

Executive Summary

The U.S. Geological Survey's Patuxent Wildlife Research Center (PWRC) is the nation's first wildlife experiment station. PWRC was established in 1936 and is located on the grounds of the U.S. Fish and Wildlife Service's (FWS) Patuxent Research Refuge in Laurel, Maryland. PWRC currently has eight field stations from Maine to Mississippi, co-located with universities or partner agencies. As a research facility of the Department of the Interior (DOI), PWRC is directed to conduct research and deliver scientific information necessary to fulfill DOI's responsibilities to the Nation. PWRC has a rich history in wildlife and applied environmental research with expertise in contaminants, endangered species breeding, migratory bird research, wildlife population ecology, wetland ecology, habitat management, urban wildlife and ecosystem management among other disciplines. With the reorganization of DOI's research capabilities in the 1990's the Center acquired additional expertise in coastal zone and flood plain management, bird and amphibian monitoring, and vertebrate systematics and biodiversity. PWRC's largest field station, the Biological Survey Unit (BSU), is located at the Smithsonian Institution's National Museum of Natural History in Washington, D.C.

The strength and future of PWRC lies as a Center of methodological excellence in comprehensive wildlife and ecosystem research built from the combination of staff expertise in biodiversity, coastal and wetland ecology, contaminant science, endangered species science, population ecology, survey design science, and decision theoretics. Ultimately, PWRC's science is shaped by the interface between pressing public natural resource needs and the intellectual creativity and motivation of its scientists and technical staff. The research of PWRC scientists is at the forefront of wildlife-oriented, ecosystem science, which informs natural resources management actions.

The PWRC vision for the future is to be recognized in the international scientific community as a premier research institution for wildlife science. To do this PWRC has the following goals: strengthen the scientific underpinnings of wildlife and natural resource management; address and solve the most critical, pressing, and complex problems in wildlife and ecosystem management; serve as leaders in assessing and monitoring the status and trends of the Nation's biological resources; improve the understanding of the effects of human impacts and natural process in the management of natural resources; improve understanding of the fate and effects of contaminants and other stressors in the environment through integration of its biological science capabilities with those of other USGS Disciplines and agency partners; and support Patuxent Research Refuge as a model of long-term ecological assessments of population and ecological status and trends.

The PWRC BSU conducts original research on systematics, nomenclature, and biodiversity of vertebrates and has curatorial responsibility for managing the Smithsonian's Natural History Collection of nearly one million vertebrate specimens. Subject matter and methodological experts in the BSU and elsewhere at PWRC have played major roles in preparing authoritative checklists of major vertebrate groups and guides for the measurement and monitoring of biodiversity.

In the future, PWRC's biodiversity capabilities will become ever more important as FWS and the National Park Service (NPS) embark on major programs to inventory and monitor biodiversity and abundance on public lands.

A number of long-term status and trends programs are managed at PWRC. The Breeding Bird Survey (BBS), a survey of birds breeding in North America conducted since 1966, allows determination of trends of many bird species. Status and trends of North American amphibian populations are determined from several surveys managed at PWRC. The North American Banding Program is administered by the Bird Banding Laboratory. Bird banding and recovery data can be used to estimate a number of demographic vital rates and is also used in the assessment of exploitation on game bird species. Future developments in monitoring at PWRC lies in the increase of statistical rigor by the incorporation of such considerations as detection and occupancy in monitoring and re-sight/recapture in band return analyses.

Coastal and wetland science at PWRC addresses the information needs of land and resource managers from an ecosystem and landscape perspective. Research focuses on identifying, understanding, and quantifying the relationships among natural and human-induced threats to ecosystem integrity and their ecological consequences. Approaches emphasize developing predictive relationships needed to forecast responses by fish and wildlife populations, natural communities, and ecosystem processes to the primary agents of change in coastal and wetland environments. The primary geographic areas of emphasis are the mid-Atlantic and northeastern regions of the U.S. An understanding of coastal and wetland processes in an ever increasing urbanized landscape of the Atlantic coast will drive this area of research in the future. Development of predictive tools and models, including GIS-based decision support systems and other management tools will be important to NPS, FWS, and other land management agencies.

PWRC continues as a world leader in contaminant research studying physiological and ecological effects of metals, chlorinated hydrocarbon pesticides, organophosphorus pesticides, polychlorinated biphenyls, petroleum products, and other contaminants on terrestrial wildlife. Recent research centers on sub-lethal effects, including endocrine disruption, disruption of enzyme systems and other physiological processes, and identification of biomarkers of exposure and stress. Important future developments in this field are emerging contaminant issues such as new chemicals, exposure to pharmaceuticals and human health care products, agricultural runoff, molecular methods, biomarkers, and evaluation of contaminant effects on population ecology.

PWRC is internationally recognized for its population and community ecology research. Although the focus among PWRC field biologists has long been on birds, PWRC also has expertise in endangered species, mammals, amphibians, and animal community dynamics. Many of these scientists are internationally recognized authorities on the species and systems they study. Nowhere else in the world are there as many quantitative ecologists and biometricians as there are at PWRC. These scientists specialize in the three broad classes of methods used in science and management/conservation: (1) modeling, (2) estimation and statistical inference, and (3) decision theory. This group works on a wide array of science and management projects, demonstrating the general applicability of their methods. They collaborate with managers from resource management agencies to establish the framework of specific management problems and then follow through to identify and refine appropriate management

actions. Future developments will include emphasis on decision theoretics, including population modeling and adaptive resource management approaches, as land management agencies attempt to make the best management decisions possible in the face of uncertainty. Status and trends specialists, species specialists and quantitative PWRC scientists will work more closely together in the future collaborating to develop new programs to meet management needs.

During the 1990's FWS Region 5 and PWRC established a close working relationship to improve management on Region 5 Refuges. A joint effort to bring more science to bear on the decision-making process for setting hunting seasons was developed by Division of Migratory Bird Management managers and PWRC scientists. A similar partnership between NPS and PWRC has been developed, primarily in the Northeast. These relationships have been very fruitful, will be maintained, and used as models for establishment of similar relationships in the future.