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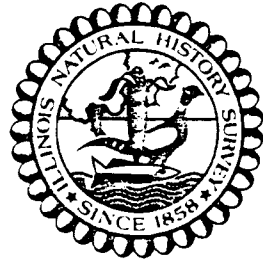
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# ILLINOIS NATURAL HISTORY SURVEY

BREEDING POPULATIONS OF MIGRATORY WATERFOWL



Section of Wildlife Research

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BY

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# Breeding Waterfowl as Potential Hazards to Low Flying Aircraft

## Introduction

Fortunately, waterfowl do not constitute the hazard to low flying aircraft from May to August within the contiguous 48 states that they do at other times of the year. This is primarily their breeding season, a period when 80-85% of the ducks and over 97% of the geese are on their breeding grounds in Alaska and Canada.

Not only are waterfowl populations at a minimum in the contiguous states but their numbers are widely dispersed over available wetlands and adjacent uplands used for nesting. Moreover, their aerial activities are generally reduced as they pursue nesting and brood rearing which embrace about three months, followed by a flightless period of about one month (the flight feathers are molted and regained almost simultaneously).

While the females are engaged in incubation that takes 3 to 4 weeks and rearing the young to flight stage for an additional 6-8 weeks, the males gather on the larger marshes for the body and wing molt.

## Flight Behavior

During the months of May-August, the flight activity of ducks may be broken down into five behavioral periods: 1) pre-incubation; 2) incubation; 3) brood rearing; 4) wing molt; and 5) postbreeding.

Pre-Incubation Period: During the pre-incubation period there is considerable flight activity by males. At this time

males are engaged in "3-bird flights" pursuing the female of a pair intruding his territorial area. In such 3-bird flights, the birds may tower and gyrate up to 300 feet above ground level (AGL). The flights are most prevalent during the first hour after sunrise, and again in the hour preceding sunset.

The flight from the wetland waiting site (or core area) to search for nest sites usually in the uplands by dabbling ducks occurs from mid-April through May. These flights are low, usually below 100 feet and in the early morning hours.

The chronology of their nesting activities varies with species with the pintail and mallard being the earliest and the blue-winged teal and gadwall the latest. However, considering all species through the month of May, ducks are in the air 2-5% of the daylight hours; most of this activity occurs in the first 2 hours of the day. Between 1000-1500 hours flight activity is at its lowest.

Incubation Period: For individuals of all species, incubation stretches from mid-April through mid-July; however, May through mid-June embraces the bulk of the incubation activity. Females usually leave the nest early in the morning and late in the afternoon to fly 1/4 to 2 miles to a feeding area. Such flights are seldom above 100 feet; an estimate of time in flight/day is 15 minutes, 1-2% of the daylight hours.

Shortly after females begin incubation, paired males leave their mates and begin to concentrate on the larger marshes for the wing molt, a period of one month when waterfowl are

flightless. Male pintails and mallards are the first species to enter the wing molt early in July, but other species are only 1 or 2 weeks later.

Brood Rearing Period: Duck nests commence to hatch by mid-May and continue to do so for the next 60-90 days depending upon species and latitude. The mother accompanies her brood until flight is approached or attained. Flight development varies with latitude and the size of the species, but most young attain flight between the age of 6-8 weeks.

After rearing her brood, the female enters the wing molt when she is flightless for about one month. Females unsuccessful in nesting enter the wing molt earlier.

Postbreeding Season: This is largely the month of August. The likelihood of an aircraft strike of a duck would increase steadily through the month. The rise in the potential risk of strikes would increase for the following reasons:

1. Males have regained their flight feathers and are beginning to fly more over and around wetlands.
2. Adult females regain flight throughout August, consequently by the end of the month a large proportion are back on the wing.
3. With each passing day more and more young enter the flight mode so that by the end of August, the population of flying ducks is double that of May.

Moreover, during August, waterfowl are flying considerably more and higher than at any other time in the May to September time frame. Birds are shifting about to find the most favorable

feeding sites. With the swathing of wheat and barley fields in the Great Plains in late August, thousands of mallards and pintails begin flying out to these fields for waste grain. This continues to increase through September.

The altitude of these flights to grain fields vary between 100 and 500 feet AGL. There is the beginning of a southward migration by teal and pintails in August, but numbers are small.

#### Temporal Parameters of Duck Strike Probability

These parameters are based upon judgment of behavioral activities only, and would be subject to revision as more hard data become available.

Assume: 1.0 = strike probability, May  
0.5 = strike probability, June  
0.75 = strike probability, July  
1.0 = strike probability, August 1  
2.0 = strike probability, August 10  
3.0 = strike probability, August 20  
4.0 = strike probability, August 31

#### Methods

Most of the breeding waterfowl in the contiguous 48 states occur on the northern Great Plains, and in the marshes and meadows of the valleys and basins of the Rocky Mountains as well as other mountain ranges of the West.

The appraisal of breeding population numbers has been derived in the West from surveys by state waterfowl biologists.



Many of these data have been obtained from the periodically issued Pacific Flyway Reports, collated and edited by Dr. James Bartonek, U.S. Fish and Wildlife Service, Portland, Oregon. Other data have been obtained from direct contact with the state concerned. In Minnesota and Wisconsin data have been obtained from the respective state publications.

