

TABLE IV
ESTIMATED AVERAGE VALUE OF OTTER PELTS, NORTH CAROLINA
1947-48 THROUGH 1958-59

Year	Price of Each
1947-48	\$20
1948-49	13
1949-50	12
1950-51	15
1951-52	14
1952-53	15
1953-54	15
1954-55	16
1955-56	22
1956-57	22
1957-58	21
1958-59	19

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DIVING DUCKS—THEIR PAST AND FUTURE

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The term "diving duck" applies to a large group of waterfowl differentiated from so-called "dabbling" or shoal-water species by certain habits and morphological characteristics. Broadly viewed, the diving duck category includes species that nest inland as well as along the coast. I shall limit the present discussion to the diving duck species on which fairly comparable data are available on status and population distribution, namely, the canvasback, red-head, ring-necked duck, greater and lesser scaup (collectively), and ruddy duck.

The literature gives clues to the former status of diving ducks, but the accuracy of methods of population estimation varies enough to reduce the validity of actual comparisons of year to year abundance. There seems to be little doubt, however, that the number of diving ducks now wintering in the Atlantic flyway is smaller, compared with that encountered during the best seasons prior to the "lean years" of the 1930's. Records based on data gathered in a systematic and uniform manner during the last decade show short-term relationships not apparent from the incomplete published observations.

During most years, well over half of the fall flight of ducks is composed of juveniles. Populations which migrate each fall, accordingly, are responsive to rates of production and survival of the young of any given year, and to a lesser extent, to the size of the adult breeding population. This is true for

both diving and dabbling species of ducks. A reduction in the breeding population of a hunted species may not be evident in the fall flight, since it frequently is offset or obscured by increased production under favorable conditions on the breeding grounds. Conversely, during years in which compensating factors do not operate favorably towards maintaining the size of the fall flight, a substantial reduction in the size of the breeding population, or in the rate of production per pair, can bring about a correspondingly greater decline in the number of birds traveling to the wintering grounds.

Occasionally, low breeding populations combine with low production rates to bring about a drastic decline in the fall flight. If this adverse combination applies only for a year or two, the drop in population may not progress to the point where restoration cannot be accomplished in two or three years, provided remedial regulatory measures are taken to protect the migrants. Should the undesirable situation continue for several years, as during a protracted drought, the fairly rapid population turnover among most ducks will result in a progressive decrease of the adult population despite increasingly restrictive hunting regulations. It is this serious condition which now confronts us in the management of waterfowl.

The complete story on the status of most species cannot be determined from observations within one flyway. Numbers seen, because of incompleteness of coverage and other factors, may be as much a measure of weather and habitat conditions as of annual relative abundance. As a result, winter census information from the flyways and data from the breeding ground surveys must not be analyzed independently if the true picture is to be obtained.

Populations of waterfowl species included in the annual surveys have changed from year to year. Some species or groups have fluctuated more than others, indicating differential response to adverse conditions, including mortality factors, and lesser ability to capitalize on opportunities that would otherwise enable them to maintain their status or to increase. Waterfowl survey records show that, as a group, the diving ducks are less successful in maintaining their numbers than the dabblers or "puddle duck" species. This difference does not apply to all species in either group, so it is likely that some divers are more adaptable than certain dabblers. To find the basis for the differential rates of population gain and loss, a comparison of habits and productivity and mortality factors of diving ducks with those of an abundant and responsive species, namely mallard, may give clues to support or dispute these assumptions. A comparison of some of these factors in puddle and diving ducks follows.

Range. The distribution of a species may be an important factor in its survival. Although the diving duck group of interest has an overall breeding range that is quite similar to that of the dabblers, the area of principal abundance of the divers is more restricted.

Principal breeding populations of canvasbacks, redheads, and ruddies now occur in the prairie-parkland provinces of Canada, which comprised the northern part of their main breeding range prior to agricultural development of the prairie portions of the United States. Ring-necks are similarly restricted in their breeding range, being found mainly on the Pre-Cambrian Shield that extends south and west of Hudson Bay. Lesser scaup, on the other hand, share the main range of the other inland nesting divers, being found throughout much of the western half of Canada and Alaska, with their principal abundance occurring northwest of the main agricultural region.

