In the spotlight. Piet Hut is fighting to keep his job at the Institute for Advanced Study.

precocious age of 32. This summer the institute asked a court to enforce a 1996 agreement in which Hut promised to leave by 2001. This month Hut countersued, saying that he was coerced into signing the document and that the institute is trampling on his academic freedom. The matter was first reported by *The New York Times*.

A number of scientists have come to Hut's defense; many feel that the institute is making a big mistake. "It's not Piet Hut's fault," says University of California, Berkeley, astronomer Frank Shu, who adds that "the institute made a gamble" when it appointed someone so young. "Now they have to either live with it or find some compromise." Alar Toomre, an applied mathematician at the Massachusetts Institute of Technology, says that IAS, by going to court, "is damaging its own reputation more than anything Piet Hut might have done."

The institute's director, Phillip Griffiths, issued a statement saying that the conflict is a contractual one and "not an issue regarding tenure or academic freedom." In its suit, filed on 25 July before the federal district court of New Jersey, IAS argues that Hut hasn't fulfilled his early promise and should abide by the 1996 agreement. Institute officials declined to comment further on the case.

IAS tapped Hut in 1985 as an up-and-coming assistant professor at Berkeley with a solid publication record in stellar dynamics. In 1986 he and an IAS postdoc, Joshua Barnes, published the famous Barnes-Hut "tree algorithm" that is widely used in computer simulations. By 1989, however, according to the institute's complaint, then-director Marvin Goldberger felt that Hut ought to "look for another position," and Hut agreed that "he was not performing ... and ... would never perform at the level ... achieved by other faculty members."

In 1993, a visiting committee called Hut's appointment a "mistake," according to the court document, and in 1995 the faculty of the School of Natural Sciences agreed at a meeting—attended by Hut—that "Hut's presence was having a detrimental effect" on the IAS. In 1996, the institute froze Hut's salary and got him to sign a letter agreeing to leave in 2001. In 1999, he signed a formal contract, but withdrew his consent during the 1-week period allowed by the contract.

Hut dismisses the negative job assessments, saying that there has been no formal evaluation of his work and that the visiting committee had little regard for his field of computational physics. He says the problem started with a 1993 dispute with string theorist Ed Witten over Hut's desire to buy an expensive supercomputer. Witten has declined to comment. Hut also says that the institute threatened to cut his salary and marginalize him if he didn't sign the 1996 letter. He says he went along initially because he saw no alternative.

Hut has no shortage of supporters. Computer scientist Joseph Traub of Columbia University and the Santa Fe Institute calls him "one of the most stimulating, creative, intelligent, serious scientists" he has known. More than a score of other scientists, including Princeton astrophysicists Edwin Turner and Bohdan Paczyński, have publicly defended Hut's scientific credentials and accused the IAS of violating his academic freedom. Hut also has many admirers among those working in the interface of science and religion, a subject that has attracted his interest in recent years.

As for his earlier work, Shu explains that stellar dynamics and computational modeling was a hot area in 1985 but that, "for whatever reasons, the subject suffered a decline" as cosmology and theoretical physics moved to the fore. Some of Hut's contributions, such as building a special-purpose chip for rapid calculations, are more valued in engineering than in physics, he adds.

Whether or not Hut belongs at IAS, many scientists think that the institute has committed a major blunder in going to court. "They're giving themselves and, to some extent, science a black eye," says Shu. "It's bad for everybody."

–CONSTANCE HOLDEN

CREDITS: (LEFT TO RIGHT) MITSU HADEISHI; AMY VEDDER AND A. WILLIAM WEBER

ECOLOGY

Pacific Salmon Run Hot and Cold

Overfishing. Dams. Disease. There's plenty to blame for the ups and downs of Pacific salmon—and humans are often the guilty party. But a new study spotlights another, more natural force driving salmon numbers: climate.

