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## THE ORNITHOLOGIST'S RESPONSIBILITY TO THE FUTURE

### *A Contribution from the Wilson Ornithological Society Conservation Committee*

An effort to anticipate and prepare for the future seems desirable, because our generation bears a responsibility for passing on to the next a potential for continued well-being, particularly in the area of bird conservation. Any estimate of the future must be based on projections of past experience and cannot possibly be much more than an assessment of relative probabilities. Such estimates, however, provide the only reasonable basis for long-range planning and have become standard practice in the world of business and government. Inasmuch as we must attempt to ensure the protection of birds and the well-being of man, there appears to be little merit in a policy of deliberate conservatism in our estimate of the future.

The trend in growth of the human population constitutes the key element in long-range planning. Continued rapid growth of our population in the United States appears to be accepted generally by demographers. The possibility of acceptance of population control seems remote. The human birth rate tends to reflect the nation's economic status, and it is certain that government will do everything within its power to maintain prosperity. A major atomic war appears to be the only event which might check the current explosive trend in numbers of people in the foreseeable future.

Projections of the total United States population, based on high fertility and low mortality assumptions characteristic of the period since the end of World War II, have been estimated to be: 202,910,000 in 1965; 237,580,000 in 1975; 342,673,000 in 2000; and 501,825,000 in 2050 (Greville, 1957:27). Luck (1957:903) considered a population of 600 million by 2050 almost inevitable. In the event that these estimates seem excessive, we may be reminded that as recently as 1941 a study of recreational needs anticipated a population of only 158 million by about 1980 (U.S. Natl. Park Serv., 1941:5).

The demand for outdoor recreation promises to grow at a faster rate than the population. The amount of leisure available to the average person has been increasing steadily. The 5-day work week is almost universal, and vacations with pay are an established custom. Old-age insurance and pension plans provide for increasing retirement of the aged. Raushenbush (1955:92) predicted a 37.5-hour work week or its equivalent in annual working time by 1960 and a 35-hour week by 1965. Despite a shorter work week and a heavy tax burden, the trend in disposable income has been upward (Dewhurst and Assoc., 1955:90). The mobility of this population is increasing at a logarithmic or percentage rate. Automobile ownership is increasing more rapidly than population, and the movement of traffic is being facilitated by extension and improvement of the highway system. Clay *et al.* (1955:8-9) reported that almost 58 million motor vehicles were registered in 1954, one for "every 700 feet of every lane in both directions on all streets and highways in the Nation." They predicted that vehicle registrations would reach 81 million by 1965. Also, extensive use of inexpensive aircraft as a future mode of family transportation does not place excessive stress on the imagination.

That the public has been using its increased leisure, income, and mobility to utilize outdoor recreation is in abundant evidence. Statistics reveal that outdoor recreation has been increasing more rapidly than the population. The use of national parks almost doubled in the decade 1947-1956 (Clawson, 1958:23). The very rapid increase in the recreational use of national wildlife refuges is of particular significance to the ornithologist. Clawson (1958:49) showed that the recreational use of national wildlife refuges more than doubled from 1951 to 1956. He compared this "with an increase of 48 per cent for the national park system, and of 75 per cent for the national forests, in the same period." Clawson classified use of national wildlife refuges in 1956 as: hunting, 6 per cent; fishing, 37 per cent; and other, including picnicking, swimming, and wildlife observation, 57 per cent, and he observed that "It would be interesting to know how much of the use was solely or primarily for the . . ." purpose of wildlife observation. Interesting indeed. A survey in 1955 determined that 21 per cent of all people 12 years of age and older hunted, fished, or did both and expended approximately \$2,850,979,000 in these activities (U.S. Fish and Wildlife Serv., 1956:7, 17). Outdoor recreation is big business and promises to get bigger.

Projections of the future use of national parks and forests for recreation have been attempted. From 53 million visits recorded in national forests in 1956, it is anticipated that an increase to 65 million in 1960 and to 360 million in 1980 may be expected; from 55 million visits in the national park system in 1956, it is estimated that 60 to 80 million visits may be anticipated in 1960 and 135 to 440 million visits in 1980 (Clawson and Held, 1957:342). This forecast of demand for recreation in the national forest and park systems probably reflects that which may be contemplated for private lands and state, county, and municipal facilities. Thus, we are in the somewhat strange business of struggling to increase facilities to accommodate a rapidly increasing horde seeking outdoor recreation and at the same time using every means within our power to encourage greater interest in Nature as a means of insuring support for its preservation and wise use.