Data on breeding abundance of ducks in Montana, and North and South Dakota have been obtained from aerial surveys made along established transects each May by the U.S. Fish and Wildlife Service. These have been conducted from 1955 to date, but we summarized the years 1965-1984 for this report.

Maps have been prepared showing the level of abundance of breeding ducks in specific regions. For several reasons the maps do not show breeding numbers of ducks in extensive regions particularly in the states east of the Mississippi River. In these regions duck breeding numbers are relatively small, breeding birds are dispersed along rivers and creeks, and in swamps. Most of these ducks are wood ducks (Aix sponsa) that seldom fly above tree height, negating their potential as a hazard to aircraft.

To assist in evaluating the maps of breeding density, we discuss the distribution on a state by state basis starting with California.

#### California

Breeding numbers of ducks have ranged from 89,000 to 309,000, 1976-1985, averaging 153,700. About 45% breed in the Sacramento River Valley; 24% in the Klamath Basin; 17.3% in the

Honey Lake region of the northeast; 9.8% in Suism, Napa, and other marshes in the Delta, east of San Pablo Bay; and 3.9% in the San Joaquin grasslands between Los Banos and Mercede. This equates to the following numbers of breeding ducks/square mile ( $m^2$ ): Sacramento Valley (Sacramento to Willows) 864, Klamath Basin 392, Honey Lake 886, Delta marshes 485, and San Joaquin grasslands 55.0.

#### Oregon

About 125,000 ducks breed in Oregon, largely east of the Cascade Mountains. The principal breeding areas are extensive wetlands lying isolated in several basins/valleys: Upper Klamath Lake marsh, Klamath Forest marsh, Summer Lake marsh, Lake Albert marsh, and the marshes about Malheur and Harney lakes.

These south-central wetlands cover 597  $m^2$  and contain at least 92% of the breeding ducks, 192/ $m^2$ . The other 8% breed in the Willamette River valley, Sauvie Island below Portland, and small, scattered wetlands elsewhere along the Columbia River.

#### Washington

Almost two-thirds of the 194,000 ducks that breed in Washington occupy the dispersed wetlands of the Columbia Plateau, delineated by the loop of the Columbia River. The Okanogan Highlands, north of the Columbia Plateau, support about 24% of the breeders, the remainder (10%) are largely in the wetlands adjacent to Puget Sound.

Because of the dispersed nature of the wetlands, the density of breeding ducks is prorated over the total regional area, and

not over the wetland acreage. On that basis there are about 13.7 breeding ducks/m<sup>2</sup> in the Columbia Plateau and 39.7 ducks/m<sup>2</sup> in the Okanogan Highlands.

#### Idaho

Mountainous terrain in Idaho severely restricts the availability of wetlands for breeding waterfowl. Of the 162 m<sup>2</sup> of wetlands, 76% (123 m<sup>2</sup>) occur in the southeast quarter. Scattered wetlands adjacent to the Snake River in central Idaho constitute 2.8%, in the area of Boise 10.2%, and the Panhandle region 16.0% of the breeding areas.

The breeding grounds in the southeast are largely in these locations: 30 m<sup>2</sup> at the upper end of Bear Lake, 25 m<sup>2</sup> Grays Lake, 40 m<sup>2</sup> in the Camos-Mud Lake wetlands of Jefferson County.

#### Nevada

Historically, waterfowl breeding grounds in Nevada have largely been restricted to the marshes and meadows associated with the Carson Sink. In the last decade, these have been in a high state of flux as a result of drastic changes of the inflow of water from Pyramid Lake and from the Humboldt River. A reduction in flow from Pyramid Lake resulted in the marshes of the Carson Sink virtually disappearing in the late 1970's.

However, unusually heavy snow pack in the Nevada Mountains in the first of the 1980's resulted in exceptionally high discharges by the Humboldt River. Consequently the 105 m<sup>2</sup> of wetlands were restored in the Carson Sink, but these too, became

inundated by water too deep for breeding waterfowl by 1985. At that time there were about 12 ducks/m<sup>2</sup>.

Meadows along the Humboldt River and its tributaries provide limited breeding grounds for waterfowl.

Although covering only about 25 m<sup>2</sup>, the Ruby Lake marsh (on the Elko-White Pine county line) in eastern Nevada is the single most important duck breeding area in the state. About 52 ducks/m<sup>2</sup> breed there. Outside of Ruby Lake, waterfowl are not important during the breeding season in Nevada. The highest breeding population in the state was 13,500 in 1981.

#### Utah

Waterfowl breeding grounds in Utah are in a highly unstable condition because of excessive run-off from snow packs in the Wasatch and Vinta Mountains, 1981-1985. The Great Salt Lake has risen to unprecedented historical highs, impacting the important and formerly extensive marshes on the east and north side of the lake.

