PATUXENT
WILDLIFE RESEARCH CENTER

50th ANNIVERSARY

Wildlife Conservation Through Scientific Research

1939
1989

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This year marks the 50th anniversary of this Nation's first wildlife research station, the Patuxent Wildlife Research Center, located near Laurel, Maryland. During that period, the Center and Service personnel working there have made numerous significant breakthroughs in wildlife research. A thorough listing would be impossible, but landmark efforts include work documenting the effects of DDT and other environmental contaminants on wildlife, the captive propagation of some of the world's rarest endangered species, such as whooping cranes and bald eagles, and the development of reliable techniques to monitor and manage waterfowl populations and habitats. Many other achievements are documented within the pages of this special publication. I hope it offers some very enjoyable reading, as well as a brief glimpse at the cornerstone of the Service's wildlife research efforts.

Frank Dunkle
Director, U.S. Fish and Wildlife Service

In a world of rapidly changing environments and increased human demand for natural resources, current and reliable information is essential in planning for the needs of wildlife. The U.S. Fish and Wildlife Service's research program provides data required to support the Service's and other agencies' wildlife, fisheries, and habitat management efforts.

Service research focuses primarily on migratory birds; anadromous, coastal, and transboundary fisheries; endangered species; and habitat requirements of all wildlife. This includes research on fish and wildlife diseases, effects of environmental contaminants, modeling and other technology development, fish and endangered species propagation, and wetlands—as well as a diversity of other topics related to fish, wildlife and their habitats. The research program is conducted through a network of national wildlife and fisheries research centers, their field stations, and Cooperative Research Units located at major universities.

While we are celebrating this anniversary of Patuxent, let's also take time to reflect on the Service's overall research program that has evolved over the years from this one station to 13 Centers—all working to provide vital information supporting the wise conservation and management of this Nation's wildlife resources.

Richard N. Smith *Regional Director, Region 8, Research & Development*

In 1936, President Franklin D. Roosevelt transferred 2,670 acres of farmed-out land to the Bureau of Biological Survey, now the U.S. Fish and Wildlife Service, for use as a wildlife refuge and wildlife experiment station. Since that time, the overall mission of the Patuxent Wildlife Research Center has been to help protect and conserve wildlife and their habitats through research on critical environmental problems and issues.

The Center, now encompassing 4,700 acres in the Patuxent River valley, is located roughly midway between Washington, DC, and Baltimore, Maryland. The area now boasts of spacious meadows, upland stands of oak and pine, bottomland hardwoods, and wetlands. Perhaps more importantly, it also offers researchers the space and facilities they require in order to conduct vanguard research on wildlife species and propagate endangered species.

As Center Director, I would like to welcome you to the Nation's oldest wildlife research center and hope you find this special publication marking the Center's 50th anniversary informative.

Harold J. O'Connor
Director, Patuxent Wildlife Research Center

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Patuxent: The Dream Becomes Reality

Pioneering wildlife researchers created an institution of world importance

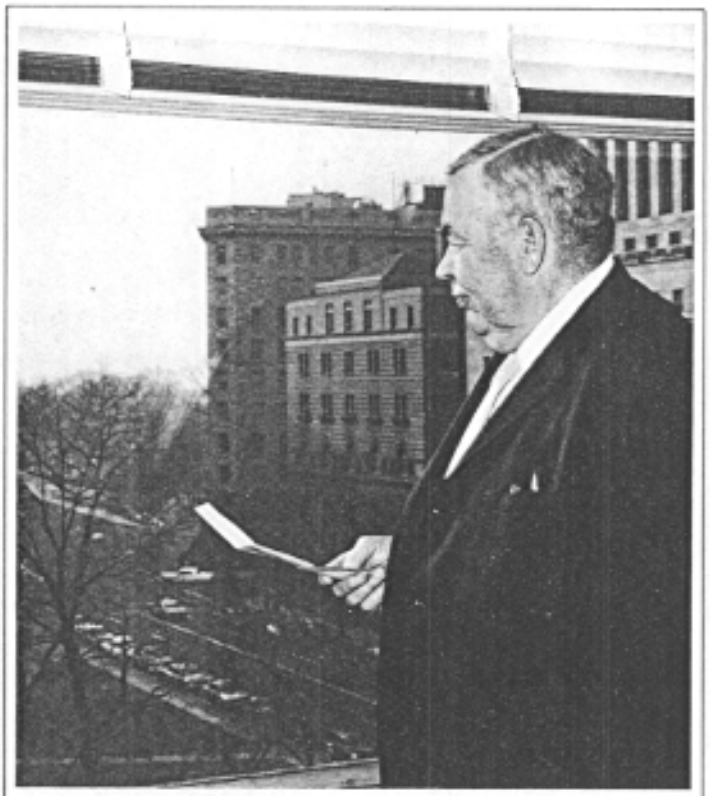
Patuxent Wildlife Research Center has its roots in a dream shared by two conservation leaders that this Nation should have a wildlife research station. Dr. Ira N. Gabrielson, Chief of Wildlife Research, and his boss, J.N. "Ding" Darling, Director of the Bureau of Biological Survey, used their persuasive powers to convince key people that the time had come to develop a field facility exclusively for wildlife investigations. At the time, research biologists worked out of offices and laboratories in Washington, DC, requiring travel to remote areas of the country to study wildlife in the field.

Because of the Great Depression in the 1930s, the Federal Government had acquired large tracts of abandoned farmland under the Resettlement Administration. Gabrielson and Darling were aware of several large Government land parcels in the Washington area that they thought would be appropriate for a wildlife research station. After several field trips to various areas, they settled on one along the Patuxent River near Laurel, Maryland.

On December 16, 1936, President Franklin D. Roosevelt transferred 2,670 acres of land to the Bureau of Biological Survey for use as a "wildlife experiment and research refuge." Early investigations of the area occurred in 1937-39 and some studies were published, but work remained fairly low-key until the official dedication on June 3, 1939. Present at the ceremony were Gabrielson and Darling, who had led the Nation on a conservation crusade during the 1930s. Both men sat on the lawn under trees in front of Snowden Hall and must have taken some pride in the events of the day. Secretary of Agriculture Henry A. Wallace officially dedicated the area as the "Patuxent Research Refuge."

Shortly after the dedication, work began on construction of new laboratories. Between 1939 and 1941, three new brick buildings, Merriam, Henshaw, and Nelson Laboratories, were built and occupied by research scientists conducting various wildlife investigations. The buildings were named after three early pioneers in the emerging field of wildlife science. Some of the biologists had been making daily trips to Patuxent from Washington by hitching rides in the trucks of the Works Progress Administration personnel who were constructing the buildings. Patuxent was also a work site for the Civilian Conservation Corps, which was instrumental in constructing many of the trails and outdoor facilities. With the completion of Merriam Lab, lodging became available on the third floor and some of the single biologists began staying overnight. Others with families started moving closer to Patuxent and the long Washington commute eventually became history.

Investigation of food habits of wildlife, originally conducted by the Bureau of Biological Survey in Washington, was one of the main areas of study in the early days at Patuxent. Stomachs and gizzards of representative animals were sent to Patuxent by biologists from all over the country. The samples were meticulously cataloged by clerks and then preserved for future analysis. One of the biologists, Francis Uhler, was conducting the examination of a black duck gizzard on December 7, 1941, when he received notification of an event that shocked the world. On the next day, after recording the percentages of the various



IRA N. GABRIELSON

First Director of the U.S. Fish and Wildlife Service and life-long conservationist. In the 1930s, "Gabe" was instrumental in the establishment of the "Patuxent Research Refuge." He personally was involved in the selection of Patuxent's land and participated in the planning, organization, and development of its facilities and programs. Gabrielson Laboratory was named in his honor recognizing these significant contributions. Memorabilia of his distinguished career are on display in the foyer of this building at Patuxent.

PATUXENT HEADQUARTERS AND RESEARCH STATIONS

food items found in the gizzard, Uhler made the following notation on the card: "Historical note: Japan attacked U.S. Pacific possessions and declared war on United States yesterday. President Franklin D. Roosevelt addressed Congress at 12:32 P.M. today. Congress declared war on Japan with only one dissenting vote."