Baker (1952:20) believes that "The greatest progress made in conservation in our generation has been growing recognition of its basic relation to human welfare . . ." There are more private and government agencies encouraging interest in outdoor recreation and the conservation of natural resources than ever before. The business world recognizes that it has a major stake in outdoor recreation. That these agencies together with the public are making their interests known with increasing power is evident in legislation of all kinds. The biologist has a responsibility here which will grow in

importance, the responsibility of guiding this power in a realistic direction. And, certainly, the biologist's role in the task of improving upon the perceptive capacity and proper conduct of the public in the out-of-doors will also take on increased importance. Pierce (1957:284) has pointed out some of the responsibilities which we bear as ornithologists.

The well-being of birds will be most vitally affected where the task of meeting the requirements of an exploding human population necessitates permanent change in habitat. The problem resolves itself into whether upwards of 220 million people can live in the continental United States without causing a major adjustment in bird populations. Birds, and people for that matter, must eventually come to terms with the limitations of their environment. An appraisal of this problem and the knowledge needed for its solution or understanding requires projection of trends in land and water use, especially as relates to change in habitat.

Of the total rural land area of the continental United States (1,903,706,000 acres), approximately 24 per cent is federally owned and federally administered. Of the federal lands, excluding Indian lands (which are not federally owned) and military reservations, it is believed that at least 95 per cent of the remaining 377 million acres will remain in federal ownership (Clawson and Held, 1957:3, 5). In a discussion of major changes in land use to 1975, Wooten and Anderson (1955:1) believed that "the total forest area may be maintained at about the present level. . ." Except for isolated problems, it seems likely that little change will take place on federal lands in the foreseeable future which would result in catastrophic adjustment of bird life. The most important considerations here will be an increasingly intensive forest management program, delay in acquisition of strategic lands to complete the national waterfowl refuge system, management of visitors to insure protection of the bird species in critical status, and excessive exploitation of nonrenewable resources.

The effect of intensive forest management on bird life should be kept under observation. Inasmuch as pines can be grown more quickly than hardwoods, it seems likely that they will be used to an increasing extent for meeting the timber needs of the future. The currently expanding application of herbicides from airplanes to relieve pines of competition from hardwoods has a great potential for producing permanent change in bird populations. Because pure stands of pine support but little wildlife, Lay (1958:5) considered that the problem resolved itself into saving a sufficient proportion of hardwoods to meet the needs of wildlife while removing enough to permit production of a satisfactory stand of pine.

Bellrose and Scott (1955:311) have pointed out the need for stepping up the acquisition of land to complete the national waterfowl refuge system. Competition for land is becoming increasingly severe. Land prices and conflict of interest may reach a point where purchase of land for wildlife refuges will become prohibitive. The encroachment of human activities on wetlands is evident in the remarks of Farley (1955:16): "Today and for years past we have watched marshes and ponds disappear as agriculture has expanded. In the black prairie-pothole region of western and southern Minnesota and eastern North and South Dakota, agricultural drainage removed, in each of the years 1949 and 1950, about 22,000 potholes, amounting to some 63,000 acres. These areas were the most productive waterfowl lands in the United States, fully equal to the best producing areas in Canada. Similar drainage is occurring in many coastal sections, which are most important to the birds as wintering grounds. Most of the great natural marshes of the Gulf are being ruined or seriously damaged for waterfowl use by salt-water intrusion as a result of the Intracoastal and connecting canals, and by exploration for

sulfur and oil. Waterfowl of the Pacific Flyway are rapidly approaching a crisis because the lush marshes which once supported myriads of birds wintering in California and northern Mexico are being turned into cotton and rice fields, orchards, and urban developments."

