ECOLOGY

Satellite Tracking Catches Sharks on the Move

With the speed of a tuna and the homing instinct of a salmon, the great white shark—once considered a homebody—is proving a transoceanic traveler. And not to be outdone, a less fearsome cousin called the salmon shark has now shown up in Hawaii, far away from its supposed home in Alaska.

Two studies in this week's issue document these unexpected sea trips. Two species "we have previously considered to be largely coastal in their movements have a much greater ecological link with the open ocean than previously thought," says Barry Bruce, a marine biologist at the Commonwealth Scientific and Industrial Research Organisation in Hobart, Australia. These findings complicate conservation efforts, he adds, as multiple countries must take part in protecting the species.

Over the past decade, satellite technologies have enabled marine biologists to follow the oceanic travels of animals tagged with transmitters. On page 100, a team led by Ramón Bonfil of the Wildlife Conservation Society in New York, New York, reports using such technologies and visual markings on fins to observe 32 great white sharks over 15 months. "These researchers have gone where others have feared to tread," says Barbara Block of Stanford University Hopkins Marine Station in Pacific Grove, California, referring to the danger and challenges of tagging these beasts.

An electronic device attached to the dorsal fin sent data about geographical coordinates whenever a tagged shark surfaced, enabling Bonfil and his colleagues to plot a shark's journey. Another device, fastened by a releasable pin, recorded depth and temperature. When the pin snapped as planned, the device surfaced and relayed these data "directly to the office," says Bonfil. In addition, the researchers equipped the sharks with acoustic transmitters and tracked the animals' finer scale movements using microphones scattered in certain South African bays.

Easy now. Researchers release a great white shark that now bears satellite tags much like those of this salmon shark (*inset*).

Bonfil's work extends earlier studies by Block's group, which found that great white sharks around the California coast periodically headed more out to sea. Bonfil's data showed just how far this species could travel. One female sped across the Indian Ocean and back at 4.7 kilometers per hour, covering 20,000 kilometers in less than 9 months. Other tagged great whites, thought to be looking for prey, regularly took 2000-kilometer trips up and down South Africa and into the waters off Mozambique.

In a separate study, reported on page 104, Kevin Weng, working with Block and others, used remote-sensing satellites to track 48 tagged salmon sharks based in Prince William Sound, Alaska. The salmon sharks also migrated long distances. After wintering off Alaska, some headed south, ▶

CONSERVATION POLICY

House Revises Endangered Species Act

Legislation that would remove a controversial provision of the U.S. Endangered Species Act (ESA) was passed last week by the House of Representatives. The bill, introduced by a longtime opponent, was pushed through at a whirlwind pace despite pleas by moderates for more time. Critics are now looking to the Senate to correct provisions that they say will weaken protection of species.

Representative Richard Pombo (R–CA) and other critics argue that the 1973 act, last amended in 1988, hurts landowners while not adequately helping endangered species. They say only 1% of 1268 species listed have ever been removed after recovering. But supporters say that the act's main achievement has been to prevent extinctions. As chair of the House Resources Committee, Pombo moved his bill through committee in just 4 days—a pace that some legislators and officials at the Fish and Wildlife Service (FWS) say precluded adequate analysis. On 29 September, the House approved it by a vote of 229 to 193.

The bill (H.R. 3824) would eliminate so-called critical habitat provisions, land or water that FWS designates as necessary for a species to recover. The designation brings several legal protections into place, but it also generates many lawsuits (*Science*, 30 September, p. 2150). FWS maintains that it's not necessary because those legal protections are redundant, but many environmentalists say that in practice critical habitat bolsters conservation efforts.

Pombo's bill would also require FWS to quickly evaluate any proposed projects that might harm an endangered species. If the agency doesn't finish within 180 days, the proposal would get an automatic green light. Environmentalists worry that FWS's long backlog will result in many harmful projects going forward. Finally, if FWS determines that land shouldn't be altered, then the agency must compensate landowners. The Congressional Budget Office estimated that amount at $10 million per year initially, but critics say it's likely to be much higher and could wind up bankrupting FWS's $143-million-a-year endangered species program.

Representative Sherwood Boehlert (R–NY), chair of the House Science Committee, and several others proposed a floor amendment that would avoid these concerns by neither giving automatic approval to projects nor compensating landowners. The amendment would have abolished the critical habitat provisions and replaced them with a similar and enforceable type of habitat designation. Although he lost by a vote of 206 to 216, Boehlert said the slim margin of defeat "showed the Senate that the House would be willing to pursue moderate reforms of the Endangered Species Act."

The Senate is unlikely to work on a companion bill until next spring. The subcommittee responsible for ESA is chaired by Senator Lincoln Chafee (R–RI), a moderate who has expressed reservations about making significant changes to the act. —ERIK STOKSTAD

CREDITS: RAMÓN BONFIL; (INSET) BARBARA BLOCK

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sometimes going as far as Hawaii or Baja California before returning to Alaska. One covered 18,220 kilometers in just 640 days, Block's group reports. As with the great whites, the salmon sharks took multiple trips but always seemed to return to familiar territory. "[Both] sharks use entire ocean basins as home ranges and show remarkable fidelity to areas," she says. "These two papers represent great leaps in our understanding of how top predators utilize the world's oceans," says Andrew Martin, an evolutionary biologist at the University of Colorado, Boulder.