World War II would have a profound effect on Patuxent. While some of the older biologists continued their studies, many of the younger ones were called into military service. Patuxent also became the location for a Selective Service Camp for conscientious objectors. Men opposed to fighting in the war were allowed to work at Patuxent on various conservation projects. These included construction of roads and trails, and an inventory of plants and animals found at Patuxent.

One of the major research undertakings at Patuxent after World War II was a comparison of farming techniques to evaluate their effect on wildlife populations. Two farms were established on the property, one that used typical farming practices and one that was managed to provide food and cover for wildlife. The latter technique allowed hedgerows to get established between fields and restricted cultivation along field boundaries near the woods. Extensive hunting and trapping were permitted and surveys were conducted on both areas. The results clearly showed that wild animals thrived with improved habitat. The well-manicured farm that left no cover and food for wildlife to survive through stress periods soon had no wildlife.

Outdoor laboratories provide opportunities for controlled field research.

H. Harams

Wetland impoundments were created throughout the refuge and studies were conducted to develop and improve management techniques that would

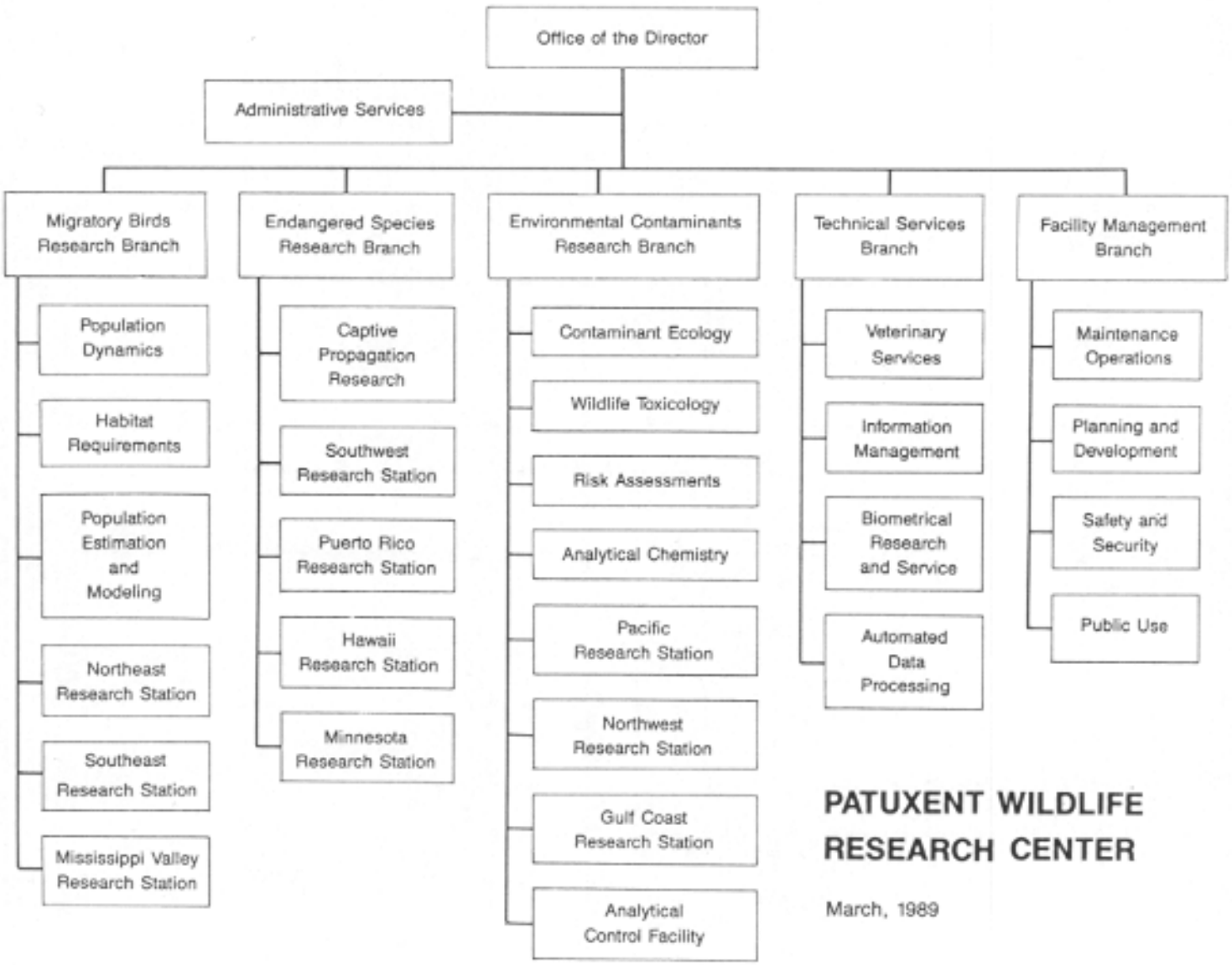
benefit waterfowl. Nest structures were established and new species of waterfowl were released in the area. Techniques developed by Patuxent biologists during the 1950s and 1960s have been used extensively by wildlife agencies, groups, and individuals throughout the world to manage waterfowl habitat and restore waterfowl populations.

One of the byproducts of World War II was the chemical DDT. This miracle chemical helped protect many military men during the war from insect-borne diseases. Its ability to kill insects was hailed and this inexpensive, abundant chemical soon was widely applied by aircraft to agricultural and forested areas for pest control. Although its use increased crop production, biologists suspected as early as 1942 that DDT might have adverse effects on wildlife. In a limited way, studies were conducted during and after the war in an attempt to determine how this chemical was affecting wildlife. Although there were direct effects on wildlife from large doses of DDT, there also appeared to be indirect effects causing alarming population declines in some species of birds.

In 1962, Rachel Carson published her award-winning book, *Silent Spring*, that warned of the dangers of pesticides. Much of the material for the wildlife portions of her book was obtained from studies conducted by Patuxent biologists.

As a result of *Silent Spring*, work increased to determine how DDT and other pesticides were affecting wildlife. British biologists conducting studies with peregrine falcons suspected in 1967 that peregrine reproduction was being affected. In 1969, Patuxent biologists released their findings that DDT in the food chain of wild birds was metabolized to DDE by the birds, and that this compound adversely affected the birds' ability to produce calcium for eggshells. This eggshell-thinning phenomenon resulted in broken eggs and markedly reduced hatching success. With the strong evidence from Patuxent that DDT and several other pesticides were affecting wildlife populations, a ban on the sale of DDT and other chlorinated hydrocarbons was established in the United States in the early 1970s. Research on environmental pollutants and pesticides that potentially affect wildlife continues to the present.

The dream of Gabrielson and Darling has become a reality. The species and studies emphasized in research have changed over the years, but the commitment to protect and enhance wildlife populations and habitats remains the same. Dreamers don't always act on their dreams, but people who value wildlife can be thankful that the dream of Patuxent was realized and is still integral to management of wildlife resources by the U.S. Fish and Wildlife Service. ■



PATUXENT WILDLIFE RESEARCH CENTER

March, 1989

Profiles Of Center Directors

One of the reasons Patuxent has had such a successful history is that it has been fortunate to have good leadership. Only seven people have been in charge of the facility during its 50-year operation.

Leland C. Morley, a veterinarian, helped plan the Patuxent Research Refuge in the mid-1930s, and became the Superintendent in charge of facilities and grounds when the doors opened in 1939. He, more than anyone else, is responsible for the beautiful trees and shrubs planted by the Civilian Conservation Corps under his direction. He also compiled a 12-year history of the refuge which has been an invaluable source of information on those years. Much of the research during those years was directed by personnel in Washington, DC, although Dr. Alexander Martin was Chief of Research at Patuxent.

Arnold L. Nelson was the first actual Director of Patuxent from 1948 to 1959. He is known for his work on the book, *American Wildlife and Plants*, published in 1951. This milestone volume drew together 65 years of research on the food habits of American wildlife. Nelson's tenure also saw the beginnings of the contaminant work, with investigations on DDT. Under his leadership, most of the waterfowl impoundments were constructed during the mid-1950s which resulted in major changes in on-site research and management.