In 1934 it was estimated that the federal government should own and develop 7,500,000 acres of wetland for the protection of our waterfowl resource (Farley, 1955:17). In 1956, Shaw and Fredine (1956:32) reported that there were 3,270,000 acres in federal waterfowl refuges, thus leaving over 4,000,000 acres to be acquired. In addition, it was estimated that the states should acquire 5 million acres primarily for waterfowl. In 1956, Shaw and Fredine (1956:31) reported that "at least 1,500,000 acres in waterfowl areas are now administered by the States." Judged by present-day tempo, it does not seem likely that we can gamble with delay much longer in acquiring the additional lands. It is most encouraging to learn that the recent amendment to the Duck Stamp Act provides that, beginning July 1, 1960, virtually all receipts from the new \$3 duck stamp will be used to acquire wetland areas needed to complete the refuge system. I am doubtful as to whether even this will provide for the necessary acceleration. Another 20 years and we may well be spending our effort trying to keep what we have rather than acquiring new lands. In addition to drainage for the purpose of increasing the area in cropland, such activities as waterway construction, drainage for mosquito control, industrial and urban expansion, highway construction, and disposal of human waste will compete for wetlands with increasing severity. Our concern with waterfowl refuges, great as it is, should not cause us to lose sight of the importance of the neighborhood marsh which provides a center of interest for bird watchers close to home.

Undoubtedly, the most marked adjustments to bird populations will take place on those lands used for agriculture, and by far the majority of our birds live on these lands. Wooten and Anderson (1957:32) estimated that "Roughly, three-fifths of the total area of land in the continental United States, or 1,158 million acres, is in farms, and two-fifths, or 746 million acres, is not in farms. Nearly half the land not in farms, or 353 million acres, is used for grazing. But much of this large area is publicly owned and is used jointly for other purposes, including forests, wild game preserves, watersheds to supply water for irrigation, power, and other uses." Land inventories indicate the following distribution of cropland and pasture on farms: cropland, 465 million acres; and grassland, pasture, and range, 633 million acres (Wooten and Anderson, 1957:33).

Higher crop yields must be achieved in the not too distant future if our population continues to increase at the present rate. Fortunately, the outstanding feature of modern agriculture has been the steady increase in productivity per acre. Leonard (1957:117), however, reported that "In spite of current food surpluses, there is concern in the United States about how to achieve food production that will be adequate to maintain the present diet for the anticipated population of 1975." Wooten and Anderson (1957:33) counseled that "If recent trends continue in the next 25 years, some 20 to 30 million acres of permanent grassland suitable for cultivation likely will be brought into the cropland-pasture rotation. In addition, possibly 10 million acres of fertile farm woodland and brushland likely will be cleared for cropland and rotation pasture, chiefly to improve the layout and add to the tillable acreages of existing farms in the farm-forest regions." The trend is toward larger areas in individual farms (Dewhurst and Assoc., 1955:809). Using the rate of production for 1953 as a base, Wooten and Anderson (1957:35) estimated that livestock products must be increased by more than 40 per cent and crop production by about 25 per cent by 1975. "The greatest increase needed in crop production would be in field crops, feed grains, hay, soybeans, and especially pasture. Crops

for which little or no increase in production would be needed to meet requirements include major food grains, potatoes, and cotton." (Wooten and Anderson, 1957:36).

The reduction of crop losses through more effective protection against insects and diseases will take on added importance as our need for food increases. More general use of chemicals for this purpose may be expected unless greater progress is made in the direction of biological control. Unless chemical poisons are found which are more specific for the problem at which aimed and less toxic to birds, losses may be expected and over greater areas than is the case today. The ornithologist bears a responsibility for adding to his knowledge of the long-range effect of modern insecticides on birds. He should at least be prepared to advise the entomologist and the public of probable consequences to bird life which may be expected from the use of particular insecticides in particular areas.

Cultivated fields undoubtedly support greater total numbers of birds now than they did prior to cultivation. Sharp reduction or elimination of waste in cultivated grains and weed plants, however, could result in food shortages for birds which could well become a major limiting factor. The intensive effort to obtain chemical control of weeds seems to be succeeding, and inefficient harvest methods are receiving increased attention. Waste grain from cultivated crops constitutes the greatest volume of food consumed by many birds. Losses in cleanly harvested crops of wheat, oats, barley and rye, even with the best combine adjustment, will vary from 1 to 4 per cent of the yield (Huber and White, 1953:4). It has been estimated that an amount equivalent to 10 per cent of the yield of corn remains in the fields as a result of inefficient harvesting methods (Bateman, Pickard, and Bowers, 1952:3). A marked reduction of waste in corn has already been achieved by a harvesting technique in which the corn is shelled in the field. Even if harvesting techniques did not improve, more corn will be gleaned by livestock in the future. As the demand for livestock production increases it seems likely that more green corn will be cut and chopped in the field to be fed as ensilage, thereby utilizing the whole corn plant.

