolk provides food for the developing embryo until the young is around 17cm (6.7in) long. This is when things get interesting.

The largest embryo—often the first to hatch—will begin to feed on the other, less-developed embryos to survive. This is known as intrauterine cannibalism, and sand tiger sharks are the only shark species known to do this. Around nine months later, the female will give birth to one or two 1m (3ft)-long, fully developed baby sharks, which would have eaten the rest of their siblings.

Aquariums

Sand tiger sharks are one of the most popular sharks to have in

aquariums because they have shown to survive quite well in captivity. The North Carolina Aquarium at Pine Knoll Shores has a large exhibit with a replica U-352 boat and many large marine animals found in the nearby waters, including sand tigers. With so many sand tigers in captivity, a lot of research has been done, and that is partly why we know so much about these sharks. They have been shown to live 10 to 15 years in captivity, although we do not know how long they survive in the wild.

Keeping sand tigers in aquariums has had benefits to science, and the sharks may help inspire people about the ocean, but keeping large animals in tanks much smaller than their natural environment is not without problems. Sand tigers kept in captivity have been shown to develop



feature



Sand Tiger Sharks

Sand tiger shark with baitball of fish (above); Divers returning to the surface from the *Caribsea* are surrounded by sand tigers (top right)

spinal deformities, probably due to tank size and from swimming in circles in one direction, causing asymmetrical stress on their bodies.

Threats

Population data on the sand tigers is sparse, so they are listed as vulnerable on the International Union for Conservation of Nature's Red List. Like so many ocean creatures, sand tigers face many threats, the largest being their slow reproductive rates—they have one of the lowest reproductive rates of all shark species. However, off North Carolina, it seems the sand tiger shark population is plentiful, and they are found throughout the world's oceans.

Sand tigers have also been targets for shark finning, and they are a highly prized food item in some parts of the world. Their ability to survive captiv-

ity has led to many individuals being captured for aquariums (and reproduction rates in captivity are also low). Sand tiger sharks are often after the same fish as fishermen, which has made them unpopular in some places. Fishermen have been known to kill them to protect their catch, and there are even specific fishing competitions targeting them in places like South Africa. Young sand tigers often reside in shallow estuaries, which can be susceptible to pollution and run-off.

Seeing these beautiful sharks underwater is a surreal experience. The way they move through the water and come so close to divers makes for an incredible dive; plus, off North Carolina, they are usually near some really amazing wrecks. Popular places beyond North Carolina to dive with sand tiger sharks include Aliwal Shoal in South Africa and off Western Queensland in

Australia, as well as most of the southern part of the Australian continent. ■

Special thanks go to Crystal Coast Tourism Authority and Olympus Dive Center.

Brandi Mueller is a PADI IDC Staff Instructor and boat captain living in Micronesia. When she's not teaching scuba or driving boats, she's most happy traveling and being underwater with a camera. For more information, visit: Brandiunderwater.com.

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Sand tiger shark on the *Atlas* wreck