John L. Buckley, Director from 1959-1963, was primarily concerned with contaminant research. Patuxent saw an increase in use of experimental and statistically-controlled studies to evaluate effects of contaminants on common bird species. Extensive studies were conducted on lead poisoning in waterfowl. The Patuxent Research Refuge became the Patuxent Wildlife Research Center, and a new building was dedicated as the Biochemistry and Wildlife Pathology Laboratory in 1963.

Eugene H. Dustman served as Center Director from 1963 until his retirement in 1972. During those years, the Endangered Species Program was added to Patuxent's list of varied responsibilities through efforts of Ray C. Erickson. Patuxent scientists participated in Congressional hearings that led to the ban on DDT in 1972. A new building, named for Ira N. Gabrielson, was dedicated in 1969 to house the Center's administrative offices and the Migratory Bird Populations Station established in 1961.

Lucille F. Stickel became Center Director in 1972 and served 8 years until her retirement in 1981. Stickel spent her entire professional career at Patuxent, and is one of its most distinguished researchers. She is an outstanding population biologist, having conducted long-term population studies with box turtles and black rat snakes, but is probably best known for her work with contaminants, especially chlorinated hydrocarbons. During Stickel's tenure as Director, 1,760 acres were added to the Center through transfer from the U.S. Department of Agriculture, and three Research Natural Areas were designated.

David L. Trauger was named Center Director in 1983 after serving 4 years as Chief, Division of Wildlife Research, in Washington, DC. Between 1983 and 1987, Trauger led efforts to unify and strengthen the research process in environmental contaminants, migratory birds, and endangered species. A major realignment was completed in 1986 to consolidate and streamline administrative and managerial operations under a new Branch organizational structure. Major advances were made in computerization, affirmative action, facility maintenance, and the Center's ability to provide information transfer and technical assistance throughout the Service. Establishment of the Patuxent Analytical Control Facility occurred in 1985.

Harold J. O'Connor, the present Director, arrived in the summer of 1987. He came to Patuxent with an extensive background in wildlife management and administration, having served in Washington, DC, in key positions in both the Service's endangered species and environmental contaminants programs, and as Assistant Director for Research and Development. O'Connor's tenure has brought major changes as he has strived to balance the Center's research and refuge responsibilities. He has played a major role in obtaining support and funding for the planned visitor center and a proposed veterinary hospital. ■

Forestalling A 'Silent Spring'

Studies of contaminants have long been a major activity at Patuxent

RACHEL CARSON

Author of *Silent Spring*, an award-winning book that started the environmental movement in the 1960s and awoke the Nation to the hazards of the indiscriminant use of pesticides. Carson was employed in various positions by the U.S. Fish and Wildlife Service and its predecessor agencies nearly 20 years prior to her retirement in 1952. Although Carson never worked at Patuxent Wildlife Research Center, she drew heavily on the research conducted there. Almost the entire content of the material concerning wildlife effects in *Silent Spring* was based on Patuxent studies.

Environmental contaminants research at Patuxent is nearly as old as the Center itself, having begun in the early 1940s with studies of DDT, a new revolutionary synthetic organic insecticide. This initial involvement in the evaluation of toxic chemical effects on wildlife was an outgrowth of Patuxent's original mission, which was to investigate the relationships between agricultural practices and wildlife populations.

It is not surprising, therefore, that Patuxent was called upon to conduct studies of the impacts of DDT. Few in those days could have anticipated that studies of DDT would continue for nearly 30 years, or that the modest beginnings of the 1940s would lead Patuxent to nationwide responsibilities and worldwide recognition as the premier center for the study of environmental contaminant effects on wildlife.

The 1940s. Research in the 1940s was well-designed and executed but, as later events would show, it was poorly adapted to the real threats from DDT. Blocks of forest of about 100 acres in the Patuxent bottomlands were sprayed with heavy applications of DDT for 5 years, and census information on birds, mammals, reptiles, and amphibians in the sprayed zones was compared with that of an unsprayed control area. Concurrent laboratory studies demonstrated the acute toxicity of DDT to a variety of wildlife species. Despite these efforts, the subtle and cumulative action of DDT was such that its real hazards were not detected in this early series of investigations.

Erich Hartmann/Magnum

The 1950s. This decade saw the formation of a multidisciplinary research team of individuals with specialized professional backgrounds to investigate the various aspects of pesticide threats to wildlife. Studies on DDT continued, particularly at various field sites, and Patuxent undertook systematic toxicological tests on the effects of other pesticides on captive wildlife. Most testing involved determination of lethal levels, but at least some tests examined effects of exposure to chemicals on reproductive performance. Certain chemical pesticides in addition to DDT began to attract attention owing either to their acute toxicity or their persistence in the environment. Among them were aldrin, chlordane, dieldrin, endrin, heptachlor, and toxaphene. Also in the 1950s, an analytical chemistry laboratory was established to detect residues of pesticides in wildlife tissues and habitats. Among its findings was that pesticide residues were much more widely distributed in the environment than formerly thought.

The 1960s. This period was one of tremendous growth and accomplishment. Public awareness of the problems posed to wildlife by pesticides increased, particularly following the publication of *Silent Spring* in 1962, in which author Rachel Carson asserted that pesticides were massively and needlessly killing wildlife, bringing some species dangerously close to extinction. Other research centers here and abroad began research on the ecology and toxicology of pesticides in the environment. Patuxent's research proceeded stimultaneously in several broad areas. Field studies documented the decline of wild populations of birds and correlated reproductive success with exposure to pesticides. Investigators elsewhere discovered the relationship between eggshell-thinning and reproductive failure in raptorial birds. Controlled experimental studies on captive wildlife populations at Patuxent documented unequivocally for the first time that organochlorine pesticides, particulary DDT, caused eggshell-thinning and impaired reproduction. Other experimental work, particularly a remarkable series of studies by Lucille and William Stickel, demonstrated the relationship between body burdens of persistent chemicals and mortality of wildlife. They explained the meaning of pesticide residues which permitted interpretation of a great volume of data from the field.

Much research on lead poisoning begun in the 1960s not only helped reveal an important threat to waterfowl, but also was Patuxent's first involvement with trace elements, a class of chemicals that later proved to be important contaminants originating from a variety of sources. The development of chemical analytical methods proceeded and enabled increased sophistication of the other lines of research. Most of the information that led to the banning or restriction of DDT and other persistent pesticides in the early 1970s was generated at Patuxent in the 1960s.

The 1970s. The decade of the 1970s began with continuing efforts to document the hazards of organochlorine pesticides to wildlife populations and, once they were banned, to track their disappearance from the environment and the recovery of affected populations. It ended with the development of new abilities to evaluate the organophosphate and carbamate pesticides that were replacing organochlorines, and to start research on the effects of industrial pollutants, including organic compounds, petroleum, and trace elements, on wildlife. Each new effort required major initiatives, including development of new chemical, toxicological, and ecological methodologies. Of particular note was the research on oil pollution. Integrated studies were undertaken on laboratory benches, in experimental pens, and in polluted environments to learn as much as possible about

the threats posed to wildlife by oil production, transport, and use. In the space of less than 5 years, Patuxent scientists "wrote the book" on oil pollution and wildlife.

The 1980s. In this period, there has been continued research on the huge number of chemical compounds entering the environment. This has involved development of many new research methods, particularly for those chemicals that are difficult or impossible to detect, either because they produce their effects at extremely low concentrations, or because they rapidly decompose. Two significant activities have dominated much of the decade. One was the discovery by Patuxent scientists that contaminants (particularly selenium) in irrigation drainwater are extremely hazardous to wildlife. Field studies conducted in the Central Valley of California, where the problem first appeared, and at other sites throughout the arid West, documented the problem. Laboratory and other controlled experimental investigations have revealed the nature of the problem and are providing the basis for regulation and mitigation.