Wildlife depredations in unharvested grain promise to become of progressively greater concern. Following a study of depredations on cultivated grains by waterfowl in southwestern Manitoba, Bossenmaier and Marshall (1958:31) recommended "The initiation of a long-range program for the development of feasible cultural methods of control . . ." This would seem to constitute an intelligent long-range objective wherever bird depredations constitute a threat.

It is apparent that our agricultural lands are particularly subject to change, and the majority of our birds live on these lands during all, or at least critical periods, of their lives. Our knowledge of the relationship of agricultural land use practices to bird populations is incomplete except for certain game birds and even here our knowledge can be improved upon. Without such knowledge we cannot forecast and prepare for likely changes in bird populations coming out of a more intensive agricultural program. Many changes on farm land are of a subtle nature from the standpoint of their effect on birds. While the trend is all in one direction, the amount of change in any one year is too small to attract much attention. During the past 10 years many miles of osage orange hedge have been bulldozed out in the midwestern United States. This must certainly have had a marked effect on the populations of those species regularly found nesting and rearing young in these hedges. Fencerows, ditchbanks, and roadsides grown to heavy herbaceous or woody cover have been "cleaned up" and many odd, unproductive bits of land have been cleared of brush or drained to improve efficiency of operations and to extend tillable lands. These activities undoubtedly have brought about changes

in bird populations which have gone unrecorded. Some species have lost out, others have been favored. But who really knows very much about the adjustment demands being made on continental bird populations as a result of the gradual change taking place on farm land.

An effort also needs to be made in the direction of evaluating agricultural practices which might prove advantageous to future farm needs and to birds. Wide-row corn seems to be one such practice (Vohs, 1958MS).

What the necessary increase in future livestock production may mean to birds also constitutes a problem. The development of improved pasture in the southeastern United States has resulted in marked changes in bird life. Attention, however, has been centered primarily on the local reduction of quail populations (Scott and Klimstra, 1954:6). The demand for grazing privileges on federal lands may well become a problem of increasing difficulty for administrators.

The importance of wildlife as a reservoir of diseases and parasites affecting livestock and man will certainly be cause for progressively greater concern as the human population and its need for food grows. Our knowledge in this field is so incomplete that intelligent action is impossible in many cases. A thoroughgoing knowledge of this subject is needed, if for no other reason than to insure against unwarranted wildlife control or eradication programs.

I have not seen estimates on the total area of land devoted to urban and industrial use or to highways, airports, rights-of-way, and other high value purposes. It is certain that the area devoted to such use will tend to parallel population growth. Wider dispersal of such key areas as a defense measure against atomic attack is being encouraged. The recently approved national highway program involves construction of a 41,000-mile network of interstate highways on an average 300-foot right-of-way which will place over 1 million acres of land along the pavement (Zuckel and Eddy, 1957:38). Egler (1958:576) estimated that there are now 50 million acres of rights-of-way land. He (1958:573) defined rights-of-way land as "those narrow threads of land which serve for transportation and communication of man and materials. They include highways, railroads, electric power and telephone lines, and pipe lines for gas, oil, and coal." He pointed out that the rights-of-way of utility corporations comprised an acreage greater than all six of the New England states combined.

Management of these vast rights-of-way holdings should be investigated from the standpoint of effect on bird populations. It seems likely that lands devoted to such use will increase in area and, with increasingly intensive use of surrounding lands, may virtually constitute refuge areas for certain species of birds if properly managed. Egler (1958:574) wrote of the use of 2,4-D, 2,3,5-T, and ammonium sulfamate in the control of brush on rights-of-way land as follows: "It must be understood that these chemicals have no known adverse effects on any animals. If used unwisely, they do have an extremely detrimental effect on wildlife habitat, and this, in its way, is far more disastrous than any killing of the animals themselves." Egler (1958:577) also pointed out that "In most cases shrub communities retard reforestation more successfully than do grasslands."

