The Squeeze on Endangered Species

Although Capitol Hill has seethed in the past month with heated debate over the fate of the Endangered Species Act, Erik Eckholm, a senior researcher at the Worldwatch Institute, called the whole show a "tempest in a teapot" compared to the ongoing worldwide extinction of endangered species. In the latest of the Worldwatch papers, *Disappearing Species: The Social Challenge*, Eckholm says that at least one species is disappearing each day in tropical forests alone — and that in a few years there may well be a species lost each hour.

Booming populations and export demands on tropical products lead to the clearing of unique rain forest ecosystems, Eckholm says. Even in the United States, once-abundant plants are threatened by intensive collecting. More than one-half million rattlesnake orchids have been collected in Tennessee for sale in terrariums. In one Texas town, sheds are filled with as many as 30,000 field-collected small globular cacti awaiting sale.

Although nearly half the drugs used in medicine today are based on substances first discovered in nature, and although less than 10 percent of the world's plants have been screened for medically useful compounds, human activity is being allowed to destroy entire species of plants by the hundreds every year, according to Eckholm. Also, as the pressure grows to develop new sources of food, plant breeders turn increasingly to wild plants to find genetic traits that can be bred into the 20 crop species upon which most of the world's people depend. Some plant breeders warn that the potential for improvement in that small number of crop species may be reaching its limit. It may be time, they say, to go back into the wild and find new plant species that can be domesticated for food.

"The overriding conservation need of the next few decades is the protection of as many varied habitats as possible," says Eckholm. Conservation, however, cannot be isolated from broader economic issues. Besieged by restless legions of the jobless and the landless, Third World governments will transform many pristine areas into agricultural settlements. Eckholm therefore calls for a massive expansion of the Biosphere Reserve system being coordinated by UNESCO. To date, 144 Biosphere Reserves in 35 countries have been established, but tropical ecosystems in particular are badly underrepresented. Unless precautions are taken, "the fabric of life will not just suffer a minor rip," says Eckholm. "Sections of it will be torn to shreds."

On Capitol Hill, meanwhile, the Endangered Species Act was under siege. Although one of its sponsors expressed a reluctance "to tinker with the universe," an amendment to the Endangered Species Act was passed by the Senate last week, which for the first time would allow human beings to deliberately decree the death of a species. Similar legislation is pending before the House. Far from being a proponent of "progress at any price" who would build dams and squash creatures, Senator John C. Culver (D-Iowa), the leading backer of the bill, considered his measure a way to avoid the total crippling of the Endangered Species Act.

As now written, the act gives threatened forms of life (except insects) absolute priority over any public works project. If the species would die, the construction cannot proceed. Upholding this principle, the Supreme Court last month ruled that the $120 million Tellico Dam on the verge of completion in Tennessee must be stopped in order to save an endangered species of perch, the three-inch snail darter (SN: 6/24/78, p. 403). Almost immediately moves got underway in the House and Senate to gut the act.

At one point during the Senate debates, ushers ejected a spectator who shouted at Sen. William Scott (R-Va.) as he spoke in support of an amendment that would have covered only species identified as beneficial to humanity. The unidentified spectator blurted out that such a determination would be impossible to make. Another amendment, introduced by Sen. John Stennis (D-Miss.), would have exempted dozens of federal public works projects. Stennis, in an impassioned call for support, argued that the unmodified act would cost jobs, stop public works projects, and "deter progress."

Heated bickering apparently did not shake up the Senate. In the end it passed a three-year extension of the Endangered Species Act and adopted the "moderate" Culver amendment. It calls for the creation of a seven-member Cabinet-level committee empowered to arbitrate conflicts between endangered species and federal public works projects and, in cases of unbreakable impasses, to exempt projects from the law. It could thus allow certain species to die off. Congressional and Interior Department officials said they doubted that the Tellico Dam would qualify for an exemption under it.

Some environmentalists were resigned to the new legislation. Others said they would fight for a stronger bill in the House, where floor action on extension of the Endangered Species Act is expected within the next month or so. Calling the Culver amendment "overly broad," Michael Bean of the Environmental Defense Fund said the committee's exemption power could end up politicizing the fate of a particular species and "destroy the consultation process that has worked so well." Under the present act, government officials and environmentalists have hammered out species-saving compromises that still permit the completion of scores of dams and other public works projects. □

Skylab: Is that a dirge I hear?

