
Use of Catfish Ponds by Waterfowl Wintering in Mississippi

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Abstract: Aerial census of waterfowl on randomly selected clusters of channel catfish (*Ictalurus punctatus*) impoundments were conducted from November 1983 through March 1984 in a seven-county area of Mississippi River bottomland. Estimates of the total waterfowl population on catfish ponds were made from census counts using the ratio-to-size estimator. The average weekly estimate was 51,853 birds (range 19,628-92,857), including northern shoveler (*Anas clypeata*), 34%; ruddy duck (*Oxyura jamaicensis*), 24%; American coot (*Fulica americana*), 12%; lesser scaup (*Aythya affinis*), 12%; ring-necked duck (*Aythya collaris*), 6%; mallard (*Anas platyrhynchos*), 5%; gadwall (*Anas strepera*), 3%; canvasback (*Aythya valisineria*), 1%; and others making up the remainder.

Bottomland hardwood forests historically provided some of the essential habitat for wintering waterfowl, particularly mallards, in the lower Mississippi alluvial plain. There were 4.8 million hectares of bottomland hardwood forests in 1937. Conversion of bottomland hardwood area into croplands was accelerated as soybean and grain crops became more profitable than hardwood products (MacDonald et al. 1979). By 1978, the bottomland hardwood forests in this region had been reduced to 2.1 million hectares (MacDonald et al. 1979). In contrast to the decline of bottomland hardwood wetlands in the Delta region of Mississippi, impoundments for catfish, bait, and crawfish (*Procambarus clarki*) production were being constructed at a rate of 4,858 ha/year, or from 6,943 ha in 1977 to 27,477 ha in 1983 (Wellborn et al. 1983).

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Notes from U.S. Fish and Wildlife Service (USFWS) midwinter waterfowl surveys indicated that catfish ponds contained increasing numbers of waterfowl. However, actual population estimates and seasonal trends of waterfowl use of catfish ponds have not been documented. This paper reports weekly population estimates for waterfowl and discusses some roles of catfish ponds in wintering waterfowl populations in the Mississippi Delta.

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Study Area

The study area consisted of parts of Humphreys, Holmes, Sharkey, Sunflower, Washington, Bolivar, and Leflore counties in the alluvial valley region of the Mississippi River, known locally as the Mississippi Delta. This area contains 80% (approximately 21,132 ha) of the catfish, bait, and crawfish ponds in that physiographic region of the state. This area also represents 75% of all aquacultural production in Mississippi and 65% of all catfish production in the Southeast. Bait and crawfish ponds make up 2% and 1%, respectively, of the aquaculture production in the study area.

Methods

Complexes of fish ponds delineated from Landsat imagery were organized into clusters according to arbitrary boundaries for single-stage cluster sampling (Cochran 1977, Shaeffer et al. 1979). All clusters ($N = 261$) then were numbered and about one-third ($N = 92$) were randomly selected for sampling. Total surface area for all clusters was calculated from the Landsat in hectares. The catfish pond clusters to be censused were organized into an aerial survey route encompassing all or portions of seven counties (fig. 30.1).

Aerial waterfowl censuses of the 92 sample clusters commenced on 5 November 1983 and continued at about weekly intervals until 10 March 1984. Estimated counts were made of the total waterfowl on each pond within each cluster. Waterfowl population estimates and standard errors for all ponds within the entire study area were estimated for each of the 19 aerial censuses using the ratio-to-size estimator (Shaeffer et al. 1979). This estimator is compatible with single-stage cluster sampling and uses a finite population correction factor. Confidence intervals were calculated at the 90% level.



Fig. 30.1. Aerial view of catfish pond complexes in Delta region of Mississippi.

Results

The mean number of total waterfowl estimated to be using catfish ponds in the study area was 51,853. Weekly estimates for all species were highest during mid-November, decreased gradually through mid-December, and showed significant declines in late December (fig. 30.2). Estimates indicated a population increase during the first census in January, followed by below-average levels throughout January and February before increasing during March (fig. 30.2). Confidence intervals for successive censuses overlapped until 16-26 December, when the weekly population projections differed significantly. During a freeze (19 December to 22 January 1983), weekly low temperatures averaged -5.5°C , whereas normal weekly lows rarely fall below 0°C (Hull et al. 1982). Marked declines in total waterfowl, ruddy duck, American coot, ring-necked duck, and canvasback population estimates occurred during the first week of freezing weather.

The mean population estimate of northern shoveler (17,778) was 34% of the mean total waterfowl population. The mean ruddy duck population estimate (12,347) averaged 24% of the total. The mean American coot estimate (6,324) was 12% of the total, as was the lesser scaup estimate (6,010). The mean ring-necked duck estimate (3,265) was 6% of the total. The means for mallard (2,653) and

