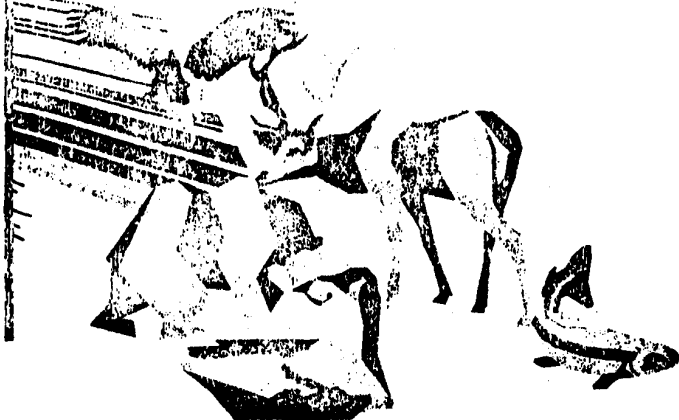


WILDLIFE NEWS



Vol. 40, No. 10

June 1, 1975

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PCBs, SEALS, AND A GIRL NAMED MARGARETA

by Peters D. Wilton and Ann Shalowitz

What do a teenage Explorer scout, a pack of seals in Puget Sound, the U.S. government, and "PCBs" all have in common? Each plays an important role in an involved story which points out the lack of adequate environmental controls for toxic substances.

Last fall, Margareta Tommos, a teenage Explorer in Seattle, Washington, wrote to the Federation about "the plight of the seal population of Gertrude Island in the southern part of Puget Sound." Two graduate students at the University of Washington reportedly had been studying the seal population on three tiny islands in agricultural, lightly-industrialized, and heavily-industrialized areas of the Sound. Gertrude Island represented the last of these areas.

Their research found that of the three seal populations, only Gertrude's showed an unusually high percentage of still births and deformities among pups. Between 1970 and 1972, the percentage of pups suffering from missing backbone sections, twisted or missing tails, exposed or missing entrails, and skull damage increased from 10 percent to 34 percent. In the past few years, the total population has dropped from approximately 200 to about 125.

Laboratory analyses of fat and tissue specimens sought out the culprits and found toxic levels of two man-made chemical compounds -- DDT (which was banned by the federal government in late 1972) and PCBs (polychlorinated biphenyls). Although speculations were made about the source of the contamination, nothing was pinpointed. Unable to secure funding for further research, the graduate students moved on to other projects.

Their work had been the subject of controversy and disagreement, according to one official in the State's Game Management Division which had originally funded part of the research. Questions were raised about the validity of the students' findings and about their efforts to bring public attention to their work to enable them to obtain further funding. However, the State itself is pursuing no research of its own on this matter. It claims that its authority in this area is pre-empted by the Federal Maritime Protection Act of 1972. The National Marine Fisheries Service, which administers the law, also is not conducting research in the matter, according to its Washington office.

In voicing her continuing concern over the problem, Margareta mentioned news articles she had read about studies on the adverse effects of PCBs on animals, about three human deaths which resulted during the manufacture of one particular PCB, and about birth deformities among infants born to Japanese women who had ingested rice oil containing 2,000 parts per million (ppm) of PCBs. "There's more information available," she wrote. "I just want to know if you can help."

Information on PCBs proved to be plentiful. Manufactured commercially since 1929, they have achieved widespread use in many different applications, including insulating fluids, plasticizer applications, transformer fluids and lubricants, and heat transfer fluids. Since the highly stable compounds are virtually free of fire and explosion hazards, they are especially useful in cases where fire protection is imperative.

It was not until 1960, however, that PCBs were first identified as potential food contaminants. Repeated incidents demonstrating the harmful effects of PCB leakage into the environment prompted public and private investigations at home and abroad. An



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A California sea lion carrying her malformed pup. Authorities suspect that premature delivery was due to PCBs.

estimate was made that the total loss of PCBs in the United States approached 30,000 tons in the atmosphere, 60,000 tons in water, and 300,000 tons in dumps, with residues of 20,000 tons in the air, 30,000 tons in water, and 250,000 tons in dumps. The Federal Interdepartmental Task Force on PCBs, which published its findings in 1972, observed that PCBs are now ubiquitous. "Although fully conclusive data are not available, the evidence for toxic and physiological effects indicates that PCBs must be viewed as potential problems at present environmental levels."

Since then, numerous studies have supported the theory that PCBs have varied and toxic effects in animals. PCBs were linked to premature births in California sea lions and in other research appeared to reduce an animal's natural resistance to viral infections. Exposure to PCBs has been found to reduce the rate of shell growth in oysters, impair egg production in chickens, cause reproductive failure and death of the young in rats and affect the weight gain of dogs. James R. Allen, a pathologist at the University of Wisconsin, found that female monkeys fed a diet containing 2.5 ppm of PCBs developed acne, hair loss, enlarged livers, stomach ulcers, and gastritis — all similar to the symptoms of those Japanese who had ingested the contaminated rice oil.

The significance of the study of the Puget Sound seals is even more clear-cut. PCBs enter the environment mainly through discharge into the water, where they are absorbed by plankton. Fish eat the plankton, and the PCB levels become highly concentrated; the

levels multiply again when the fish are consumed by seals or man, both of which are at the top of their respective food chains.

In addition, the fact that the harbor seals are non-migratory indicates that the source of PCBs may well be the heavily industrialized area near Gertrude Island, supporting the Interdepartmental Task Force on PCBs' hypothesis that: "Probably the largest amounts of PCBs circulating in the environment reach it through industrial and municipal discharges to inland and coastal waters."

