The Home Forum

On the trail of a massive, mysterious fish

kid space

THE FIGHT is over for the 300-pound bluefin tuna. It's been reeled in by an expert fisherman and hauled aboard the Calcutta, a 55-foot sport-fishing boat. As the fish lies on a plastic pad, a seawater hose is placed inside its mouth. Its staring eyes are covered with a wet cloth. The fish doesn't struggle, but stretches out its fins as if feeling for the water that suddenly vanished.

Most people think of tuna as sandwich filling. But this silver-blue fish is a perfect swimming machine, one of the most remarkable animals in the ocean. Unfortunately for the bluefin, it is also one of the tastiest animals in the ocean. Bluefin are a great delicacy in Japan, served as sushi (raw fish with rice) or sashimi (simply raw). Japanese diners will pay very high prices for a prime fish. In 2001, a 444-pound bluefin sold for $175,000 at a fish market in Tokyo. That's $394 per pound!

The Calcutta's bluefin, however, won't be put on ice and flown to Tokyo. It's about to become a living "spy probe."

'Spyfish' instead of sushi

The Calcutta's science team kneels around the bluefin. "Two hundred centimeters," says Dr. Barbara Block of Stanford University, as she measures the fish. Chuck Farwell, an aquarist at the Monterey (Calif.) Bay Aquarium, holds the hose in the fish's mouth. The hose forces seawater through its gills and helps it breathe while out of water.

Dr. Block pushes a pointed metal barb the size of a large paperclip into the muscle on the bluefin's back. A pop-up satellite tag the size and shape of a small microphone is attached to the barb by a plastic cord. Dr. Block pushes in a smaller barb to anchor the other end of the tag. When she is done, she stitches up the small cuts.

In just a few minutes, the bluefin's discomfort is over. Block, Mr. Farwell, and the rest of the team pick up one end of the pad and carefully slide the fish back into the water. This time next year, the high-tech tag on the bluefin's back will report back to Block, giving her a fish's-eye-view of life in the open ocean.

"Bluefin are incredibly tough fish," says Block as the tuna disappears into waters off North Carolina. "We know from tag data they are soon back to normal." Block has put high-tech tags on 680 Atlantic bluefin tuna since 1997. Through the tags, she is learning more about bluefin and their ocean habitat – information which could help her protect the bluefin from being overfished.

PHOTOS BY PAMELA S. TURNER

TUNA TRACKERS: Dr. Barbara Block (r.) and Chuck Farwell (c.) attach high-tech tags to an Atlantic bluefin tuna, before releasing it back into waters off North Carolina. Such research helps scientists study the bluefin's travel patterns (see map, below) and protect it. Recently, they were surprised that the fish often swims to Europe.

Atlantic bluefin tuna aren't the only creatures carrying "spy probes." Block and other scientists have already tagged great white sharks (see "Shark trackers," the Dec. 3, 2002 "Kidspace"), salmon sharks, Pacific bluefin, albatrosses, elephant seals, sea turtles, blue whales, and large squid.

But studying marine life isn't easy. A scientist doing chimpanzee research can follow a troop through the forest, watching every move and nibble. That is impossible with fast-moving, deep-diving, wide-ranging ocean animals.

For many years, scientists have used metal or plastic tags to find out where fish go. If a tagged fish was caught, the fisherman would (hopefully) send the tag back and tell the scientist where and when the fish was caught. However, these simple tags can only show that a fish traveled from point A to point B, not what happened in between.

Back in Block's lab, Farwell shows me a pop-up satellite tag like the one now carried by the Calcutta's bluefin. "These three dots are the sensors. This one senses swimming depth, and this one water temperature. This one records light levels, which can be used to calculate the fish's location," explains Farwell. "The tag takes and records measurements every two minutes."

The pop-up tag looks like a microphone and weighs no more than a candy bar, but it is really a minicomputer. After a set time – usually one year – the tag pops off the fish and floats to the surface. It sends its data to an orbiting satellite, and the satellite sends the data to Block's computer.

