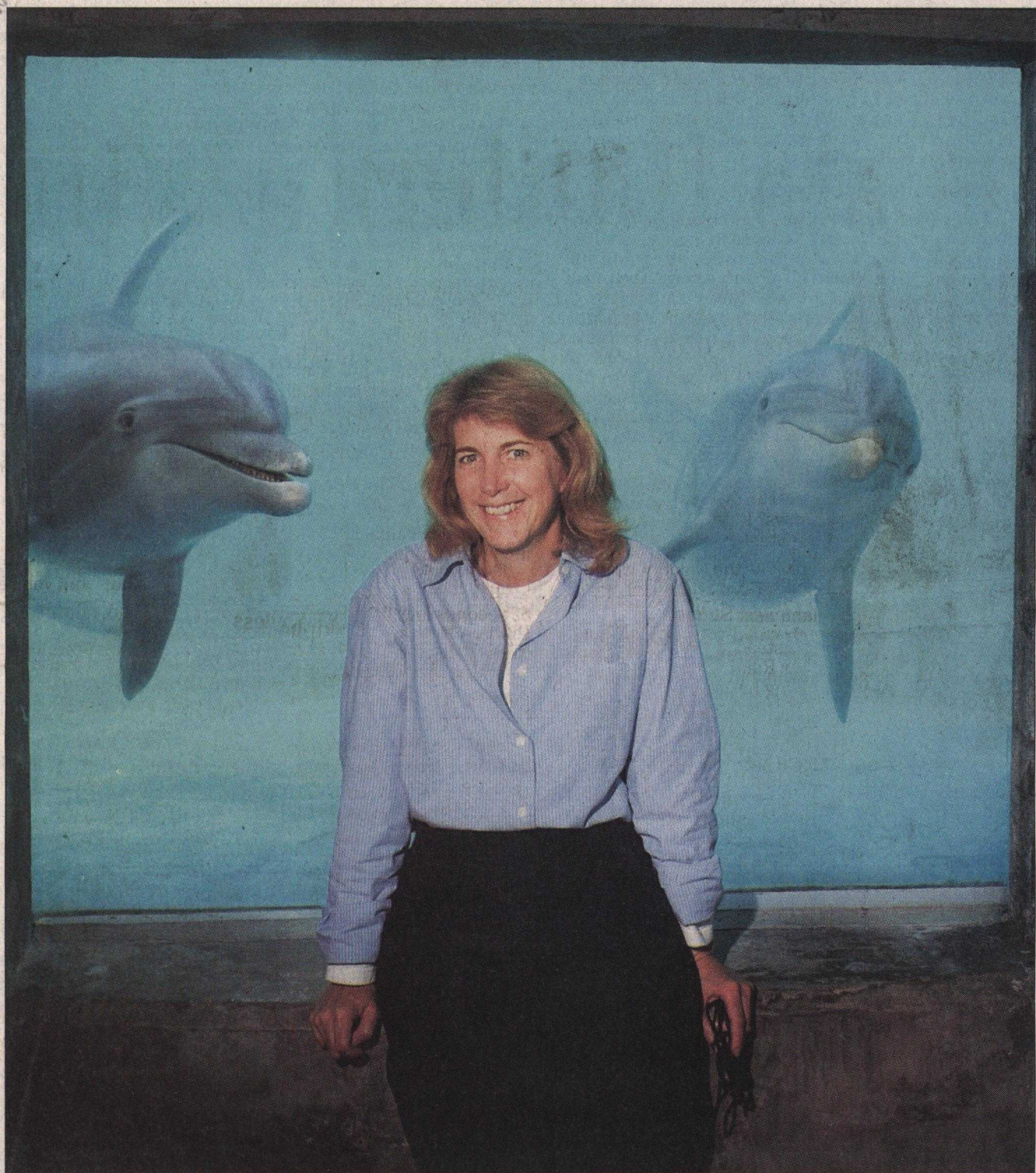


Bio Williams  
Santa Cruz scientist heads to Antarctica — again —  
in quest to learn just what mammals need to survive



PATRICK TEHAN — MERCURY NEWS ARCHIVES

**RESEARCH IN SANTA CRUZ:** Terrie Williams, an exercise physiologist who researches large marine mammals at University of California-Santa Cruz, enjoys the company of dolphins Primo, left, and Puka at Long Marine Lab in Santa Cruz.