Because many potentially hazardous materials occur together and interact in irrigation wastewater, Patuxent launched its first large-scale involvement in studies of contaminants acting in combination as part of the drainwater effort. Like earlier work on oil pollution, the irrigation drainwater research should ultimately provide the basic information

Chemist detects contaminants in tissues with spectrophotometer.

Migratory Bird Research—Studies in Contrasts

Appearances are deceiving at Nelson Laboratory, where space-age equipment and basic biology go hand-in-hand

Nelson Laboratory, home base of Patuxent's Branch of Migratory Bird Research, is replete with contrasts. Lined up outside the old Georgian-styled brick building are U.S. Fish and Wildlife Service vehicles sprouting space-age antennas. Inside, next to oak-paneled cabinets, are sophisticated microcomputers and other high-tech paraphernalia.

The biologists are a study in contrasts as well. Some specialize in the theoretical and predictive aspects of population ecology. They use complex programs on computers to handle the large sets of data on waterfowl and other migratory birds, developing insight into reasons for changes in populations. Other biologists specialize in field studies of the habitat requirements and population trends of birds. The most useful tool for these biologists often is a pair of binoculars, but computers, radiotelemetry, and other modern gear may also be used in their work.

One former contrast has faded: the distinction between research on migratory game birds and migratory nongame birds. The biologists now are organized into groups that tackle particular types of problems, whether the birds in question are hunted or not.

An example of current research is the work on canvasbacks being conducted under the general heading of "Survival and habitat use of wintering canvasbacks in the Atlantic Flyway." These studies are planned to complement research on the same species by the Northern Prairie Wildlife Research Center at breeding and migration staging localities, and by the National Wetlands Research Center at wintering localities on the Gulf Coast. Coordination is assured through annual meetings of the researchers from all three centers at one of the study sites.

The canvasback studies are linked not only with these two other centers, but also with the National Wildlife Health Research Center, which assisted in surgically implanting radio transmitters into the ducks, and with the Cooperative Fish and Wildlife Research Units Center, through a cooperative agreement with Virginia Polytechnic Institute and State University. Two graduate students at the university are conducting portions of the canvasback project.

The canvasback work also is linked with activities of Region 5's Chesapeake Bay Program, based in Annapolis, Maryland. This program has targeted several prominent species of wildlife, including the canvasback, for special attention in a major Federal and state effort to restore and protect the Bay. Information from the branch's research helps this program to identify habitat requirements and management actions needed for canvasbacks.

A series of studies on minimal forest area requirements of eastern breeding birds has yielded intriguing but disturbing results. While some species seem tolerant of or even benefit from forest fragmentation, many others appear to require large tracts of forest. Their populations decline rapidly as suburban or agricultural expansion invades contiguous forest systems. At greatest risk are many of the migratory species that winter in

required for management of the hazards this source of pollution poses to wildlife.

The second major activity consisted of the technical transfer of methodologies developed in earlier decades to operational units of the U.S. Fish and Wildlife Service, permitting them to respond to local threats to fish, wildlife, and habitats on a routine basis. The activities of these field biologists may also benefit the research effort by feeding back information on emerging environmental problems. The first of such technologies brought on line is in the area of analytical chemistry. Its provision and management for the Service's seven geographic regions is the responsibility of the Patuxent Analytical Control Facility.

The 1990s. Despite the progress of the past, new contaminant threats to wildlife continue to develop, and old ones are slow to go away. Already it is clear that contaminants will be part of the agenda for the 1990s. Intensification of agricultural production, increased pressures to develop natural resources, and dwindling acreages of undisturbed habitat all provide scenarios in which environmental contaminants may pose even greater problems to wildlife than in the past. Previous research has been highly successful in examining the effects of contaminants on individual animals or on captive populations, but have scarcely addressed the impacts of contaminants on natural populations. Perhaps the most insidious effect of contaminants has been in destroying or degrading habitats, and assessment of these impacts on wildlife populations will require much research. Studies of entire ecosystems may replace those focused on single-species populations. In the area of the transfer of technologies to operational units, there is the need for biological techniques to complement the chemical capabilities already provided. ■

Striving To Save Endangered Wildlife

Species of concern range from Hawaiian forest birds to Minnesota wolves

Research on endangered species began at Patuxent Wildlife Research Center in 1965 as an offshoot of efforts to rescue the whooping crane from extinction. Now scientists of the Endangered Species Research Branch conduct research on several endangered species in their native habitats throughout the United States and its territories. Current studies focus on such species as the Puerto Rican parrot, California condor, Hawaiian forest birds, Kirtland's warbler, and eastern timber wolf.

For most species, Patuxent uses a two-pronged approach to assist with the recovery effort. First, biologists at each of the five research stations, located from Puerto Rico to Hawaii to Minnesota, study species threatened with extinction in their native habitat. The objective of ecological research on endangered species is to identify factors limiting distribution and abundance. The ultimate goal of the field ecological research is to develop practical management strategies to assist in species recovery.

The second approach is to conduct research on endangered species in captivity to develop methods so that sufficient numbers of individuals can be propagated for release to bolster wild populations. Key

the neotropics. Patuxent is currently conducting studies on both the breeding and tropical wintering grounds to evaluate the relative roles of domestic and tropical land-use changes on population levels of neotropical migrants.

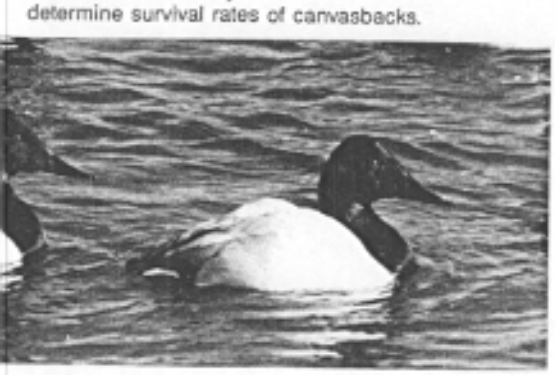
Other studies have addressed issues of more generic application. For example, research is being conducted on the influence of open marsh water management on birds inhabiting Atlantic coastal salt marshes. This method of biological control of mosquito populations by modifying the natural hydrology of tidal marshes has been widely implemented in the Northeast with little knowledge of the consequences for migratory birds. Bird use of natural and modified habitats is being monitored.

There has been a broad range of studies at Patuxent dealing with habitat influences on migratory birds. Examples of research applied to specific, local problems are studies of the effects on bird communities and populations of the Seney National Wildlife Refuge fire, strip-mining in Appalachia, and winter navigation on the Great Lakes.

The difficulty of studying migratory birds in areas far from Laurel led to the establishment of three field stations. The Northeast Research Group is on the University of Maine campus at Orono. Its assignments have included investigations of the survival of woodcock during their breeding season and of the effects of acid rain on black duck production. The Southeast Research Group is on the University of Georgia campus at Athens. Its work has included studies of the productivity and survival of mourning doves and more recently it has emphasized studies of the survival and habitat use of woodcock during the winter season. The Mississippi Valley Research Group shares office space with a Region 4 Ecological Services unit and with a field station of the National Wetlands Research Center at Vicksburg, Mississippi. Its primary mission has been to study wintering waterfowl habitat requirements and survival in the lower Mississippi River Valley in relation to changing patterns of land use and weather.

To sum it up, the Branch of Migratory Bird Research generates scientific information about migratory birds that can be used for their conservation. The Service's Office of Migratory Bird Management is a major customer, receiving input on how to interpret information about continental waterfowl populations that is used in recommending harvest limits for the upcoming hunting seasons. National wildlife refuges use results of the Branch's research in designing censuses and in planning habitat management for the benefit of woodcock and other migratory birds. Ecological Services field offices use information about habitat requirements of migratory birds generated by the Branch in their interactions with other agencies on land use issues. In addition, a wide range of Federal and state agencies, university laboratories, and foreign scientific institutions use methods developed by the Branch to monitor and analyze changes in migratory bird populations. ■

Studies are underway to determine survival rates of canvasbacks.



endangered species, as well as closely related surrogate species, are maintained at the main facility in Laurel, Maryland, for captive propagation research. The physiological, behavioral, and veterinary charactertistics of these species are evaluated to gain a better understanding of possible biological problems as well as to assist with management of the species in the wild.