Of the diving ducks, the lesser scaup alone has maintained comparatively high populations and has not shown characteristically low numbers, as with ring-necks and ruddies, or such gross fluctuations, as have canvasbacks and redheads. The breeding range of the divers may be separated into the prairie-parkland habitat of the agricultural region occupied by the canvasback, redhead, and ruddy, and the more northerly and westerly bush and tundra country occupied by the lesser scaup and ring-necked duck. The mallard, on the other hand, though most abundant during good water years in the agricultural portions of the prairie provinces, is well distributed from the northern United States northwesterly through Canada and Alaska.

During favorable water years, the small water areas of the prairie-parkland habitat are the most important duck producing region in North America. This region, however, is extremely susceptible to drought whereby its productivity is severely reduced. This reduced productivity is an especially prevalent characteristic of ducks that nest in vegetation over water, namely, the canvasback, redhead, and ruddy duck. Such nests are commonly abandoned by the female and are more susceptible to predation when receding water levels leaves them exposed on drying pond margins. Thus, these three diver species are among the first ducks to be affected by subnormal precipitation on the breeding grounds. Their recovery after a drought is also slower, since their principal nesting materials are mainly the dead growth of previous growing years. One or more growing seasons of favorable levels must pass before conditions are acceptable to overwater nesters.

The more northerly and westerly domain of nesting lesser scaup and ring-necks remains well watered, even during severe drought on the prairie provinces. It is not surprising, therefore, that the annual breeding pair indices and the fall flight of the scaup show relatively little fluctuation. The ring-neck breeding populations show less stability, but an explanation of this difference may be related to greater vulnerability to gunning which I shall discuss later.

A comparison of breeding indices through the years shows that the annual production of mallards in a given locality tends to hold up except under the most severe drought conditions. Being primarily land nesters, they do not rely on emergent plant cover that is so essential to the nesting of canvasbacks, redheads, and ruddies. As the water withdraws and leaves this marginal over exposed, its utility to these three diving duck species drops abruptly. The needs of the mallard and most other dabblers still are served so long as sufficient aquatic foods and suitable brood-rearing areas remain. If the levels of ponds continue to drop, they may become so low, or so few in number, that even the mallard must look elsewhere to survive and reproduce.

A comparison of breeding population density data through the years reveals that major geographic shifts do take place. Surveys have shown that the movements of drought-displaced waterfowl to new locations are not accompanied by sustained waterfowl production. The reason for this lowered rate of productivity may lie in the reluctance of females with previous nesting attachments elsewhere to continue similar efforts at the new location. The move may be of value mainly for survival of the adult population. If so, the continued status and distribution of a species is related to the proportion of the production area that is affected by drought. It follows that the more widely distributed species will be vulnerable to weather and habitat conditions principally in that part of their range in which adversity occurs, but in other areas, breeding populations may continue able to weather and habitat conditions principally in that part of their range in which adversity occurs, but in other areas, breeding populations may continue to flourish and repopulate the depleted locations. Expressed another way, distribution of the breeding population of mallards over a large variety of habitats and great geographical extent reduces its vulnerability to local habitat inadequacy, leading to greater stability of annual production and of the perennial overall status of this species.

The distribution of various species of waterfowl in spring and fall migration, and during the winter period undoubtedly affects their survival indirectly. Period and location of occurrence and abundance influence their vulnerability to various forms of mortality. Losses may result from disease, parasites, accidents, or the ingestion of toxic substances, as in botulism and lead-poisoning, and from hunting. With the canvasback, over half of the total mortality may be attributable to gunning. (Geis, 1959.)

Sex differences. It seems reasonable to assume that a maximum production potential of a waterfowl species requires an equal or greater proportion of females in a breeding population. Most studies of the dabblers have revealed fairly equal sex ratios, while with diving ducks a disproportionately greater representation of drakes has existed. The difference is greater in spring among transient birds, and somewhat less among resident populations, indicating that the males may leave the wintering grounds slightly earlier. Several opinions

have been advanced to explain the preponderance of canvasback males, most of the ideas referring to greater vulnerability to predation of the nesting and brooding female, or greater losses of females to gunning. A detailed analysis of banding records by Geis (1959) suggests that female canvasbacks have a higher rate of mortality than males throughout the year.