The outlook for keeping the Skylab orbiting workshop from "falling" out of orbit has gone from iffy to bleak. As though malfunctioning components and escalating predictions of atmospheric drag (SN: 7/22/78, p. 52) were not enough, a major problem during an attempt to re-stabilize the craft last week has caused highly placed space agency officials to all but give up hope that Skylab can be saved by sending space-shuttle astronauts to fire it into a higher orbit. "Unfortunately," says Christopher Kraft, director of the NASA Johnson Space Center in Houston, "I think that Skylab is going to die."

The difficulty this time was not with the breaking down of pieces of equipment stressed far beyond their originally planned lifetime. Instead, it grew from the complexity of the instructions needed by Skylab's on-board computer to let it hold the workshop in a desired orientation in space. Controllers at JSC have only limited telemetry to work with, and the craft's attitude-control system is so complex that it is difficult to identify early signs of impending trouble. In addition, limited coverage by tracking stations on the ground (a fourth station is being added) means that problems can sometimes occur with no way to know until it is too late.

All of these factors combined on the night of July 19 to produce what may be the largest single blow so far to the planned life-saving effort. It happened when Skylab's movements caused two of its three gyroscopic stabilizers to reach their limits of position in their respective axes (a condition known as "saturation"). The on-board computer followed its pre-programmed instructions, ordering the guidance system to ease the saturation by rolling the workshop on its remaining axis. Another part of the program caused the guidance system to try to compensate for the rolling by firing its attitude-control jets. This cost Skylab 1,800 pound-seconds of its total available thrust, leaving only a thin margin above what project officials are calling "the redline."

The redline is the minimum amount of thrust expected to be needed by Skylab

when the astronauts go up to save it. Riding close to Skylab in the space shuttle, the astronauts would use a remote-control system to send over a specially designed rocket engine, which in turn would dock with the workshop and be ignited to carry the huge facility up to a higher, longer-lived orbit. The remote-control rocket would do most of the maneuvering in such an operation, but Skylab would need some thrust to at least hold itself steady or make small corrections. Below the redline, engineers calculate, the exercise may be doomed from the start.

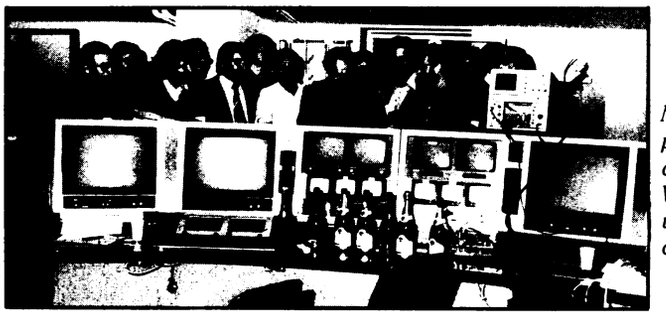
That particular problem, however, may never even have a chance to make a difference. A maneuver conducted on July 25 was successful at getting the workshop re-stabilized in a position calculated for minimum atmospheric drag — using 270 additional pound-seconds of precious thrust — but Kraft and other NASA officials think that Skylab is likely to reenter the atmosphere before the rescuers can get to it. Says Kraft, "We are going to have to live with the fact that Skylab is going to die a natural death."

It does not help any that the space shuttle continues to experience delays in its own test program, particularly with its large main engines. One of the most recent developed on July 18, when a single engine was being fired at full thrust on a test stand at the National Space Technology Laboratories in Bay St. Louis, Miss. Less than 42 seconds into a planned 300-second firing, a fire developed in the engine's liquid-oxygen turbopumps. There was "only minor damage" to the rest of the engine and to the test stand, says a NASA official, but it is one more worry in what is already the "pacing item" of the shuttle's delays.

