

Coughing fish as pollution detectors

An unexpected spin-off from a study of the effects of water pollutants on freshwater fish, initiated in 1971 by the Environmental Protection Agency, is that coughing fish could be used to monitor the quality of lakes and streams. Coughing is the normal way of clearing debris settled in gills for bluefish, snuffish, flathead minnows and all species of trout and salmon.

A major portion of the study involved measuring the number of coughs per minute among fish contained in separate aquariums with a polygraph called an electrode-chamber. The fish are subjected to various pollutants and are monitored 24 hours prior to the addition of the pollutants and several days after their removal. In tests with copper and mercury, it was found that the concentrations that increased the frequency of coughing were approximately the same levels that have been found to be damaging to fish growth and reproduction.

"The ultimate use of our findings," says aquatic biologist Robert A. Drummond, in charge of the study, "could be a system for keeping tabs on concentrations of complex industrial wastes entering lakes and streams from waste treatment plants and industry. A sudden increase in fish coughs within a given body of water could trigger an alarm to warn plant personnel that potentially damaging effluent is leaving the plant."

Imperative for clean lakes

Two years ago the United States and Canada signed a Water Quality Agreement prohibiting the use of phosphorus in detergents and controlling inputs of phosphorus into the Great Lakes, in the belief that phosphorus compounds stimulate algae and plant growth and choke off necessary oxygen supplies for animal life—a process called eutrophication. Since the accord was signed, however, implementation of the phosphate ban has lagged because of uncertainties surrounding possible complementary causes and alternative cures. New research, reported in May 24 SCIENCE, should lay some of these uncertainties to rest.

By taking small lakes and adding various combinations of suspected pollutants, D. W. Schindler of the Fisheries and Marine Service, Freshwater Institute, Winnipeg, found that phosphorus is indeed the prime culprit. Irrespective of other influences, addition of phosphorus to a lake fertilizes it to become a "teeming, green soup within weeks," says Schindler.

But his research also led to discovery of a pleasantly surprising corollary—removal of phosphorus allows recovery of a lake at a faster rate than previously expected. "It appears that a basinwide ban on detergent phosphates would quickly bring about a partial recovery of Lakes Erie and Ontario," Schindler concludes.

Transplanting eagle eggs

The U.S. Fish and Wildlife Service is transplanting eggs of bald eagles from nests in Minnesota to nests in Maine, as part of the continued effort to prevent the American national emblem from following Britain's into oblivion. (The English presumably do not mourn the lack of lions about the countryside, but reputed unicorn horns were used to prevent royal poisoning until the time of Charles II.)

The egg-switching, reported in the May 17 OUTDOOR NEWS BULLETIN of the Wildlife Management Institute, will allow replacing pesticide-thinned Maine eggs with more viable ones from Minnesota.

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A certain air of neon

Far-flung Pluto, most distant and least known world in the solar system, may be cloaked in an atmosphere as dense as the earth's but consisting of almost pure neon, suggests Michael H. Hart of the Hale Observatories.

"At the temperature of Pluto, about 43 degrees K.," he writes in ICARUS, "the only gas which would neither condense nor escape is neon." Unlike more common gases such as methane, it is volatile enough to avoid freezing out, and unlike hydrogen it has a high enough molecular weight to keep it from escaping into space.

Observations of the planet's albedo (reflectivity) at different wavelengths are compatible with an atmospheric pressure as high as that of the earth at the surface, Hart says. This probably means that convective heat transport between the light and dark sides of the planet keeps the temperature range around the planet within about two degrees—a not unreasonable assumption considering the minuscule amount of solar energy that gets out as far as Pluto.

Hart believes, however, that there are probably no neon "oceans" on the planet. He calculates that to produce enough vapor pressure to cause oceans to condense would require more than 20 atmospheres of surface pressure, which is not supported by the albedo studies.

Space contractors and earth laws

After more than a decade and a half of dealings, some of them disputed, with private contractors, NASA has finally established a full-time, independent Board of Contract Appeals. Yet the board will be unable to do anything to help reduce the time-consuming contractor-vs-contractor hassles that have been causing delays in the space shuttle program.

The appeals board, certainly a long-needed body as recommended by the Commission on Government Procurement, is concerned with disagreements between NASA and other institutions such as industry arising over contracts between them. The space shuttle has been bedeviled by disputes of a different sort, in which one contractor protests NASA's awarding some juicy piece of space business to another. These are the domain of the General Accounting Office, whose meticulous investigations and deliberations often take many months.

The contract for the main shuttle engines, for example, was awarded to Rocketdyne in July of 1971, protested by Pratt and Whitney the following month, and resolved by the GAO (in favor of Rocketdyne) in March of 1972. A more serious problem—because it comes closer to the shuttle's deadlines—has been Lockheed's protest of Thiokol's contract to build the strap-on boosters for the shuttle's launch vehicle. Filed last December, the protest has been dragging on through the GAO while NASA tries to sustain Thiokol with month-to-month study contracts and hopes that it will be able to order materials for the boosters on schedule.

Last week NASA announced that the GAO will rule on the protest on June 24, six months after it was filed. NASA could not reasonably be left to adjudicate its own contracting policies, but the GAO certainly does go on.

Astronomy satellite rejoins family

The series of High-Energy Astronomy Observatory satellites, suspended in January 1973 for lack of funds, has been restored by NASA to its FY 1975 budget request, though with smaller probes carrying fewer experiments. The first one should fly in 1977, with two more to follow.

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