Whooping Cranes and Captive Breeding

The majority of the studies conducted by the Captive Propagation Research Group are related to development of techniques to improve the captive propagation of whooping cranes. Current studies are aimed at improving crane propagation by developing a new mechanical incubator to better simulate natural incubation, determining the genetic variation in the captive flock to know how individual cranes are related so that maximum genetic diversity within the population can be maintained, evaluating the diet of the captive cranes, and improving the effectiveness of several drugs for controlling various diseases. The goal of all these projects is to maintain a healthy captive flock and determine more effective methods for producing cranes for release into the wild.

In order for releases of young cranes to be successful, enough birds must be produced each year that can adjust quickly to natural conditions. The group is investigating methods of rearing young whooping cranes without using conventional parent-rearing techniques, which are costly, require a large captive flock, and risk injury to the birds. Hand-rearing techniques are being developed to enable care for the birds without their being imprinted on humans. Procedures are being evaluated to imprint the young cranes on adults of their own species to enhance survival once the birds are released into the wild. Once released, survival of parent-reared and hand-reared birds will be compared to determine the most effective rearing method.

Recently, researchers began to look for ways to apply recent scientific advances in biotechnology to the recovery of endangered species. Efforts are focused on long-term preservation and subsequent recovery of viable semen and embryos. This work should enhance preservation of long-term genetic diversity for a species and may aid in the recovery of critically endangered species.

Patuxent produces several thousand masked bobwhites annually for reintroduction into the wild at the Buenos Aires National Wildlife Refuge in Arizona. Propagation needs for this species have been successfully addressed and this effort will be phased out after 1989. In the past, biologists successfully overcame problems related to the captive propagation of bald eagles and Mississippi sandhill cranes and reared young of each of these species for release into the wild. Reintroduction efforts have been successful in bolstering wild populations. Experience and knowledge gained through these successful reintroduction efforts may be extremely valuable in the future as other reintroductions are attempted for such species as the whooping crane, Puerto Rican parrot, and California condor.

Puerto Rican Parrot

Research on the Puerto Rican parrot began in earnest after the population reached extremely low levels during the late 1960s and 1970s. Initial studies were focused on the importance of competition and predation as limiting factors, as well as on determining the nesting habitat requirements of parrots. As a result of these efforts, various methods are in use to increase annual production in the wild, including nest guarding, improvement and maintenance of active nest sites, development and provision of alternate nest sites for the pearly-eyed thrasher (a nest-site competitor), and removal of parrot eggs and chicks from wild nests during periods of endangerment.

Radiotelemetry is used to study the palila, an endangered Hawaiian bird.

Current and future field research efforts by the Puerto Rico Research Group will focus on developing techniques to capture and mark wild parrots for individual identification, developing techniques for reintroduction of captive-reared parrots to the wild, and determining why some pairs of wild parrots do not breed successfully. Current effort in the Luquillo aviary, which houses captive Puerto Rican and surrogate Hispaniolan parrots, is focused on improving the captive production of young parrots acceptable for reintroduction into the wild and maintaining and increasing the genetic diversity of the captive flock.

California Condor

Research on the critically endangered California condor is conducted by the Southwest Research Group, headquartered in Ventura, California. The last wild California condor was captured in 1987. Current research is focused on identifying suitable sites for future releases of condors to the wild using past condor habitat-use information to develop a preserve design, determining the contaminant load of other scavenger species within the traditional range of the condor, and conducting a release of Andean condors into the traditional condor range to develop and refine techniques that will increase the success of future releases of captive-produced California condors.

Hawaiian Forest Birds

The Hawaii Research Group is conducting research in unique areas that contain several species of endangered forest birds. Research is aimed at determining the factors that limit the distribution and abundance of endangered forest birds in order to develop management strategies for their critical habitat. Research efforts include detailed sampling of bird populations, habitat structure

Patuxent provides quality animal care of captive wildlife.

and composition, availability of food resources, and impact of predators on the native forest bird species. A comparison of data on habitat use in areas consistently occupied by forest birds with habitat characteristics of apparently suitable but unused areas nearby is needed to allow researchers to devise methods to increase the suitability of these unused areas and thereby allow populations of endangered forest birds to expand.

Kirtland's Warbler

The Kirtland's warbler research project, led by biologists at the Southeast Research Group, is conducted on the breeding grounds in Michigan. Past efforts attempted to determine factors limiting the species on its wintering grounds in the Bahamas Archipelago. Research results suggested that winter habitat availability was not a limiting factor for this species. However, the future of the Kirtland's warbler and other species of passerines may depend on habitat protection on their wintering grounds outside the political jurisdiction of the United States.

Current research in Michigan involves evaluations of annual and seasonal movements, survival and mortality factors, nesting success, activity patterns, and land-use changes of the Kirtland's warbler on its breeding range. Efforts to individually mark and band these birds over past years are expected to provide much valuable data during the 1989 breeding season as the birds are recovered by mist-netting in Michigan. These data should allow for the successful management and eventual recovery of this warbler.

Eastern Timber Wolf

Research on the eastern timber wolf is conducted in Minnesota and is focused on determining limiting factors, population size and trends, and social and reproductive criteria. Wolf populations in selected areas of Minnesota, and to some extent in Wisconsin, have been evaluated for several years, and data have been collected on long-term population trends, the social ecology of wolves, and the complex relationship between wolves and their major prey species (i.e., white-tailed deer and moose). The wolf population in the primary study area, the Superior National Forest, has been studied extensively for 20 years. This research, conducted by the Minnesota Research Group, has also improved our understanding of the relationship between the wolf and domestic livestock. Patuxent's study of wolves in Minnesota serves as a model for wolf biologists throughout the world. Many techniques required to study wolves and other large carnivores have been pioneered through this research. ■

Patuxent's Reach Is International

Information is increasingly shared with researchers from countries around the globe

Patuxent veterinarian and Soviet scientists share treatment work.

Over the past 5 decades, Patuxent Wildlife Research Center has increasingly become a focus for international research and cooperation on wildlife. Each year, Patuxent plays host to government officials, administrators, and biologists from numerous foreign countries: Australia, Brazil, Canada, India, England, Denmark, Bhutan, Venezuela, Sri Lanka, China, Norway, New Zealand, Yugoslovia, Japan, and the Soviet Union have visited in recent memory. These visitors come because they share common research interests with the Center's staff, they are planning comparable facilities and programs in their own countries, or they have a desire to see the work conducted here firsthand. Patuxent's scientists and administrators are also frequently called upon to participate in international conferences and to assist in the planning or evaluation of research programs. Visiting foreign scientists also have worked at Patuxent, exchanging ideas, sharing methods, and producing results on many research topics.

International cooperation with Canada and Mexico has been longstanding, but in recent years major new initiatives facilitated by the Service's Office of International Affairs have expanded Patuxent's involvement in joint projects with China, the Soviet Union and several countries in Latin America.

Staff in the Branch of Migratory Birds Research continue research of bird distributions in relationship to vegetation and land use in Latin America. This work began 5 years ago as a result of the effects of forest fragmentation on populations of birds breeding in woodlands in the eastern United States.

Many of these species migrate south of the United States where they spend the majority of the year. Therefore, it is necessary to study their habitat use and the effects of loss of forest from timber harvesting, agriculture, and development in Latin America, as well as in North America. These studies will help wildlife managers understand the significance of these land-use practices in avian population declines.

Migratory Bird Research staff, collaborators in several countries, and volunteers have sampled dozens of sites to learn about bird-habitat associations. Changes in habitat over large areas can be monitored by studying satellite imagery. These changes can be used to predict resulting changes in bird populations. Now the biologists are mapping vegetation and bird distributions in sample areas in Belize and Costa Rica that will be used to verify the accuracy of satellite imagery.

The People's Republic of China and the United States signed a nature conservation protocol in 1987, and migratory bird work is one topic in which these exchanges have occurred. On the first exchange, a U.S. delegation, including Patuxent biologists, visited eastern China to meet with

Ministry of Forestry staff, and to observe survey and banding operations. The second exchange involved a visit of four Chinese biologists who were hosted by Patuxent's Branch of Migratory Birds Research and the Migratory Bird Management Office's Branch of Surveys.