Nesting. The importance of the greater vulnerability to drought of diving duck nesting habitat, especially of canvasbacks, redheads, and ruddies, has been stressed. The time of nesting is also important. Early nesting mallards and pintails, unsuccessful in their first attempts, have maximum opportunity to renest and compensate for earlier failures. The later-nesting diving ducks have a shorter breeding season in which to bring off young. In renesting efforts there is a minimum of time to produce experienced flyers before the hunting season, or before the water areas dry up and leave the flightless broods vulnerable to predators.

Egg-laying habits may influence the productivity of a species. It has long been known that redheads and ruddy ducks habitually lay eggs in nests other than their own. Without going into a discussion of the conditions under which this habit is encountered, it may be said that the consequences are of two types, namely, those which adversely affect the intruding species or the one being victimized. Since the habit is most prevalent among the diving ducks which nest over water, the same group is most affected by the promiscuous egg-laying. Comparatively few of the intruded eggs hatch, and the disturbance often causes the host duck to abandon its nesting effort. Thus, this trait must be considered detrimental, insofar as the total productivity of the involved species is concerned.

Feeding habits. Feeding habits of waterfowl may be important in affecting their vulnerability to various forms of mortality. Mallards, pintails, and widgeon are versatile, feeding readily in upland fields or in aquatic habitats. They are able to winter successfully in a large variety of habitat types, even in areas subject to intense hunting pressure where they must resort to night feeding and remain during the day on areas relatively inaccessible to hunters. Mallards show maximum adaptability to various conditions affecting their food supply, successfully wintering far north of their traditional concentration areas if sources of food are in the general vicinity of the open water of large reservoirs, rivers, or springs.

Diving ducks do not feed extensively on cultivated cropland except when it is flooded. Of the diving ducks being discussed, the ring-neck is most inclined to remain during the hunting season and throughout the winter on fresh, partly open marshes, depending upon them both for food and resting space. The tendency of the ring-neck to remain on the smaller, fresh ponds and marshes may leave them more vulnerable to hunting than most of the other divers, providing a possible clue to the continued lower numbers of this species than the lesser scaup, part of whose breeding range the ring-neck shares.

The divers are less inclined than mallards, pintails, and widgeon to move out on foraging flights, so they often must choose between areas with adequate food supplies and concentrated hunting pressure, or relief from gunfire in areas where the food may be more scarce or of poor quality. In the Atlantic Flyway, most diving ducks other than ring-necks spend the winter in the larger lakes, bays, sounds, and estuaries, or offshore in coastal waters. Their rate of survival on the wintering grounds is, therefore, related to condition of these feeding grounds and to the extent to which hunting and other forms of disturbance may make the areas unavailable or prevent adequate breeding stock from surviving each year.

Flight habits. The comparative vulnerability to hunting of divers as opposed to dabblers, as indicated by maneuverability in flight, susceptibility to decoying, and other characteristics, is an interesting topic which can only be mentioned in passing. Hunters along the boundaries of refuge areas are only too familiar with the high approach and departure of most mallards and pintails, well beyond effective gunning range. A comparison of the composition of waterfowl populations with the harvest of each species in a hunted area shows almost invariably that a disproportionately large part of the kill consists of diving ducks.

Management. Management measures directed towards the goal of maintaining huntable population levels of all species of waterfowl fall under the categories of habitat preservation and manipulation, and the formulation and enforcement of hunting regulations. The availability of suitable breeding habitat from year to year, so long as the breeding population is not excessively decimated by hunting, largely determines production and the size of the fall flight, especially of diving ducks. If the habitat is made unsuitable by drought, agriculture, or other influences, production falls off and the fall flight declines. Hunting regulations must take into consideration the status of the population as estimated by survey data gathered on the wintering and breeding grounds. Regulations are employed to protect those species needing help, and at the same time, to permit a rational harvest of other species as their populations will allow. With declining populations, the take must be reduced in order that adequate breeding stock will return north the following spring.

Through habitat studies carried out on the breeding grounds, and analysis of banding, waterfowl population, production, and kill surveys, we are increasing our knowledge of the principal breeding areas, production characteristics, habitat requirements, and mortality factors for each species. With this information species management, as expressed in habitat acquisition and manipulation and in regulations, becomes more and more effective, and shows promise of further refinement in the future. These prospects could lead to unbounded optimism were it not for the fact that while management knowledge increases, loss of vital waterfowl habitat—breeding, migrating, and wintering—continues at a serious rate. Practices of pond and marsh destruction which have been developed to such a high degree of efficiency in the United States, now are making wholesale changes in the waterfowl-producing landscape of southern Canada where the interests of agriculture prevail.