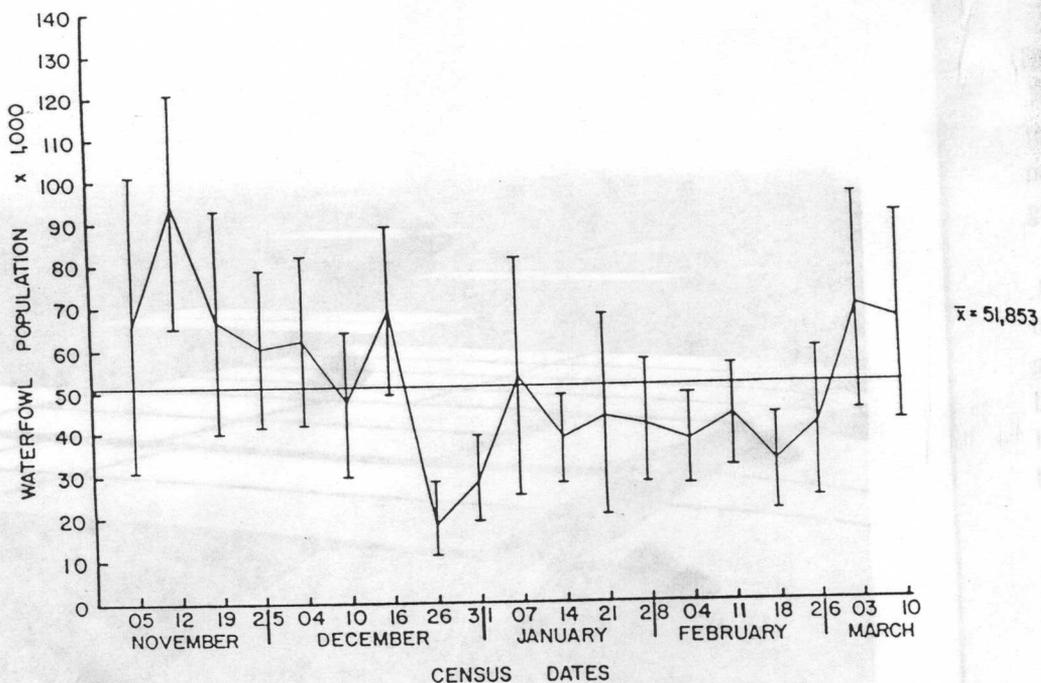


Fig. 30.2. Total weekly populations of waterfowl using catfish ponds in Mississippi River alluvial bottomland region of Mississippi, 1983-84. Populations calculated using ratio-to-size estimator with confidence intervals at $P < .10$.

gadwall (1,255) were 5% and 3% of the total, respectively. Lastly, the mean canvasback estimate (531) was 1% of the total. Miscellaneous species in which population estimates averaged 200 birds or fewer included hooded merganser (*Mergus cacullatus*), bufflehead (*Bucephala albeola*), redhead (*Aythya americana*), northern pintail (*Anas acuta*), American wigeon (*Anas americana*), green-winged teal (*Anas crecca*), and Canada goose (*Branta canadensis*).

Discussion

Catfish ponds in Mississippi represent a substantial area of permanent, artificial wetlands available to waterfowl in a region that has otherwise undergone major declines in natural permanent and seasonal wetlands. Aerial surveys conducted during the fall and winter of 1983-84 demonstrate that these ponds are used by wintering waterfowl. Because catfish ponds constitute most of the permanent open-water, lacustrine habitat in the Delta region, they may provide the major source of habitat available to shovelers, scaup, ruddy ducks, ring-necked ducks, coots, and canvasbacks.

Midwinter waterfowl survey data for the southern portion of the Delta show the yearly (1972-83) average total waterfowl population to be 178,200 birds (table 30.1). The estimated average waterfowl population on catfish ponds during 1983-84

Table 30.1. Average midwinter waterfowl survey counts for the southern portion of the Delta (1972-83)^a

Species	Average count
Mallard	126,610
Northern pintail	10,621
Ring-necked duck	7,913
American wigeon	7,269
Ruddy duck	5,900
Gadwall	5,723
American coot	4,688
Scaup	4,144
Northern shoveler	4,069
Green-winged teal	3,596
Canvasback	1,156
Snow goose	1,108
Total waterfowl	178,200

^aAverages computed from data supplied courtesy of B. R. Tramel.

represented 29% of the average total waterfowl observed in this seven-county area during midwinter surveys. USFWS waterfowl biologists noted that, during dry winters since the late 1970s, about half of the waterfowl observed on midwinter surveys in the Delta region were on catfish ponds (B. R. Tramel and S. Woodson, pers. commun.). Wells (1984) also suggested that catfish ponds are especially important during winters with low precipitation. Catfish ponds probably make their most vital contribution to waterfowl during the driest periods of the non-breeding season, such as late fall and late winter.

The majority of mallards, pintails, American wigeon, gadwalls, green-winged teal, and snow geese (*Chen caerulescens*) do not use the catfish pond habitat, whereas a small proportion of American wigeon and gadwalls use catfish ponds consistently. The estimated maximum population of mallards during the freeze (18,000) represents only 10% of the 1983-84 midwinter waterfowl survey (conducted at about the same time) estimate for the entire Delta region of Mississippi. Comparing the average populations calculated for northern shovelers, scaup, ruddy ducks, and American coots using catfish ponds and their average midwinter counts, we see that the majority of these species inhabit catfish ponds throughout the winter. Similar comparisons with canvasbacks and ring-necked ducks show that these species apparently use other wetlands in addition to catfish ponds. Northern shovelers, American coots, and ring-necked ducks were observed using flooded rice and soybean fields in addition to catfish ponds.

Midwinter survey data show general downward trends in diving duck use on large reservoirs outside the study area and on oxbow lakes adjacent to the

Mississippi River. Wells (1984) believed that a decrease in diving ducks observed on Mississippi reservoirs was probably the result of the catfish ponds. Diving ducks may be shifting from one habitat to another. The importance of catfish ponds to waterfowl may increase with time and as the surface area of this unique new habitat increases.

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