Waterfowl Research on the SRS

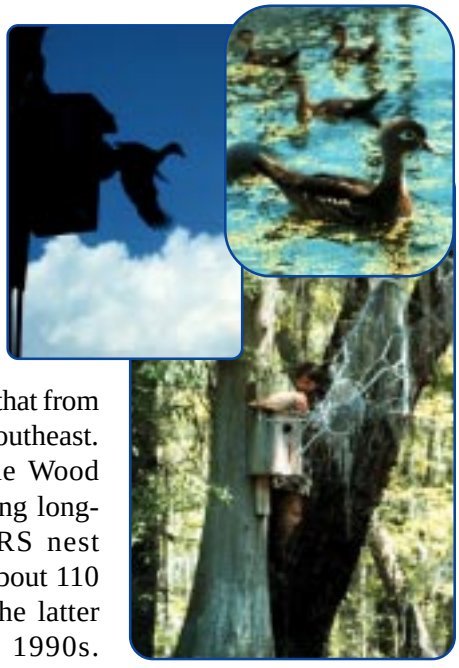
Waterfowl are important components of wetlands and represent an enormous sport-hunting opportunity with an associated economic impact totaling tens of millions of dollars in the U.S each year. This popularity with the public has resulted in North American waterfowl being among the world's most thoroughly studied biota as efforts are made to refine their management. At the Department of Energy's (DOE) Savannah River Site (SRS), large numbers of waterfowl have been present since the SRS was established in the 1950s. Here, however, waterfowl populations also represent potential vectors of the Site's contaminants to the offsite hunting public, thus warranting particular scrutiny. The Savannah River Ecology Laboratory (SREL) has conducted ecological research focusing on SRS waterfowl for over 25 years in an effort to gain a better understanding of the interactions between waterfowl and environmental contaminants.

Waterfowl studies on the SRS have focused on three primary areas: basic ecological studies of both the locally breeding waterfowl populations and the much larger visiting winter populations, studies of the patterns of abundance and distribution of waterfowl on the SRS, and environmental contaminant uptake and cycling. Among the techniques commonly employed in these studies have been the use of artificial nest boxes for the cavity-nesting Wood Duck, aerial censusing of winter waterfowl populations, large-scale trapping and banding efforts, and gamma-spectroscopy.

The cavity-nesting Wood Duck is the only waterfowl species that commonly nests on the SRS.

Long-term study of breeding Wood Ducks

Wood Ducks are second only to Mallards in numbers of waterfowl harvested along the Atlantic Flyway, with an average of 286,000 birds killed annually between 1961 and 1986. Since the early 1970s, breeding Wood Ducks using nest boxes located throughout the SRS have been studied extensively. This research has provided valuable information on the population dynamics of Wood Ducks. Annual adult female survival on the SRS, estimated from capture-recapture data, averages 59% and is comparable to that from other areas of the Southeast. The breeding female Wood Duck population using long-term monitored SRS nest boxes stabilized at about 110 individuals during the latter 1980s and early 1990s. Production of Wood Ducks from nest boxes, however, is known to be only a fraction of that occurring in natural cavities. Total breeding pairs on the SRS are likely to exceed 1,000, particularly taking into consideration the vastness of the Savannah River swamp.



- Overall, research indicates a high degree of environmental health and productivity in SRS wetlands occupied by Wood Ducks.

Wintering waterfowl studies on the SRS

During fall and winter, migrating waterfowl use the SRS extensively. As many as 28 species of North America's native waterfowl have been identified on the SRS. Aerial surveys conducted over the SRS each winter since the early 1980s have identified the Site's former reactor cooling reservoirs as important inland wintering refuges for diving ducks in the Southeast, with maximum numbers exceeding 5,000 birds annually. These long-term survey data have been particularly useful for determining the responses of waterfowl to Site-related activities. For example:

