DEPARTMENT of the INTERIOR

news release

FISH AND WILDLIFE SERVICE

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LIVE, VIA SATELLITE: WILDLIFE BROADCASTS SECRETS TO BIOLOGISTS

A loggerhead turtle swims a solitary southwest course in the Gulf of Mexico. Although out of sight of any person, her path is being carefully charted.

A polar bear crosses a vast Arctic expanse in search of a suitable den. Hers is the only shadow cast on the frigid wasteland, but each mile that takes her closer to Siberia is being meticulously recorded.

Both the turtle and the bear have been subjects of studies which apply the same communications technology that beams live TV news and entertainment into the public's living rooms. Now, satellites are adding a new dimension to biotelemetry, the study of animals at a distance to record biological information without disrupting normal behavior. But whether satellites or standard radio units are used, telemetry continues to revolutionize wildlife research, yielding invaluable information to improve wildlife management.

Information may be beamed from a polar bear's 10-lb. radio-fitted neck harness or a pine mouse's 1.4-gram, ring-sized transmitter collar: the electronics specialists and wildlife biologists at the Denver Wildlife Research Center (DWRC) tailor transmitting devices for dozens of species, depending on size, life style, habitat, and the type of information needed.

Radio telemetry came of age with the development of transistors in the 1960's and integrated circuitry in the 1970's, providing small parts and increased reliability so that electronic tracking became practical. DWRC, a major research station of the U.S. Fish and Wildlife Service, is a pioneer in this area and works with other Federal, State, and private research teams to expand telemetry's capabilities.

Tracking sea animals is a special challenge, since radio signals cannot be carried through salt water. DWRC teamed with the U.S. Department of Commerce's National Marine Fisheries Service (NMFS) to develop ways to track endangered sea turtle species and in 1978, specialists released baby loggerhead turtles into

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the Gulf of Mexico with radio transmitters encased in floats tethered to their shells. Trackers hoped the transmitters would signal when the reptiles surfaced for air every few minutes. The experiment proved that telemetry could be a valuable information tool, although limited by small-power transmission to trackers in light aircraft.

To help save any endangered species, scientists must learn long-term behavioral information. Toward this end, the Commerce agency funded a cooperative project with DWRC to track an adult loggerhead turtle by satellite. A 212-lb. turtle was released in October 1979 with a cylindrical float containing a transmitter compatible with a NASA weather satellite system. The turtle's 1,400-mile movements were tracked for 8 months, and indicated the big reptile preferred to stay offshore at about 10 fathoms. But, as the researchers were recording the turtle's movements, the satellite beamed the unbelievable: the sea turtle was in Galena, Kansas!

The riddle of the grounded reptile was soon solved. The transmitting device, its tether cut, was traced to a fisherman who had discovered it on a trip to Port Arthur, Texas. The souvenir served as a doorstop and child's toy until its signals led the team to it. However, the fate of the turtle remains unknown.

The Fish and Wildlife Service's electronics experts had been encouraged by their first satellite tracking experiment in 1978, despite one study subject which, unaware of such human conventions as national borders, crossed into the U.S.S.R. With the cooperation of NASA, the Service had begun to study the feasibility of satellite tracking to learn the possible effects of energy exploration on polar bear denning habits. The 400- to 500-lb. female bears seek isolated dens to give birth. The movement of ice in the Far North results in large chunks of ice breaking up, giving the bears shelter to create dens.

Three polar bears were captured and fitted at Point Barrow, Alaska, with transmitters in camouflaged white harnesses built to withstand the severe climate. One bear was tracked for over a year with a satellite that passed 680 miles overhead, receiving intermittent signals and beaming them down to a Fairbanks station which forwarded the data to NASA's Goddard Space Flight Center in Maryland. Researchers charted the bear's westward progress past Wrangel Island off the coast of Siberia to her eventual denning location in the west Siberian Sea, a total of more than 1,000 air miles. Her long odyssey surprised Service researchers and disproved the theory that Point Barrow and Wrangel Island bears belonged to separate colonies.

While many uses may be envisioned for satellite tracking, it must be limited to large animals that can carry the required equipment, and to cost-effective studies where there is no other practical means of getting long-term information. Meanwhile, uses for standard telemetry appear almost unlimited. A simple transmitter that can report an animal's movements to a field researcher equipped with a receiving unit may provide information to help resolve pressing wildlife-related problems. Such transmitters on vampire bats in Latin America enabled biologists to discover that the biting, blood-lapping carriers of rabies lived in colonies in certain caves, apart from other, harmless bat species. By the mid-1970's, selective controls could be applied to keep the vampire in check, protecting humans and saving millions of dollars in livestock losses.

Federally protected species like the loggerhead turtle and the polar bear are often subjects for telemetry studies. These studies yield data on such topics as seasonal movements which are invaluable to scientists who must make recommendations that are used to manage populations. Service researchers use transmitters on endangered Florida manatees that congregate around warmwater springs in the winter to see where these elusive, otherwise solitary creatures go when spring arrives. Transmitters have also been used to study movements of the endangered shortnose sturgeon in the Altamaha River in Georgia. Service fishery researchers have even developed tiny transmitters that are ingested by salmon. The resulting information is being used to help restore depleted salmon runs on both coasts.

As the number of species under study for various purposes has increased, the telemetry experts have refined their tools. Self-adjusting radio collars have been developed which expand since young antelope, elk, deer, sheep, and small mammals may more than double their size in a season. This has relieved concern about animals which could outgrow their collars and choke before they could be recaptured and fitted with larger equipment. It also makes instrumentation a one-time task.