For example, as late as 1982 there were still 770 m<sup>2</sup> of wetlands in Utah north of Salt Lake City. By 1985, the flooding of the lands left only 320 m<sup>2</sup>. However, in Utah south of Salt Lake City, breeding grounds for waterfowl have increased from 101 m<sup>2</sup> to 257 m<sup>2</sup>. Nonetheless, wetlands for waterfowl have declined 34%, 1982-1985. During the same period breeding ducks have declined 40% to 353,000.

As of 1985, there were 287.2 ducks/m<sup>2</sup> in wetlands along the east and north side of Great Salt Lake and in the meadows along

the Bear River. In Utah wetlands south of Salt Lake City, there were 101.5 breeding ducks/m<sup>2</sup>.

#### Colorado

The largest breeding area for waterfowl in Colorado embraces the San Luis Valley of 4,000 m<sup>2</sup> (with 1,783 m<sup>2</sup> wetlands) in the south-central part of the state. Almost directly north are the wetlands of North Park, an area of 210 m<sup>2</sup> embracing 52 m<sup>2</sup> of wetlands. In the High Plains east of the Front Range from Denver to Fort Collins and along the South Platte Valley is a region of 3,900 m<sup>2</sup> with wetlands of 205 m<sup>2</sup>.

These wetland regions of Colorado support a breeding population of 115,000 ducks. Prorated over the regional tracts, this amounts to: 17.28/m<sup>2</sup> for San Luis Valley (37.5/m<sup>2</sup> wetland), 84.3/m<sup>2</sup> for North Park (343.9/m<sup>2</sup> wetland), and 5.3/m<sup>2</sup> South Platte-Front Range High Plains, (100.7/m<sup>2</sup> wetland).

#### Montana

Most of the waterfowl breeding grounds in Montana lie in the Plains, especially north of the Missouri River. For the most part, wetlands are small and widely dispersed requiring the duck density to be based on total land area within the extensive region surveyed along aerial transects. North of the Missouri River the duck density is 21.5 ducks/m<sup>2</sup>; south of the Missouri River it is 12.5 ducks/m<sup>2</sup>.

Large marshes with much higher breeding densities of ducks occur at a few places. These are shown on the accompanying map as distinct entities where breeding densities may be expected to

range from 200-500/m<sup>2</sup>.

#### Wyoming

Waterfowl breeding areas in Wyoming are small and widely dispersed over the rolling Great Plains covering the eastern half of the state. Over the period, 1976-1985, the number of breeding waterfowl has ranged from 276,000-585,000, a mean of 330,500. This equates to a density of about 6.7/m<sup>2</sup>. There is no particular area of high density.

#### North Dakota

The largest number of breeding ducks in the contiguous United States occurs in North Dakota. There has been a mean breeding population of 3,177,000 ducks, 1965-1984. The highest density (100.2/m<sup>2</sup>) is in the Missouri Coteau, east of the Missouri River. The Northeastern Drift Plain is next with 90.6/m<sup>2</sup>, the Western Drift Plain 68.6/m<sup>2</sup>, the Western Slope Region, west of the Missouri River, 21/m<sup>2</sup>, and the lowest occurs in the Red River Plain (9.7/m<sup>2</sup>) of eastern North Dakota and western Minnesota.

#### South Dakota

South Dakota is second to North Dakota in number of breeding ducks, with a mean 1965-1984 population of 2,030,000. West of the Missouri River the density is lowest (19.3 m<sup>2</sup>) because of the paucity of small water areas. The Missouri Coteau, to the east of the Missouri River, has 46 ducks/m<sup>2</sup>. Farther east, the Prairie Coteau has 23.5 m<sup>2</sup>. Other areas, as indicated on the

map, have lower densities.

#### Nebraska

Breeding populations of ducks in Nebraska are located in two diverse regions: the Sandhills north of the Platte River and the Rainwater Basins south of the Platte. Ponds and sloughs are scattered through the Sandhills, particularly west of 101° longitude. They are largely within that part of the Sandhills shown on the map. The density of 11.0 ducks/m<sup>2</sup> is prorated over the entire region depicted because of the land-wetland interspersion.

The Rainwater Basins have a breeding density of 7.0 ducks/m<sup>2</sup> in the east and 5.0/m<sup>2</sup> in the west.

#### Minnesota

Minnesota's average 664,000 breeding ducks, 1976-1985, vary greatly in density with the wide variety of ecosystems prevalent in that state. The prairie-parkland landscapes in the west-central part of the state have the highest breeding densities. The northern bogs and the coniferous forest region of the northeast have low densities of breeding ducks. The driftless region in southeastern Minnesota is almost devoid of breeding ducks because of its mature drainage.

#### Wisconsin

Wisconsin's average 289,000 breeding ducks are largely concentrated in a broad arc stretching across the state from the southeast to the northwest. The driftless areas of the

southwestern part of the state are almost devoid of breeding ducks, as it is in Minnesota. The breeding density declines to  $2/m^2$  in the coniferous forest region of the north and northeast.

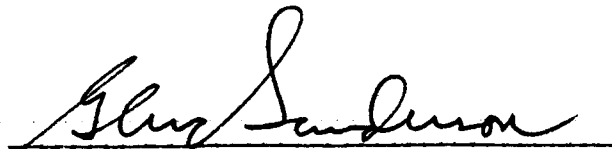


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