Block's group also discovered that two cardiac proteins may enable the salmon shark to withstand water temperatures cold enough to stop a polar bear's heart. She and her colleagues now report that salmon sharks have excess SERCA2 and Ryanodine receptors—proteins key to keeping the heart beating—just as hibernating animals do. In the heart's muscle cells, these proteins help control the flow of calcium and consequently the rate of contraction. This result "advances Block's developing story about how physiological adaptations allow niche expansion," says Martin.

The unexpectedly large ranges for both sharks revealed by the new studies have a downside: The more spread out a species is, the harder it is to protect. Great whites are particularly vulnerable. For example, great whites protected by South Africa are fair game for Mozambique fishers. "They are so much more exposed to being caught because they cover a much wider area," says Andre Boustany of the Hopkins Marine Station. Thus, "conservation management of this species and other highly migratory species must occur on an international level." —ELIZABETH PENNISI

FRANCE

Reform Law Fails to Impress Researchers

PARIS—French scientists will be more competitive, young scientists will be paid better, and the public and private sectors will work together more closely, say government officials, thanks to a long-awaited draft science reform law unveiled last week. But research leaders who have protested against current policies say the reforms don't go far enough, urging the government to do more to create jobs and improve prospects for young scientists. "The system is becoming more complex and more opaque," says chemist Jacques Fossey, head of the main research union SNCS.

In the reform bill, due to be published on 5 October, the government earmarks an extra $23 billion in public funds for research between 2004 and 2010. It will award young researchers in public labs an 8% pay hike in both 2006 and 2007, allow university lecturers to spend fewer hours teaching, and provide incentives for companies to hire more postdocs. The government will also create a 24-member agency to evaluate labs, research teams, and individuals so as to improve the distribution of funds. Universities and government research agencies would be offered subsidies to join forces on projects from neuroscience to nanotechnology.

The draft law, which is expected to be adopted by Parliament in February, is "symbolic" of the government's research reforms, says junior research minister François Goulard, because it has already set up the grant-giving National Research Agency this year (*Science*, 26 August, p. 1316) and will soon form a blue-ribbon council to advise the French president on research priorities. But Fossey says that the government must go further. France needs 9000 new public scientific posts and a $6-billion-a-year jump in spending to reach the European Union goal of 3% of gross domestic product spent on research by 2010.

No guarantees. French research minister François Goulard.

CREDIT: BEHROUZ MEHRI/AFP/GETTY IMAGES

Goulard won't make any guarantees, saying only that this figure is "accessible" and that "the weak link is the private sector." Even the government's commitment is short-term, however, given that national budgets are drawn up annually and presidential and parliamentary elections are due in 2007. Cochin Institute biologist Alain Trautmann, a leader of the protest movement, wishes it were otherwise. "Governments can and should make long-term moral commitments beyond the next elections," he says.

—BARBARA CASASSUS

Barbara Casassus is a writer in Paris.

ScienceScope

Baltimore Bids Adieu

Biologist David Baltimore will step down as president of the California Institute of Technology (Caltech) in Pasadena in June 2006 after 9 years on the job. The 67-year-old Nobelist plans to return to research and teaching as a faculty member.

"I analyzed a lot of things about myself and my position in the world and my age and where my satisfactions were, and I decided that, on a personal basis, this was a time to think about it," he said, announcing his decision last week. "And as I thought about Caltech, I recognized that we had a lot of things in place and had done a lot of things and it wasn't a bad time to have a transition."

Caltech has already raised $1.1 billion in a $1.4 billion capital campaign that it launched in 2002, and Baltimore was instrumental in creating the Broad Center for the Biological Sciences. He will go down in history "as one of the great presidents of Caltech," says Eli Broad, a trustee of the institute and namesake of the center.

—YUDHIJIT BHATTACHARJEE

Googling NASA

After years of casting about for a major industrial partner, NASA's vast Ames Research Center will take advantage of its Silicon Valley location and partner with Google.

The famous search-engine company will develop up to 93,000 square meters on an Ames research park for its research and development efforts. Ames Director G. Scott Hubbard predicts that Google's presence will provide advances in "new sensors and materials from collaborations on bio-info-nano convergence, improved analysis of engineering problems," as well as in supercomputing and data mining.

—ANDREW LAWLER

Annan Names U.N. "Flu Czar"

British public health expert David Nabarro has been picked to become the United Nations' point man for influenza. The 28 September appointment by U.N. Secretary-General Kofi Annan gives Nabarro, who has held various positions within the World Health Organization (WHO), a coordinating role in efforts against avian and human influenza across U.N. branches. WHO will remain the lead agency on flu.

Nabarro immediately made world headlines when he told reporters that a flu pandemic might claim as many as 150 million lives. The next day, a WHO spokesperson said that a more reasonable projection would range from 2 million to 7.1 million deaths. —MARTIN ENSERINK

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