The Chinese biologists met with many of the staff and participated in ongoing projects at Patuxent. They also visited the Chincoteague National Wildlife Refuge, Assateague Island National Seashore, and State of Maryland wildlife management areas. The first two exchanges were opportunities for biologists to learn about the interests, needs, and capabilities of their foreign counterparts. With that background, a Sino-American Bird Banding Workshop was organized in Qingdao, Shandong Province, in October 1988. Seventeen Chinese delegates and 10 U.S. delegates presented papers and demonstrations dealing with survey methods, banding and auxiliary markers, tissue sampling for genetics and contaminant studies, and analytical methods and results relevant to bird conservation. The United States and China have extended the protocol to continue cooperation in nature conservation, and migratory bird projects are included in future exchanges.

During 1988, Patuxent research biologists and chemists participated in the third joint American-Soviet Expedition to the Bering Sea and Central Pacific. Six Patuxent researchers conducted studies during a 4-month visit to arctic and tropical waters aboard the Soviet research vessel, Akademik Korolev. The expedition began in Dutch Harbor, Alaska, and ended in Singapore. The mission was to determine the effects of pollutants on marine ecosystems and to study marine and island biogeochemistry and ecology. On the Bering Sea, work focused on characterizing the present condition of hydrochemical contamination in this sparsely studied area and assessing the area's capacity to assimilate marine pollution. Patuxent scientists examined microlayer pollutants, trace elements in the water column, and the abundance of marine plastic pollution in the Pacific Ocean. Ecological observations of birds and other wildlife were also made throughout the voyage.

The route for this expedition went into some areas where American scientists had never studied before. This was especially true of the Gulf of Anandyr and along the Siberian coast in the Chukchi Sea. A significant contribution to the organic pollutant studies was a capillary-equipped gas chromatograph provided by Patuxent for use on the expedition. This instrument was shared by U.S. and Soviet chemists in the spirit of cooperation. Numerous samples of surface water and air were collected, and the data pointed to a widespread, fairly high and even dispersion of hexachlorocyclohexane (HCH) compounds there.

Along the Central Pacific route from Hawaii to Singapore, plastic debris was found in 20 percent of the sampling stations. Raw materials used in the manufacturing of plastic products were most frequently found, suggesting widespread dispersal of these industrial wastes. In the South China Sea, 50 percent of the samples contained plastics. Tar balls from petroleum pollution also were found.

This expedition, as had past cooperative ventures, resulted in not only a new and greater scientific cooperation among researchers from the two countries, but also a better understanding between people. ■

D. White

At the Front Lines Of Pollution

Biologists are fighting against pollution threats in a wide variety of habitats

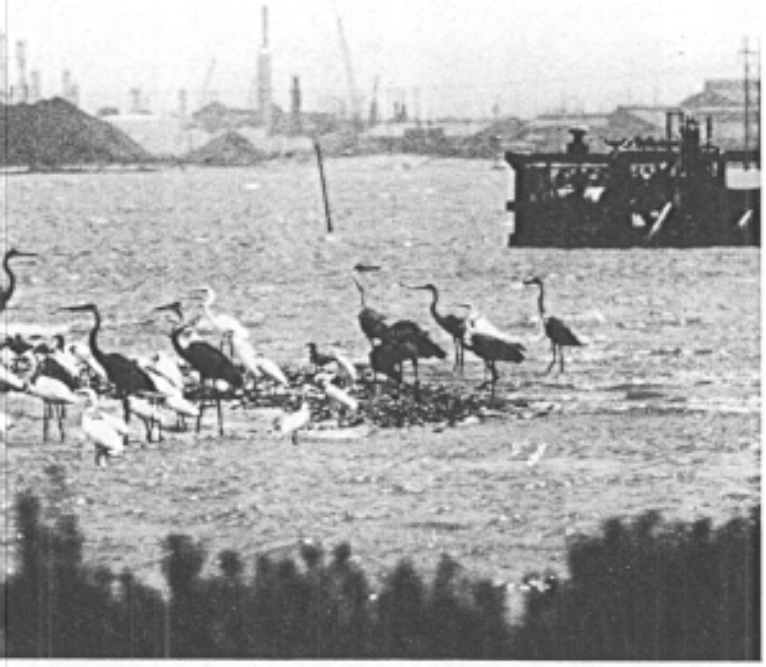
Biologists from the Environmental Contaminant Research Branch are currently waging an escalating war against an ugly enemy—pollution. Based at several field sites across the United States, they are the first line of defense to protect wildlife populations and habitats from a myriad of chemical threats generated by agricultural, industrial, and municipal sources.

Located near the central Texas coast in an area of intense development, biologists at the Gulf Coast Research Station began in 1966 to document relationships between contaminants and wildlife in Texas, New Mexico, and Louisiana.

Early studies of the effects of aldrin-treated rice seed on wildlife were instrumental in national suspension of this chemical. Extreme south Texas, an area of intense agriculture, was identified as one of the Nation's hotspots of organochlorine contamination (mainly DDT) and several studies investigated the effects of these chemicals on wildlife survival and reproduction. Numerous wildlife die-offs have been identified in Texas and have expanded knowledge of the hazards of modern pesticides to wildlife. One of the few national studies on the effects of hazardous waste-site chemicals on wildlife was conducted from this station.

Present research includes studies to determine the effects on waterfowl and shorebirds of oilfield waste water, which is legally discharged into estuaries and is contaminated with petroleum and trace elements. Research is also under way to determine the effects on upland birds of conservation tillage, an agricultural practice that reduces soil erosion but requires increased pesticide applications. Heavy metal and selenium contamination of wildlife nesting at a contaminated coal-fired power plant reservoir is currently being addressed. The field station also has the lead role in expanding the National Contaminant Biomonitoring Program to include an estuarine component; studies are focused on incorporating herons and egrets into the program.

In 1976, the Northwest Research Station was established in western Oregon, primarily in response to forest insect spray activities. Studies over the years included the long-term evaluation of DDT spraying on birds-of-prey and cooperative studies with the U.S. Forest Service to evaluate less persistent alternatives. Heptachlor-treated wheat seed and endrin use in fruit orchards that killed Canada geese, pheasants, hawks, owls, and eagles also were the focus of research for several years in the late 1970s and early 1980s.



Nesting area for wading birds adjoins Texas industrial complex.

The banning of most organochlorine pesticides in the 1970s led to new research on replacement chemicals in the 1980s. Field research at the station first documented the secondary and tertiary poisoning of hawks and bald eagles by the organophosphorous pesticides famphur and fenthion. Recent observations of mass mortality of sage grouse in dimethoate and Monitor-treated fields has resulted in the development of plans to study population impacts of organophosphorous insecticides in cooperation with the Environmental Protection Agency.

Current studies include an evaluation of the impact of lead from mining and smelting activities on tundra swans, wood ducks, ospreys, and American kestrels. Research on contaminants in irrigation drainwater outside California has also been a recent focus. Investigations of ducks and other waterbirds are being conducted on national wildlife refuges and adjacent lands in Oregon, Nevada, Wyoming, and Utah.

The Pacific Research Station has conducted research since 1980 throughout California to determine the effects of agricultural and industrial chemicals on wildlife. Many forms of wildlife have been studied, but most of the studies have focused on birds. The most extensive and intensive research has been conducted in the San Joaquin Valley and San Francisco Bay.

In the San Joaquin Valley, research has been primarily related to evaluating effects on wildlife using wetlands contaminated with agricultural waste water. Studies conducted at Kesterson Reservoir were the first to document the potent environmental hazards to wildlife, such as selenium poisoning associated with agricultural waste water. Selenium was found to occur at moderate to high concentrations in agricultural waste water. It accumulated in the food chain to concentrations that were toxic, causing severe embryonic deformity and mortality as well as adult mortality of aquatic birds at Kesterson. As a result of this research, the U.S. Fish and Wildlife Service, with partial funding by the Bureau of Reclamation, and other Federal and state agencies undertook research to evaluate more thoroughly the environmental hazards associated with irrigation waste water throughout the western United States.