Lean, mean, swimming machines

Adult bluefin are among the farthest-ranging creatures on the planet, built to cover long distances quickly and efficiently. Their "superfish" swimming design is the envy of submarine engineers.

You might expect a perfect swimming shape to be long and thin. Yet bluefin are stout. Scientists have discovered that the bluefin's body thickness compared to its length perfectly minimizes drag in the water.

Every bit of the bluefin's body is designed to cut smoothly through the sea. Its fins fit into notches on its body. Its eyeballs are recessed into its head and its scales are slick. The bluefin's design, millions of years in the making, is far more sophisticated than a racecar's.

Sleek racecars don't have wimpy engines, and neither do bluefin. A large, powerful heart and strong muscles propel the "superfish." Bluefin can sprint at 25 miles an hour when chasing prey – as fast as a speedboat pulling a skier.

Unlike most other fish, the bluefin is

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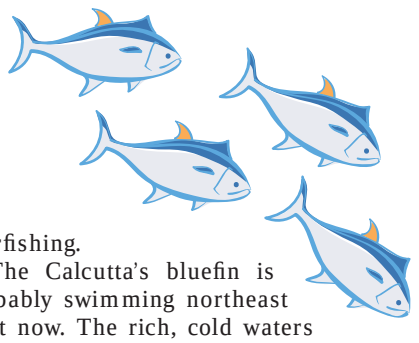
SOURCE: Wildlife in North Carolina magazine

KAREN SCHNEIDER – STAFF

Fish follies

ON THE Blue Planet website, kids can explore the deep sea, tide pools, coral reefs, and the California coast with 13 online games. 'Fact Files' and 'Infobursts' help players with the quiz questions. Go to: **www.bbc.co.uk/nature/blueplanet/games.shtml**



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warm-blooded. Blood heated by the bluefin's muscles warms blood cooled by its seawater-chilled gills. Having warm muscles gives bluefin extra power, especially in cold water. Because it can control its body heat, the bluefin can live in both the near-freezing waters of the sub-Arctic and the bathtub-warm waters of the tropics.

Block's high-tech tags have shown just how far the "superfish" roam. One Atlantic bluefin carrying a long-term "archival" tag left North Carolina and swam up to feeding grounds off Canada. Then it swam across the Atlantic to Spain (near the Mediterranean Sea), and back to Canada. From Canada, it swam to the Bahamas (near the Gulf of Mexico) and back again to Spain. Block has discovered that the fish can cross the Atlantic Ocean in just three weeks!

A 'third eye' for navigation?

How do bluefin find their way across thousands of miles of ocean? "No one really knows," says Farwell. "But bluefin have a 'pineal eye' on top of their head. It's a piece of colorless skin that is like a window shining into their brain." This strange "eye" may use light cues – such as the position of the sun – to help the fish navigate.

As schools of bluefin roam the open ocean, they hunt smaller schooling fish, squid, and crab. Bluefin are formidable predators. We think of sharks as scary, but to another fish, a lightning-fast, hungry bluefin is just as dangerous. Block's tagging data shows that bluefin can dive 3,000 feet down. No one knows how they find prey in such dark depths.

Although adult Atlantic bluefin can grow to 15 feet and 1,500 pounds, there are even bigger predators in the open ocean. Large sharks sometimes attack bluefin, as well as orcas (killer whales). "I've seen a 10-ton orca nail a large bluefin we had hooked," says sport fisherman Peter Wright.

Protecting bluefin from overfishing

Orcas may attack, but humans are by far the biggest threat to bluefin. People used to believe the sea could supply us with an endless amount of fish. We now know that fish, like bison or tigers, can be overhunted. The bluefin population off the Eastern US has fallen 90 percent since the 1970s because of overfishing.

Block's tagging studies are helping to protect bluefin. Scientists used to think that bluefin in the Western Atlantic (near Canada and the US) rarely mixed with bluefin in the Eastern Atlantic (near Europe). The tags show that the Atlantic is one big fishbowl to a bluefin tuna. Dr. Block's research shows that people on both sides of the ocean will have to work together to protect the bluefin from overfishing.