Using a novel technique, described on page 795, paleoceanographer Bruce Finney of the University of Alaska, Fairbanks, and his colleagues have been able to chart the

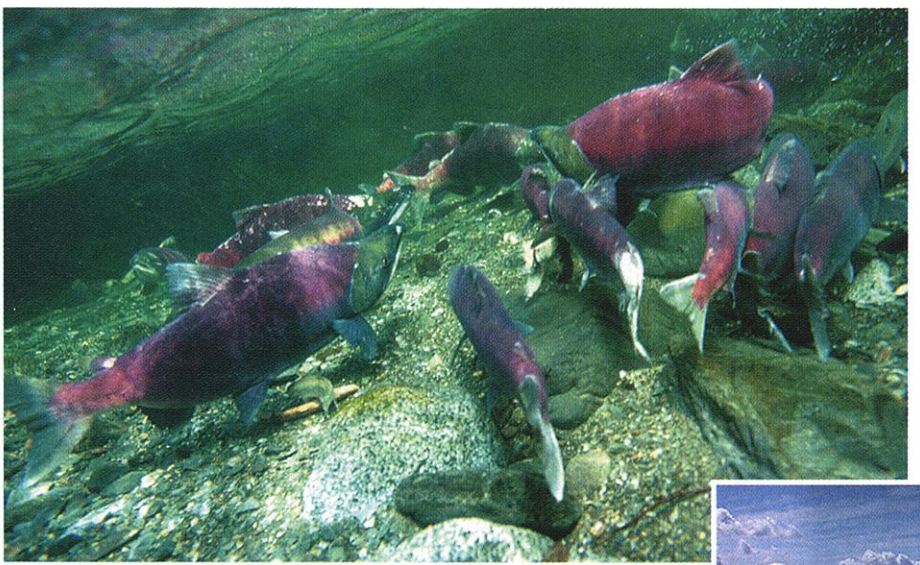
ScienceScope

Matchmaking A trio of leading Canadian science groups want to create a new "National Academies of Canada" that will provide expert advice to the government. Earlier this month, the heads of The Royal Society of Canada, the Canadian Academy of Engineering, and the Canadian Academy of Medicine (being established by the Canadian Institute of Academic Medicine) asked the government to spend $2 million a year to found the new body. That's less than other nations spend to obtain similar advice, says Royal Society president William Leiss.

But few politicians besides science czar Gilbert Normand have endorsed the idea. The lack of enthusiasm may stem from a consultant's 1994 conclusion that the Royal Society had failed a government-sponsored, $5 million, 5-year test to see if it could reposition itself as some form of national academy. Still, if the proposal matures, the new academy could fit snugly into the Interacademy Council, an international body being established "to do studies for the U.N., World Bank, and similar clients," says U.S. National Academy of Sciences president Bruce Alberts.

Great Apes Cash In Conservationists are jubilant over a new federal effort to protect great apes. After hearing how logging and illegal hunting are pushing several species to the brink of extinction, the Senate last week unanimously passed the Great Ape Conservation Act. The measure, already approved by the House and a sure bet for President Clinton to sign, authorizes the government to spend up to $5 million a year over the next 5 years to protect wild chimpanzees, gorillas (above), orangutans, gibbons, and bonobos.

Ape programs might not get any cash this year, however, as Congress has already finished work on the 2001 spending bill that covers the U.S. Fish and Wildlife Service, which will administer the fund, says Christine Wolf of the Fund for Animals in Silver Spring, Maryland. And although the bill allows the government to spend up to $5 million per year on apes, supporters will have to lobby hard to convince Congress to appropriate the full amount. Similar funds for elephant, rhino, and tiger protection routinely get no more than $1 million a year. But chimpanzee expert William McGrew of Miami University in Oxford, Ohio, isn't disappointed. Even $1 million, he says, could make a big difference to ape conservation in key African and Southeast Asian countries.



The long way home. Sockeye salmon spend up to 3 years swimming the Pacific Ocean *(above)* before migrating back home to freshwater systems like Lake Karluk *(right)* in Alaska.

abundance of sockeye salmon in the Bristol Bay and Kodiak Island regions of Alaska over the past 300 years—by far the most complete record yet. Through time, they found, sockeye populations have alternately soared and slipped, following natural climate variations—well before commercial fishers began throwing nets over the sides of boats.

"This paper is terribly important, because it's the first solid proof that salmon abundance fluctuates naturally," says ecologist Richard Beamish of Canada's Department of Fisheries and Oceans. Although many researchers have assumed that climate variability affects Pacific salmon, precise data have been scarce. "Now, we have sound scientific evidence that climate is a natural part of salmon dynamics," Beamish says. And that could change the way salmon stock managers set harvest limits or evaluate fish population swings, he adds—particularly in the beleaguered Pacific Northwest, where many sockeye stocks have already gone extinct or live at record lows (*Science*, 4 August, p. 716). The new study also highlights an early factor vital to the survival of salmon before they set out for sea: the nutrient-rich carcasses of adult fish that have migrated back home to nursery lakes.