A solution to the problem of preserving wetlands for waterfowl, does not lie in the purchase or lease of the endangered areas, for waterfowl breeding populations are so widely dispersed that millions of acres in countless small water areas would have to be controlled to affect a substantial proportion of the total habitat that is vulnerable to drainage or destruction and is now producing waterfowl. The Bureau is working with agricultural agencies, landowners, and other interests towards finding additional means of preserving wetland habitat of value to waterfowl.

Prior to the colonization of North America, diving duck production doubtlessly was subject to annual fluctuations in response to habitat condition. The general trend of waterfowl resource abundance, in the presence of the expanding settlement of the continent and the continuing disappearance of habitat, has been downward. The fluctuations may have been modified somewhat by regulatory and habitat management measures, but without correcting the continually decreasing size of the waterfowl population. In the light of past events, I believe it is reasonable to expect, insofar as the future of waterfowl and waterfowling in general, and diving ducks in particular, are concerned, continued fluctuations in numbers in response to the availability and condition of their habitat, in the presence of increasingly effective regulations designed to allow a more selective harvest of the surplus of individual species or groups of waterfowl on a truly sustained yield basis. With a continued decline in total waterfowl habitat assets, especially natural types, management efforts will have to be focused on lessening populations, with progressively fewer birds available to the hunter each fall. Plans for accommodating waterfowl and waterfowling through land acquisition in the migrating and wintering areas are already well on the way towards realization, as expressed in the acreage which will eventually be controlled by agencies. The big question remains, "Will we be able to preserve adequate breeding habitat to permit the birds to take full advantage of our 'southern hospitality'?"

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WILDERNESS AND THE SOUTHEASTERN WILDLIFER

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"I believe that at least in the present phase of our civilization we have a profound, a fundamental need for areas of wilderness—a need that is not only recreational and spiritual, but also educational and scientific, and withal essential to a true understanding of ourselves, our culture, our own natures, and our place in all nature" (Zahniser, 1957: 199). When Howard Zahniser made this statement, he summarized for many people the need for wildernesses. Even the eloquence with which he writes cannot produce for us the entire picture of wilderness, its needs, potentials, and demands. What he has left unwritten is for the individual; in wilderness there will always be more than will be expressed or completely understood.

The recent emphasis on wilderness and its preservation has been occasioned primarily by Congressional debate on Senate Bill 1176, more recently S. 4028, S. 1123, H. R. 1960, and H. R. 5523. Never before has so much vocal public opinion been built on natural resource legislation. With the interest in the Wilderness Bill proposals have come for reclassification of primitive areas, and encroachment upon existing wildernesses by dam builders, miners, and livestock interests. The remarkable interest in this phase of the conservation movement has several implications for the wildlifer, the most important of which is the need for deciding just what is our place on the bandwagon, and what part, if any, we shall play.

DEFINITION

A definition of wilderness is difficult, if not impossible, for wilderness is many things to many people. One definition cannot encompass all of its surrounding complex and largely abstract concepts. It is desirable that a definition be presented as a foundation for the paper to follow. The writer defines wilderness as an advanced-succession community in which flora and fauna exhibit natural relationships and in which modern man (as differing from aboriginal man) has had basically no influence. Thus armed with a definition, we can proceed to examine the wilderness movement and the responsibilities and opportunities for members of the wildlife profession within the movement.

SURMOUNTABLE SHORTCOMINGS

Many people have an aversion to wilderness. The mere mention of the word causes immediate distasteful connotations of extremism, waste, and special-group interests. It is regrettable that there are parts of the program for wilderness preservation that cause such feelings. Proponents of wilderness and their opposition alike may well examine some of the fallacies of the program. The writer fears that the same attitude is displayed to proponents of wilderness as to "dicky bird watchers." The latter flippant expression has certain connotations, no matter how unhealthy or undesirable, that are known to all wildlife managers. The ornithologist and the advocate of wilderness have a like quality;