Urban and suburban residential areas are expanding at a rapid rate. Perhaps the average family of the future will tend to satisfy more of its needs for pleasure in the out-of-doors and for escape from the pressures of civilization in its own back yard. The ornithologist should prepare to offer advice on neighborhood management of birds as a part of this scheme of things.

Zahniser (Callison, 1957:150-151) reported that according to available records in 1953

there were 2,030 state parks comprising 5,077,331 acres and a report for 1951 showed 17,142 county and city parks totaling 644,067 acres. Additional parks will undoubtedly be established, especially small parks in urban areas. However, it seems likely that the addition of parks will not parallel population growth. Such parks will receive increasing use and unless managed properly may serve more as a refuge for nuisance species of birds than desirable forms.

While the total water area will be very small by comparison to the land area, it can be of great strategic importance to birds. Impoundments for purposes of hydroelectric power will probably be installed wherever feasible, for they have the advantage of being based on a nonexhaustible source of energy. Impoundments for public water supplies and industry will probably tend to parallel population growth, and their location will reflect the dispersal of industry. The average daily quantity of water consumed "for all purposes increased from 600 gallons per capita in 1900 to 1,100 gallons in 1950 and 1,300 gallons in 1955. By 1975 the country will be using 1,800 gallons of water a day for every man, woman, and child" (U.S. Soil Conservation Serv., 1957:5). The added water areas will undoubtedly enhance the well-being of some birds, if they can be managed for multiple purposes. Water pollution is closely associated with the density of population and with industry; hence, unless protective measures are rigidly enforced, the aquatic foods, especially of animal origin, of birds may undergo undesirable alteration. Industrial pollution may cause direct loss as in the case at Lake Calumet, Illinois, where severe losses among migrating shore birds in fall have been traced to soluble lead.

A reliable basis for appraising long-range adjustments in the numbers and species of birds is needed. Perhaps a running inventory of bird populations, classified to land use or habitat category, in winter and during the breeding season would provide such an index. Excellent information is available for waterfowl, and our knowledge of upland game birds is good and is improving rapidly. The nesting season data published annually in *Audubon Field Notes* are helpful. Nevertheless, objective data of this nature are generally deficient for other species. Ornithologists are either underestimating the importance of this need, are shunning it as a personally unprofitable chore, or are living with the false hope that someone else will do it. The job needs doing in representative habitat categories throughout the country, and responsible leaders must take the initiative in filling the gaps in these censuses of birds. In Illinois, we were fortunate enough to have benefited from the foresight of Stephen A. Forbes who encouraged extensive, systematic censuses of birds throughout Illinois in 1906-09. The data obtained (Forbes and Gross, 1922, 1923) were classified by land-use category. These censuses are being repeated now, some 50 years later, as a means of interpreting the adjustments which have taken place.

Another matter of general concern is the need for early acquisition of land for wildlife management areas. Shepard (1957:9-10) has emphasized the need for "immediate action . . . to preserve specific areas of land before they are overrun and lost forever" and recommended that industry might do well to participate in the acquisition of such lands. He points out that even now "The preservation of even small bits of marshlands or woods representing the last stands of irreplaceable biotic communities is interwoven with the red tape of law, conflicting local interest, the overlapping jurisdiction of governmental and private conservation bodies, and an intricate tangle of economic and social considerations." Along these lines, it is my personal belief that wildlife conservation agencies are gambling with their future well-being when they concentrate all of their land purchasing resources in the so-called waste lands and fail to obtain small, evenly dispersed parcels of land throughout intensively cultivated areas.

Another matter which will attract special consideration will be an increasing demand for birds to hunt. A part of this demand will be met by commercial, controlled shooting areas where the hunter may buy pen-reared game birds for hunting. The search for exotic game birds to occupy those areas where game birds are absent or scarce is likely to receive greater emphasis.

This analysis constitutes an effort to examine problems of bird conservation in the light of human progress. Glass (1957:11) has observed that "Few biologists, outside of an occasional leisure thought, seem to think very frequently or deeply about human progress." While the material presented here barely outlines the problem, it is sincerely hoped that it will serve to stimulate ornithologists to make a careful, critical, and imaginative examination of what the future holds for bird conservation.

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THOMAS G. SCOTT, *Illinois Natural History Survey, Urbana, Illinois.*