The Calcutta's bluefin is probably swimming northeast right now. The rich, cold waters off New England and Canada are the favorite spring and summer feeding grounds for adult bluefin. It will stuff itself with mackerel, herring, and squid. With luck, it will dodge the nets and hooks lying in wait. Then "superfish" will be off again. Trailing a small spy probe, it will slip under the blue horizon.

Pamela S. Turner

AHOY MATE: A hooked bluefin is brought on board for tagging. The fish can grow to 15 feet and 1,500 pounds, dive 3,000 feet down, and swim across the Atlantic in just three weeks.

A robotic tuna?

WANT TO BUILD a better submarine? Check out fish first. That's the idea behind RoboTuna. Engineers at the Massachusetts Institute of Technology in Cambridge build robotic bluefin tuna and test them in a special tank. Uncovering the fish's swimming secrets may lead to better submarines and underwater vehicles.

"One of the things we'd like to develop are flapping foils that mimic the way fish use their tails and fins to propel themselves," says Dr. Michael Triantafyllou of the RoboTuna project. "That would help submarines and underwater vehicles move and turn faster."

RoboTuna has several thousand metal parts and a computerized "nervous system." Instead of scales, it is covered with blue swimsuit fabric.

Why use the tuna? "We wanted something evolution had already perfected," says Dr. Triantafyllou. "Tuna are the champions of long-range swimmers."

P.S.T.

TODAY'S ARTICLE ON CHRISTIAN SCIENCE

For kids

It's a good time to pray

WHEN I WAS A LITTLE GIRL, our country was at war. I felt safe, but I remember being afraid that my dad might have to go and fight in that war. One day he had on new khaki pants like the soldiers wore, and I was even more afraid. As it turned out, he didn't have to go.

Maybe the idea of someone you love going to war is a scary thing to you, or maybe there are other things that scare you. It's a good time to pray. And you can include all of the kids (and grown-ups) all over the world in your prayers.

Psalm 91 in the Bible tells about how God helps us. It uses word pictures to show that we're always with God and always safe. When you read the psalm and think about it, it will be like a prayer.

The psalm begins: "He that dwelleth in the secret place of the most High shall abide under the shadow of the Almighty." A secret place. A place where we can go and be with God. That place isn't just in the East or the West, or in any one geographical spot. You get to it by thinking about God.

What is your favorite thing about God? That He is all-powerful? That He loves you? Think of things you love about God. This helps you feel close to Him. You'll feel as if His arms are around you, and you'll feel safe. That's being in your own secret place.

The psalm says you need to dwell there, to stay with God in your thoughts. Then you'll be under God's shadow. This reminds us of how close we are to Him. We're right there, covered by His mighty power.

Keep reading, and you'll find other pictures that help you know how God takes care of you.

God is like a fortress. Think of a thick, walled place that's totally protected. There isn't anything stronger than God.

God is like a huge bird, and we're under His soft feathers, protected by His mighty wings. Just like being wrapped up in a huge blanket and held in your mom's or dad's arms.

There are angels in the psalm too. They are messages from God that say, "You're with Me. I will always love you and take care of you, no matter where you are. Even if you think there is danger, I'll be with you." God's love doesn't change or run out. He's not so busy loving other kids that He forgets to love you. He has enough love for everyone, everywhere.

> You'll feel as if God's arms are around you, and you'll feel completely safe.

One of the verses warns us not to believe what our eyes and ears tell us. Pictures on TV can look pretty scary sometimes. So it's important to decide what to trust. Will you trust what you know about God? Or will you trust what your eyes and ears are telling you? Remember, if you trust God and keep thinking about Him, you'll stay in that secret place, where you are completely protected.

You can think about the psalm at bedtime and when you wake up. You can think about it during lunch, or when you're out playing. And in school, too. These are good times to pray. Even just a one-second thought can be a prayer. And it will make a difference.

Your prayers will help you and help kids all over the world. The woman who started this newspaper, Mary Baker Eddy, wrote that every good thought we think acts like armor for us, strong armor that shields us from evil. You put on that armor when you pray. It's a good time to pray.