## WOMAN STUDIES SEALS IN CHILLY TRIP SOUTH

✓ Bio-W  
By David L. Beck  
*Mercury News*

Ah, summer in Antarctica! Twenty-four-hour solar radiation. Temperatures down to 94 below. Seals pupping, penguins sliding, outhouses flooding. What's not to like?

Not much, if you're Terrie Williams, a cheerful, energetic exercise physiologist based at the University of California-Santa Cruz, who's just completed her fifth 10-week stay on the ice studying how huge Weddell seals hunt, dive, breathe and, well, "make a living" down there.

"If somebody told you you were going to get really cold and you're going to be on these horrible, cramped flights and the food was going to be really cruddy ... but, you were going to see things that nobody else has ever seen — would you do it?" she asks.

Her answer is a resounding yes. Williams first went way down under in 1997, and on that very first trip, she took to it "like a penguin to ice," recalls her post-doctoral adviser, Antarctic veteran Jerry Kooyman of the University of California-San Diego.

In the Antarctic, she and her colleagues (seven of them on the 2001 expedition, all men) were attaching infrared cameras and a complex package of biometric

measuring devices to the seals. The seals dive hundreds of meters beneath the ice in search of food, and the team wanted to know how they do it.

"What do mammals need to survive? That's all it is," said Williams, who also has worked with sea otters in Alaska and dolphins in Hawaii, and continues to work with otters as part of UCSC's Department of Ecology and Evolutionary Biology, studying their feeding

needs and habits.

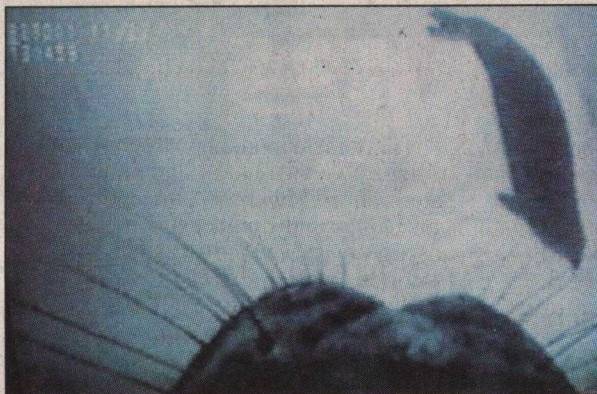
Her husband, marine ecologist Jim Estes, technically an employee of the U.S. Geological Survey, also works at UCSC's Long Marine Lab, studying otters and coastal systems.

Why Santa Cruz? Williams says it's one of the few schools that really appreciate *organisms* — that believes *animals* are worth studying, rather than their molecular structure.

"There are so few studies on big mammals," Williams said. "These are the

top predators ... and yet we don't even know how much an animal needs to take out of the environment."

Part of the need-to-know here is practical: What is the effect on the top of the food chain if, say, the fishing industry begins depleting the middle of it by, say, fishing for cod in Antarctic waters?



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**SEAL STUDY:** A Weddell seal wearing a camera pack swims underneath a glacier in Antarctica. The camera helps researchers learn about the seal's activities.

See **ANTARCTICA**, Page 8B



# ANTARCTICA | Study sends scientist south

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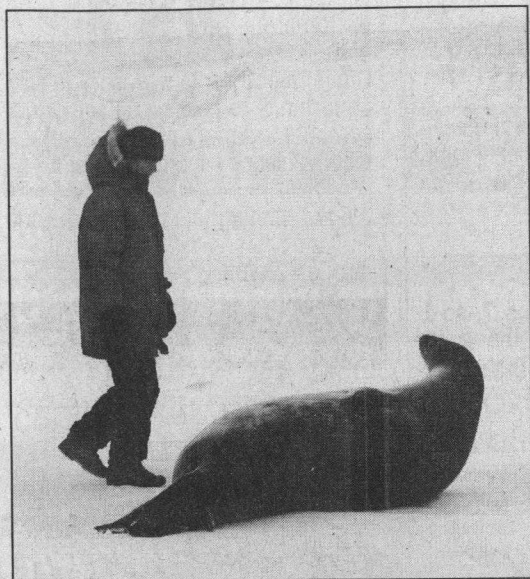
Williams starts at the top of the chain, with killer whales. "Individual killer whales eat a lot," she said. "And what they used to eat was big whales." With whales growing scarce, killer whales now eat sea otters and Stellar sea lions. If humans take the food the otters and sea lions eat, what happens to those species — and to the killer whales that feed upon them? "So many unanswered questions," she said. "But the basic problem is, we just know so little about the basic needs of these animals."