Finney and colleagues studied sockeye salmon near pristine Kodiak Island and Bristol Bay on Alaska's southern coast. There, millions of sockeyes hatch and live in lakes for up to 3 years before migrating, during spring, to the Pacific. After swimming a well-worn sea route for 2 or 3 years, the salmon return home, spawn, and die.

While at sea, sockeyes feast on plankton, squid, and small fish, packing on 99% of their adult body weight. And it's this sea buffet that makes the salmon easy to track decades later. Consuming vast amounts of seafood, the fish take on a high ratio of nitrogen-15, a stable nitrogen isotope, before returning home. Few other fish or atmospheric factors add large amounts of nitrogen-15 to freshwater lakes, so the isotope—which eventually settles, year after year, in the layers of the soupy lake floor—is a tracer for past salmon populations. "We can recreate history from records left behind in the sediment," Finney says.

Finney's team decided to reconstruct history in five Alaskan salmon nursery lakes: Karluk, Red, and Akalura lakes on Kodiak Island, and Becharof and Ugashik lakes in nearby Bristol Bay. They included two additional lakes as controls. From float planes or boats, the researchers sunk an 18-kilogram core—basically, a barrel with weights—into the bottom of each lake and retrieved a sediment sample. Every half-centimeter of the green-brown goop corresponded to about 5 years of lake history, according to time markers such as volcanic ash in the sediment.

The scientists measured nitrogen-15 in each section of lake sediment, estimating changes in the number of salmon that returned to the lake over 3 centuries. Then, they compared those salmon population trends with fishing data from commercial catch records and with past climate descriptions, based on previously published tree-ring data.

The emerging pattern was clear: Alaskan sockeye numbers tended to drop when ocean temperatures fell and jump when waters warmed. In the early 1800s, for instance, the sea surface temperature was about 1°C below average, and an estimated 500,000 salmon returned to Karluk Lake every year. By the 1920s, however, the sea surface had warmed by 1.5 degrees—and the number of returning salmon had more than quadrupled to an estimated 2.5 million fish. "We can see this distinct variability happening on the order of 50 to 100 years, with climate change driving salmon populations up and down in a coherent way over fairly large regions," Finney says. By contrast, control lakes, without salmon, showed consistently small amounts of nitrogen-15.

The sediments also recorded the collapse of Alaskan salmon with the onset of fishing in the 1880s. And it wasn't just the number of netted fish that led to the sockeye's decline. It was also, Finney says, the drop in nursery lake nutrients when fewer mature salmon returned to spawn and die. Normally, salmon carcasses litter the lake floor, releasing nitrogen and other essential nutrients consumed by plankton and, in turn, young salmon. Along with nitrogen-15, Finney's team counted plankton fossils trapped in lake sediments. In years when many salmon returned to the lake, eutrophic algae and zooplankton thrived.

Today, Alaskan salmon enjoy a favorable climate. More careful management—and a warming trend—boosted the sockeye to record highs in the 1990s. But farther south, those warmer waters spell trouble. While salmon in the Gulf of Alaska have prospered in nutrient-rich, warm waves, salmon numbers in the Pacific Northwest have dropped. There, researchers suspect, warming waters tend to stratify differently than in the north, trapping nutrients too far below the plankton and migrating salmon in the upper ocean. The warmer coastal ocean has packed an added wallop for Pacific Northwest salmon, already stressed by overfishing and habitat loss, says Nathan Mantua, a climate scientist at the University of Washington, Seattle.

The new study, Mantua says, underscores the challenges facing the flashy red sockeye both at sea, in a fickle climate, and at home, where vital lake nutrients vary. "The lesson is that we really can't ignore what happens at any stage of the salmon's life cycle," Mantua says. Salmon management, he adds, may grow even more important in the future. Waters in the Pacific Northwest appear to be cooling, but the specter of global warming looms. As Finney puts it: "We've still got a lot to learn."

–KATHRYN BROWN

Kathryn Brown is a writer in Alexandria, Virginia.

CREDITS: (LEFT TO RIGHT) ALASKA DEPARTMENT OF FISH AND GAME; IRENE GREGORY-EAVES/QUEEN'S UNIVERSITY, KINGSTON, ONTARIO