In 1971 and 1972, studies by the Food and Drug Administration of human consumption of PCBs found less than 0.0001 milligrams of PCBs per kilogram of body weight per day. This was based on food consumption approximately twice the normal diet. According to the Federal Task Force in 1972, an analysis of 688 Americans in three states revealed that about two-thirds have detectable PCB residues, but only one-third have residues in their fatty tissues of one part per million or greater.

Since 1971, legislation to regulate the introduction of toxic substances such as PCB's into the environment has been pending before Congress, but never has been enacted. Different



Tiny Gertrude Island, located near McNeil Island in Puget Sound (circled), lies just north of the heavily-industrialized Tacoma area.

bills, including one introduced this year by Senator John V. Tunney of California, would require manufacturers of chemical substances to provide basic information and testing data to the federal government before the substance could be manufactured commercially. Using this information, EPA could determine whether the manufacture would pose environmental problems and should be regulated in any way to protect the environment.

A congressional report on one bill introduced in 1973 specifically cited PCBs as demonstrating three important facts about toxic substances: 1.) the existence of a real environmental problem; 2.) the absence of pertinent information on toxic substances (Thirty-five years passed before PCBs were identified as a potential hazard, and it took an additional five years to get the manufacturer to release data on the substance's manufacture and distribution); and 3.) the absence of statutory authority to control the sources of a toxic substance once it has been identified.

Last September, while separate toxic substances bills remained stuck in a congressional committee, a dramatic illustration of the need for legislation was provided. A transformer



My God, I thought chromsome damage would take generations!

being shipped by the Army Corps of Engineers to an Air Force base in Alaska was dropped on a deck and approximately 100 gallons of PCBs were spilled into the Duwamish River, which feeds into Puget Sound. It was the largest such spill ever recorded. The subsequent confusion over who was responsible for the cleanup delayed the recovery process for over a month, causing some increase in the PCB levels in the river bottom.

But the Duwamish spill is relatively unique, whereas industrial discharge of PCBs is not. In 1970, the Monsanto Chemical Company — the sole American manufacturer of PCBs — voluntarily restricted its production and distribution of the chemical. Despite this action, Dr. Spyros Pavlou of the University of Washington, who monitors Puget Sound for background levels of PCB and DDT, commented, "I haven't seen a decrease in PCBs in the environment at all."

This paradox is partially explained by recognizing that the PCB problem is by no means a domestic one alone. The chemical is currently manufactured in Europe, Russia and Japan; domestic production accounts for only about one-half of all PCBs manufactured. Foreign ships in the Puget Sound area may leak PCBs, imported electrical equipment may contain PCBs, and PCBs from distant spills may reach the United States through tide and wind motion. The passage of toxic substances control laws would certainly constitute a step in the right direction, but international agreements would be necessary before the substance's entrance into the environment can be fully brought under control.

Unfortunately, the fact that their plight demonstrates a need for the control of toxic substances has not helped the seals. The sources of PCB contamination in the Puget Sound area have been neither identified nor brought under control. Public concern in Seattle is fading, at least in Margaret's eyes, as local publicity over the seals and the Duwamish spill fades.

Terry Newby, one of the graduate students who conducted the study of the three seal populations, is unable to continue his work because of "political problems" with the

federal government. "The 'problem,'" he says, "is they refuse to admit that PCBs are one of the causative factors giving rise to a high incidence of birth defects and abortions in seals."

The government, it seems, will not fund a study without proof to warrant such a study; however, there is no proof because there have been no conclusive studies. It's a vicious cycle. Meanwhile, Margareta Tommoss and the seals of Gertrude Island continue to wait for help.

GIANT SNAIL STOPPED IN FLORIDA

The giant African snail, after chewing its way around the world, has been stopped in Florida, but not before it gave the Miami area a nasty scare.

In mid-April the United States Department of Agriculture lifted emergency regulations imposed in 1969 to prevent the pest from spreading out of southern Florida. An intensive poisoning program had wiped out the snails. Considered by many experts to be the world's worst mollusk pest, the giant African snail grows from five to nine inches long and may weigh a pound.

Thousands of Teeth

Equipped with thousands of rasping teeth and a voracious appetite, the snail can polish off a head of lettuce at one sitting. It avidly chews flowers, leaves, fruits, and cultivated crops.

In search of calcium to build shells, the snails often crawled over buildings to nibble paint, leaving behind trails of slime and excrement. Floridians also complained that the snails wandered into window air conditioners and died. The units then wafted a powerful smell into houses along with cool air.

The king-size pest was introduced into Florida in 1966 by an eight-year-old North Miami boy who brought back three from Hawaii as a present for his grandmother. She was touched but not overjoyed, and the snails were released.

By 1969, they had multiplied so alarmingly that the Department of Agriculture banned shipments out of the Miami area of anything that might harbor the pest.

Other parts of the world have not been as fortunate as Florida when invaded by the giant snail, *Achatina fulica*. It has — with man's help — spread devastation far beyond its original home on the east coast of Africa.

An English naturalist and traveler took the snails to India in mid-19th century. Fifty years later, they turned up in Ceylon. A scientist reported: "The huge snails were to be seen — literally in millions — crawling over the ground, climbing up walls, fences, and poles, and clustered upon the trunks of trees."

Spread to Islands

African snails spread to Southeast Asia, China, Formosa, Saipan, Tinian, Hawaii, and other Pacific islands. Promoters introduced them to Japan as a cure for everything from