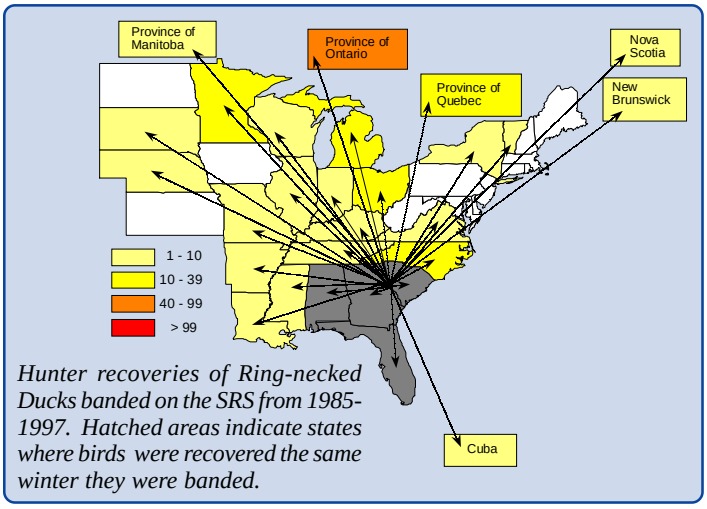
Male Ring-necked Duck

Marking waterfowl

- Addition of the L-Lake reservoir in 1985 apparently has not yet increased the overall carrying capacity of the SRS for wintering waterfowl, but instead has resulted in a redistribution of birds across the Site.
- Species responded differently to the partial drawdown of the Par Pond reservoir in 1991--Lesser Scaup and Ring-necked Ducks moved to L-Lake, Bufflehead and Ruddy Ducks remained at Par Pond, and thousands of American Coots were displaced to unknown locations off the SRS.

Ring-necked Duck banding efforts on the SRS from 1985 to 1995, together with hunter-reported recoveries, have provided information on the geographical extent and patterns of migration exhibited by this species. As expected, most hunter recoveries took place within the Atlantic Flyway, although some limited exchange with the Mississippi Flyway was evident. Direct recoveries (those occurring in the same winter as banding) occurred in only four Southeastern states.

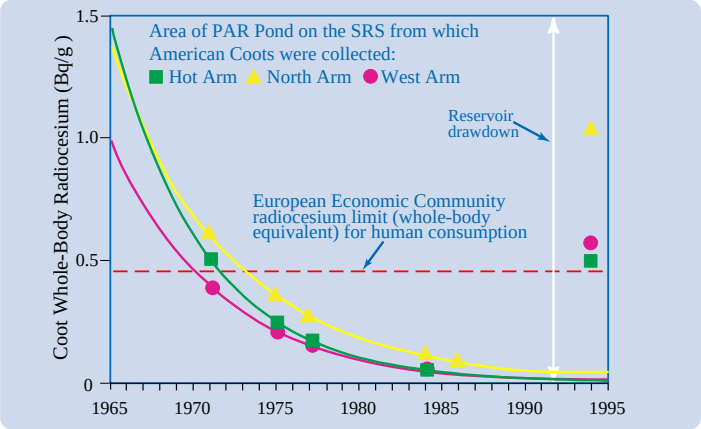
- South Carolina, Georgia, Florida, and Alabama have the highest probability that SRS-contaminated waterfowl could be harvested while they still contain measurable radiocesium levels.
- An estimated 2.5% of Ring-necked Ducks that visit SRS reservoirs each winter are harvested in that same winter.



Hunter recoveries of Ring-necked Ducks banded on the SRS from 1985-1997. Hatched areas indicate states where birds were recovered the same winter they were banded.

Waterfowl contaminant studies

The nature of DOE's activities on the SRS warrants concern that the Site's abundant waterfowl resource could become contaminated by radionuclides or other environmental wastes and thus threaten the health of the birds themselves or offsite hunters who may consume them. An integral part of SREL's waterfowl research program has been the investigation of contaminant accumulation by waterfowl and the associated risk this presents. In the early 1970s, American Coots were identified as a potential "worst case" species for radiocesium accumulation among the Site's aquatic birds. The subsequent study of coot whole-body radiocesium levels at Par Pond has indicated a long-term pattern of declining radiocesium levels in the coot population (94% decline from 1965 to 1986), with average levels in the population declining by one-half (i.e. the ecological half-life) every 4.3 years. Disturbances to contaminated areas on the SRS can have unpredictable consequences to contaminant bioavailability; the 1991 Par Pond drawdown and its later refill dramatically affected coot radiocesium uptake, increasing body burdens to levels not observed since the early 1970s. Furthermore:



- Wood Duck females and their eggs contain radiocesium and mercury at levels comparable to those in the environment where they are collected on the SRS.
- Wood Ducks in Steel Creek attain equilibrium levels of radiocesium in only 17 days.
- Wood Ducks eliminate radiocesium rapidly, losing one-half of their body burden (i.e. the biological half-life) every six days.
- Risks to individual hunters consuming SRS-contaminated waterfowl are low when one takes harvest patterns, equilibrium radiocesium levels, and elimination rates of the birds into consideration.

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