In San Franciso Bay, research revealed high levels of organochlorines, selenium, mercury, and cadmium in birds. These results, along with public concern about the scarcity of information on contaminant effects in the Bay, led to increased funding for Service research. Current efforts are focused primarily on evaluating contaminant effects on wintering waterfowl, because of the importance of the Bay for wintering populations of ducks. Other studies have been conducted to assess the effects of environmental contaminants on herons and egrets, and on other components of the Bay ecosystem.

Studies of the impact of pesticides on wetlands used by breeding waterfowl in the prairie pothole region were started in 1986 by Patuxent biologists cooperating with the Northern Prairie Wildlife Research Center and Arrowwood National Wildlife Refuge. This region is a major breeding ground for many species of North American waterfowl, accounting for more than half of the continent's annual waterfowl production. Unfortunately, drainage of wetlands for agriculture has been severe, and the proximity of agricultural land to the boundaries of those remaining makes direct and indirect additions of agricultural chemicals likely.

Results of the studies conducted to date indicate that the potential for aerially-applied insecticides to enter prairie wetlands and reduce the quality of these wetlands for waterfowl is great. Future studies by the Center and its cooperators will focus on determining the extent of agricultural chemical additions to wetlands within the region and the effects of this on waterfowl productivity, and identifying the chemicals and management strategies that meet the needs of the farmer and also preserve the quality of the wetland resource. ■

The Stickels: In Appreciation

A laboratory is named for a couple who conducted important studies of contaminants

The Stickels began their careers in the early 1940s at Patuxent. During the next 4 decades, until their retirement in 1982, they conducted numerous important studies that provided the basis for present approaches to the evaluation of the biological and ecological effects of environmental contaminants on wildlife populations and habitats.

Lucille F. Stickel was instrumental through her personal research in bringing sharp focus to the effects pollutants had on wildlife and the environment. In addition, she served as a very capable and effective Director of the Patuxent Wildlife Research Center from 1972 to 1981. As a senior scientist, Dr. Stickel also served on many national and international advisory panels as the U.S. Fish and Wildlife Service expert on environmental contaminants. Dr. Stickel is the recipient of many awards which include the Department of the Interior's Distinguished Service Award, The Wildlife Society's Aldo Leopold Award, and the Federal Women's Award.

William H. Stickel is recognized as a pioneer in research on environmental contaminants. He is widely known and respected for his innovative experimental studies, his objectivity in the interpretation of research results, and his

development of practical management applications of research findings. In addition, Mr. Stickel helped establish the world renowned reputation of Patuxent as a place for credible research through his communications within the scientific community. Mr. Stickel not only advanced Patuxent's scientific research programs, for which he received several awards, but he also became an authority on the history and cultural resources of Patuxent.

Both Lucille and Bill Stickel dedicated their lives to developing Patuxent into what it is today. Their influence on the selection of the present outstanding staff and on the conduct of high-quality research was profound. They authored numerous scientific papers and technical publications while at Patuxent, but their individual and collaborative contributions to Patuxent and the U.S. Fish and Wildlife Service have extended significantly beyond to a deep commitment to natural resource stewardship and the responsible use of pesticides in environmental management.

Lucille F. and William H. Stickel conducted pesticide studies.

In recognition of the life-long contribution of the Stickels, the U.S. Fish and Wildlife Service authorized the renaming of the Chemistry and Physiology Laboratory at the Patuxent Wildlife Research Center as the William H. and Lucille F. Stickel Laboratory. Stickel Laboratory will be officially dedicated as part of the 50th anniversary celebration in early June. Appropriately, the scientific and administrative offices for the Environmental Contaminants Research Branch have been consolidated in Stickel Laboratory. ■

Bird Populations Are Nature's Barometer

Studies of migratory species are providing insight into ways to pinpoint problems before they become overwhelming

Changing distribution and abundance of migratory birds provide biological indicators of environmental conditions and quality of natural habitats. Research on nongame birds began to come into its own with the establishment of the Migratory Bird Populations Station at Patuxent in 1961. The goal of this new group was to study the population dynamics of North American migratory birds, both game and nongame species.

Although game birds had traditionally received the greatest attention, biologists were encouraged to pursue studies to develop a survey to monitor national population trends of nongame birds. This work culminated with the design and implementation of the joint U.S.-Canadian Breeding Bird Survey in 1965. This continent-wide survey of breeding birds enlisted volunteer birdwatchers to collect data along statistically predetermined roadside routes. Numerous research efforts were completed over the next decade to refine survey methodology.

Today the Breeding Bird Survey is an operational survey of the Fish and Wildlife Service coordinated by the Migratory Bird Management Office at Patuxent. It has grown to nearly 2,000 routes in the United States and Canada and is considered a benchmark survey program. In addition to providing information on long-term population trends of 250 species, the survey also documents short-term population fluctuations and distributional shifts. It has become one of the most important sources for documenting population declines of birds, providing an early warning to their plight before they become threatened or endangered.

Support for development of this survey was indicative of America's environmental movement during the 1960s, spurred by revelations about the effects of DDT on bird populations and the potential for using birds as indicators of environmental deterioration. As Patuxent became the center for research on contaminant effects on wildlife, a parallel research effort on population dynamics of migratory nongame birds also gained strength.

In 1973, the research component of the Migratory Bird Populations Station was reorganized as the Migratory Bird and Habitat Research Laboratory. For the first time, an organized research team to deal specifically with nongame bird population research problems was established as a section of the laboratory. By the late 1970s this group possessed expertise on songbirds, raptors, colonial waterbirds, shorebirds, and avian community structure. Although not administratively affiliated with Patuxent at the time, the Laboratory merged with Patuxent in 1981 and now exists within Patuxent's Branch of Migratory Birds Research.

The focus of nongame research in this group has continued to the development and improvement of population monitoring methods for species not adequately surveyed, and investigation of the effects of habitat structure and change on nongame bird populations. Because habitat change is one of the most important agents of population change among nongame bird species, these two research approaches complement each other in producing the kinds of information essential for effective nongame bird management.

The current research program has received a boost from recent Congressional add-ons earmarked for migratory nongame bird research and management in the Service. One significant result of these funding infusions has been the preparation of "Nongame Bird Strategies" by the Office of Migratory Bird Management. Pervasively influenced by Patuxent's long and productive involvement in nongame research, this document represents a first cut at a Service policy on nongame birds and should pave the way in the Service for growth and expansion of this important field. Inevitably, Patuxent will continue to play an integral role in these developments for the foreseeable future. ■

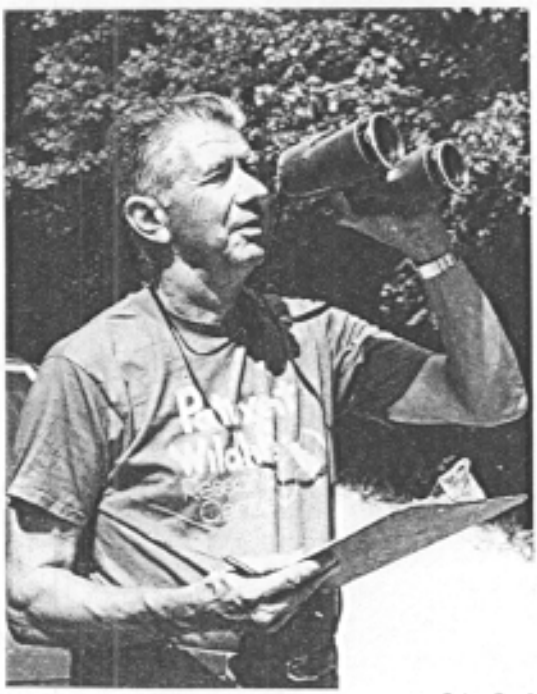
Migratory Bird Surveys Provide The Critical Link

Survey biologists and researchers work together at Patuxent

Research and management of migratory birds have been closely linked throughout the history of Patuxent Wildlife Research Center. Today, the Office of Migratory Bird Management's Branch of Surveys, co-located at the Center, continues an association rooted in the establishment of Patuxent itself. Although administratively aligned through the Assistant Director for Refuges and Wildlife and the Office's headquarters in Washington, personnel in the Branch of Surveys share a common heritage and mutual interest with Patuxent's Migratory Birds Research Branch. At various times over the past 50 years, staff and functions have been merged, interchanged, and separated in several organizational configurations.