Which takes us to the seal camp on the Ross Sea's ice covering in the fall — Antarctic spring — where Williams and her colleagues were trying to learn how Weddell seals "make a living in what seems to be a really hard environment."

The short answer, detailed and illustrated on Williams' field-notes Web site at [www.biology.ucsc.edu/people/williams/antarctic](http://www.biology.ucsc.edu/people/williams/antarctic), is:

- 1) They dive very, very deep, at least 400 meters, in search of fish.
- 2) In order to do so, they allow their lungs to flatten and they do an energy-saving glide on the way down.
- 3) It isn't clear how the seals spot their prey in the dark, but the best guess still seems to be that they look up and see the fish silhouetted against the ice. At least in summer.
- 4) When they get back up, they need air fast — these are mammals, remember — and they'll bite and fight another seal to get to an air hole.
- 5) At the air hole, they can fill up again in just a few massive breaths.
- 6) They "haul out" onto the ice as often as they can, warming and perhaps healing in the sun.

You would think that these massive predators — an adult seal is equal in weight to four or five scientists, Williams said — would be a little prickly about being wired up, but they're not. "Weddell seals have no land predators," said Randall Davis, an Antarctic



Terrie Williams, a researcher for UC-Santa Cruz, approaches an adult Weddell seal in Antarctica, where she and her colleagues researched the giant mammals as part of a study on how mammals survive.

D. CALKINS — NATIONAL MARINE FISHERIES

veteran based at the University of Texas at Galveston. "They have no natural fear of humans. They just have a very, very mild temperament." Also they're just a little bit sedated, he said.

The scientists glue pieces of Neoprene rubber to the seals' hair using wet-suit glue. The finely calibrated package of instruments is attached to the rubber. The glue comes off easily when the seal returns — generally, but not always, to the ice hole through which it departed. This year's camp was built over one such ice hole, drilled for that purpose, which worked fine until the summer sun began to soften the ice and the seals began to pop up here and there.

They brought back all sorts of readings on their breathing, heart rate and other metabolic conditions. And their cameras took some astonishing photos far beneath the ice.

As for the humans, they fared well, too, despite a series of Herbies, or windstorms, that pinned them inside for days at a time and piled up snow by the yard.

This year they combined the laboratory, kitchen and men's quarters into a single long Jamesway hut, a Quonset-shaped device made of insulated canvas over curbed ribbing. It's a Korean War-vintage product, and it works beautifully, Williams said.

This was her first trip as the

ries, mess hall and services are. It's where you go to get a haircut, for example.

And it used to be where you had to go for a shower every week or so. This year the team, farther out of town than in the past, installed one of its own, a camp-style "sun shower" in a hut with a hole in the ice for a drain.

Another huge improvement in life on the ice has been — no surprise, really — e-mail, which dramatically lessens the sense of isolation.

As for other needs: Former Antarctic researcher Suzanne Kohin, now at UCSD, recalls pulling on her coat and boots

over her long johns for the 20-yard dash to the outhouse and its blue foam seat.

This year, "We ... experimented with an indoor outhouse," said Davis. "It didn't work out so well" — something about the ventilation pipe warming the ice hole — "but we know how to correct it for next year."

Kohin recalls a male-female ration of about five to one at McMurdo. But when it comes to the work, researchers say gender barely or rarely is a factor.

"Because physiology and field work is sort of male-dominated anyway, you get sort of

used to it," Williams said. "For the most part, you don't even think of it."

In the Antarctic, she said, where survival is tied to mutual dependence, "you recognize what everyone's good at ... and it's better not to try and be an Amazon and show off and get hurt, potentially."

"On the personal level, most of us are colleagues, and I don't think it ever entered into anything except one too many jokes about Snow White and the seven dwarfs."

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