With the odds so stacked against success — Kraft has estimated as high as 50 to 1 — the question has inevitably arisen of whether NASA might simply stop trying. In a recent television appearance, NASA administrator Robert Frosch said, "I think we should do what we can to prevent [the reentry] up until we arrive at some point where it is clear that we can't go on farther. If we are unable to hold Skylab in a low-drag condition — if we lose control of it — I think that might be a situation in which we stop."

Several NASA officials have said privately that they believe the chance of a piece of the reentering Skylab striking a person to be extremely — some say insignificantly — small. Small, but not zero. Some of the same officials, however, say that the odds of pieces reaching the ground (not necessarily hitting anyone) are extremely high. The workshop's outer skin will probably burn up, but there are, for example, the three gyro wheels, each weighing more than 100 kilograms of solid metal. A furnace used in materials-processing experiments has three-inch-thick titanium walls, and there are spherical gas bottles and other tough components that may not burn during reentry. □

PETRA storing beams six months early



PETRA

Members of PETRA-*project group gather around leader G.-A. Voss. Champagne waits on control console.*

The first colliding beam facility for particle physics that was of a size worth thinking about was called Ada and was built at Frascati, a city previously famous for its wines. Its latest lineal descendant, PETRA, the most energetic electron-positron colliding-beam facility in the world, recently went into operation at the Deutsches Elektronen-Synchrotron (DESY) laboratory near Hamburg, a city previously famous for amusements other than wine.

The notion that accelerating two beams of particles and colliding them head on will deliver much more energy for the production of new particles and other effects than the other experimental technique, striking one accelerated beam against a fixed target, can be derived from very elementary physics. Making it work was difficult because the beams must be dense with particles, sharply focused and precisely aimed. To build up these qualities the beams must be held for a while in storage rings, which is the other usual name of this kind of facility.

Once the principle worked it was a smash. Most of the interesting physics reported in the last few years has been done at colliding-beam facilities, and there is something of a breathless quality about the push for more energetic ones. PETRA, which will provide a total of 38 billion electron-volts energy compared to the maximum of 10 billion available in DORIS, the smaller electron-positron ring at DESY, was pushed to completion six months ahead of schedule (and within its budget). After the ring had been closed, the first stored beam was achieved at 10:15 p.m., Hamburg time, on July 15. Members of the PETRA-project group, which is led by Gustav-Adolf Voss, celebrated with the traditional champagne party in the control room. PETRA's American counterpart, PEP, will take a couple of years to finish.

A running-in period will follow. Experimentation is expected to begin in the autumn. So intense is interest in extending this kind of investigation to new energy levels that the number in line is large. A DESY announcement cites several hundred from all over the world including China, the United States and Japan. To quote the announcement, "For the first time in many decades Europe is able to provide its scientists with unrivaled facilities in a field in which the United States was traditionally leading." □

U.S.-Soviet exchanges hurt by recent trials

The climate for scientific cooperation between the Soviet Union and United States has turned very chilly. Largely responsible are the harsh sentences handed dissidents Anatoly Shcharansky and Aleksandr Ginzburg this month and Yuri Orlov in May. Although the U.S. science community has protested Soviet human-rights violations against dissident and Jewish "refusenik" (SN: 1/7/78, p. 7) scientists for several years, the Shcharansky trial escalated U.S. protest to a point that now threatens official government policy.

In a controversial and somewhat unexpected move, President Carter last week quashed the sale of a powerful computer to the Soviets and threatened to prohibit export licenses for "high-technology" oil-production equipment. In the past month Carter has also "postponed" indefinitely three separate, high-level government missions to Russia. One, a joint science and technology commission meeting originally scheduled for last week, would have involved the President's science advisor. All actions have been linked with the administration's dissatisfaction concerning Soviet attitudes and handling of the dissident trials.

In an informal congressional briefing last week, representatives of several large science organizations registered their concern over possible effects this new tack in government policy may have. Calling the recent trials a "profoundly offensive" spectacle, William Carey, executive officer of the 130,000-member American Association for the Advancement of Science, warned that any full-scale boycott of scientific exchanges with the Soviets would only further isolate repressed scientists. He and others suggested that the decision be left to individuals and organizations within the science community — not the federal government — as to what the extent of their cooperation will be. □