Each new project presents a new puzzle to the DWRC electronics specialists. An animal must accept an artificial attachment without changing its behavior pattern for information to be useful, and weight is a critical factor. The general rule is not to exceed 5 percent of a mammal's or 3 percent of a bird's weight in designing a custom transmitter. Even with miniature transistors, tiny batteries, and lightweight antenna wire, it remains a challenge to build a workable device that allows small species to run or fly, feed, mate, and rear young without interference.

Avian aerodynamics call for featherweight instruments which must be attached so that a bird's balance is not upset. Transmitters clipped to tail feathers are common, although leg attachments enable small birds to carry heavier equipment, and may eventually be used for most species. Some transmitters now in use are equipped with solar cells to recharge small batteries, thus lengthening their life.

Beyond their laboratory, which processes about 500 transmitters a year for various studies, the DWRC electronics experts hope to see commercial firms develop fully automated tracking systems that can be adapted for wildlife research. However, the Service's telemetry pioneers are less concerned with space-age showmanship than simple invention, such as applying glue to secure molting tail feathers carrying clipped-on transmitters and experimenting to see whether the G-string of a guitar or dental wire makes better antenna material.

Grizzly bears, condors, falcons, and dozens of other species have been successfully fitted with transmitters. Each study brings needed information to scientists who constantly work to improve techniques for managing species, whether they are threatened by humans, or humans are threatened by them.

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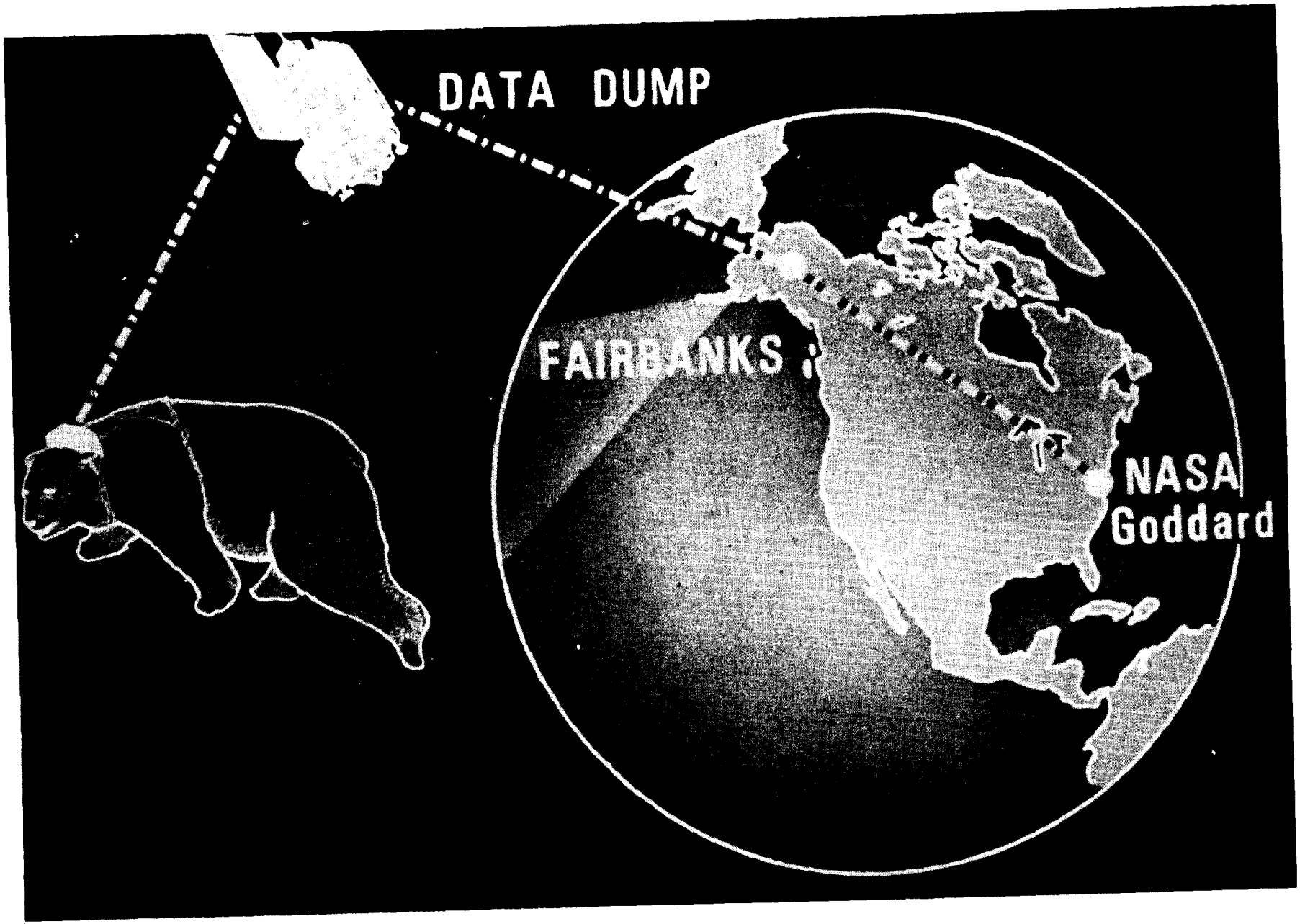

Signals from a polar bear's radio-fitted neck harness were beamed via NASA satellite to a Fairbanks, Alaska, station, which transmitted the information along ground lines to the Goddard Space Flight Center near Washington, D.C., for computer decoding. (U.S. Fish and Wildlife Service diagram)

U.S. Fish and Wildlife Service electronics engineer Larry Koltz holds a tranquilized polar bear, equipped with a radio-fitted neck harness for satellite tracking. (U.S. Fish and Wildlife Service photograph)

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