Bird banding is one critical link between the two organizations. A major impetus for the establishment of Patuxent was to finally have a permanent home for the millions of banding records that had accumulated since the early 1900s. Administrators and biologists alike had grown increasingly worried about the security of the banding files and weary of their frequent shuffle from one cramped, government office to another in downtown Washington. With the new facilities constructed at Patuxent, a safe, permanent respository for this invaluable information was at last available.

Chandler Robbins: authority on bird populations.



Barbara Dowell

One million migratory birds are banded each year in North America, and approximately 50,000 bands are subsequently recovered by hunters, birders, and others. The task of keeping records on all those bands is performed by the Bird Banding Laboratory within the Branch of Surveys. In addition to processing this information, all types of banding and marking activities on migratory birds are coordinated by the Laboratory. Bird banding permits, bands, and related forms are issued from this location.

Banding records are widely used to manage our waterfowl resources, both in the United States and Canada. These data are invaluable for determining geographic distribution, migratory routes, harvest rates, annual survival rates and other life history information. Biologists at Patuxent rely heavily on banding and recovery data to investigate the population dynamics of various waterfowl species. Results of these studies are, in turn, used by the Migratory Bird Management Office as a basis for management decisions and hunting regulations.

But that is only a part of what the Branch of Surveys does. Another activity is conducting waterfowl population surveys from aircraft flying at low altitudes, a task performed by 8 Flyway biologists stationed at 5 locations across the United States. Surveys include waterfowl breeding populations and production, prairie ponds in May and July, winter waterfowl, fall goose populations, sandhill cranes, and special censuses of redheads, canvasbacks, black ducks, brant, snow geese, and swans. The Branch of Surveys plans, coordinates, and conducts most of the duck banding projects.

Waterfowl harvest surveys are undertaken to measure the size, species, sex, and age composition of the duck and goose harvest. Each year about 70,000 waterfowl hunters respond to a questionnaire, and 30,000 hunters send in wings and/or tail feathers from birds harvested. The woodcock breeding population is monitored by a survey of breeding males. The harvest of woodcock is monitored by consulting a sample of hunters. A dove survey is conducted on more than 1,000 routes by state and Federal cooperators to measure trends in the size of regional dove populations. For each species, the survey results are analyzed and the current status of the species is reported annually.

Patuxent biologists have worked closely with the Office of Migratory Bird Management and its predecessor, the Migratory Bird Populations Station, to develop, evaluate, and improve all of these surveys. The close physical juxtaposition of staff at the Center has contributed to this productive working relationship over the years. ■

Information Transfer: Bridging the Gap

Service managers get helping hand with technical reports and data

Research information can and must be used and interpreted in many different ways. Managers need information on the results of research to make decisions concerning natural resources. Regulatory agencies need information to make decisions regarding the protection of the environment and human health. Researchers need to know what other research has been done because that will affect their efforts in planning and conducting future studies, and possibly most importantly, Service operational staff must have access to the results of research in a timely and useful format to guide their actions.

Patuxent's Section of Information Management provides information services to Center staff, organizes and manages technical documents related to all aspects of research, and facilitates the transfer of research results to users in formats specific to their needs.

Hundreds of information requests are received at Patuxent each year, ranging from general requests from school children who want to know "everything about birds" to more complex inquiries about specific aspects of our environmental research.

In order to bridge the gap between research and application, highly technical research results are condensed, repackaged, and disseminated in formats more acceptable and usable by others. As an example, in response to needs identified by regional environmental specialists, Patuxent has summarized the effects of several major pollutants on fish, wildlife, and invertebrates. These "Contaminant Hazard Reviews" rapidly became much in demand as important reference tools for field and laboratory investigators.

Because managers and scientists have both questions and answers, Patuxent works closely with the Office of Information Transfer in Fort Collins, Colorado, to foster and facilitate the exchange of information on a broad range of natural resource issues. Cooperation has involved Regional workshops on a variety of resource management topics, special publications to meet general needs, and direct consultations on specific subjects.

With assistance from the Office of Extension and Publications, Patuxent research results are packaged for use by the U.S. Department of Agriculture Extension Service and other similar groups to produce useful, practical information on wildlife management to landowners and the general public. A recent educational package will be used in Puerto Rico's elementary school system to teach young children and their families the importance of conservation, using a native endangered species, the Puerto Rican parrot, as an example.

Over its 50-year history, Patuxent biologists have produced over 3,000 publications from scientific monographs to leaflets, brochures, and popular articles. For additional information, including lists of publications, contact the U.S. Fish and Wildlife Service, Patuxent Wildlife Research Center, Section of Information Management, Laurel, MD 20708. ■

Vantage Point for Visitors—Patuxent's New Dream

New facility planned to tell Service's research story to public

It has been said that Patuxent Wildlife Research Center is the best-kept secret around. For 50 years, researchers at Patuxent have published scientific articles based on studies of wildlife species, populations, and habitats. But relatively few people knew what this facility did except for those in the wildlife profession, scientific community, and conservation organizations.

That the laboratories, fields, and forests at Patuxent are still a secret is no great mystery. Many researchers and administrators liked it that way and thought it ought to stay that way. Over the years, many in the Service felt that Patuxent should tell the world about its exciting research. These people believed the old Boy Scout maxim that you can't get your bugling merit badge unless you blow your own horn! Some even believed if Patuxent didn't start blowing its horn, this best-kept secret might eventually disappear.

Now, however, all that is changing. The first serious discussions of a visitor center to tell the research story began in the mid-1960s. Everyone agreed that such a public facility should be away from sensitive research areas. Rough plans were drawn for a modest building with exhibits and a courtyard with a pool in the middle encircled by cages housing some examples of Patuxent's unique wildlife species under study. After the report was completed, it was filed and Patuxent administrators awaited further direction and the necessary funding from Washington. Neither came.

The Service contributed to recovery of the bald eagle, America's symbol.

The environmental movement that began in the 1960s and continued into the 1970s brought funding and enthusiasm for new research to help solve some of the Nation's many environmental problems. By 1977, Patuxent was at an all-time high number of personnel and active research projects. Activities were also increasing at field locations throughout the country. But there was hardly a mention of a visitor center.

The 1980s brought a change to all this. Increased land values, burgeoning local growth, and the ever-increasing list of environmental problems convinced administrators in Washington and at Patuxent that the time had come for Patuxent to let the public know about the problems facing wildlife and the wildlife research being conducted by the Service. Planning money for a visitor center was approved by Congress in the summer of 1988.

Independently, a citizen effort was initiated to raise private funds for this project, too. The Prince George's County Parks and Recreation Foundation took on the visitor center as a special fundraising effort. The foundation established the "National Fund for the Patuxent Wildlife Research Center" and appointed a board of directors to assist in obtaining contributions from the private sector and general public.

Contracts have now been established with architectural, engineering, and exhibit companies, and planning is under way. The visitor center will be located on the south side of Route 197 away from the research areas. Exhibit themes will cover the major research thrusts of the U.S. Fish and Wildlife Service. The exhibits will be designed to be of broad, general interest and will illustrate how the Service manages and protects habitat for wildlife. ■

CONTRIBUTORS: George Archibald, Richard Baldauf, Nancy Barber, Nancy Bushby, Nancy Coon, DuPont Corporation, R. Michael Erwin, Mark Fuller, Christian Grue, Russell Hall, G. Michael Haramis, Elwood Hill, Marshall Howe, Richard Jachowski, Elizabeth Lipscomb, William MacDougall, Sandra MacPherson, Matthew Perry, Sandra Pletschet, Rachel Carson Council, Barnett Rattner, David Scott, Gregory Smith, Robert I. Smith, David Trauger, Donald White.