SUMMARY

Although snipe shooting has been a popular sport in the Southeastern states for many years, it appears that the accidental combination of land and water conditions have been solely responsible in providing an attractive spot for snipe.

Several techniques are now available to farmers who want to use a part of their land for this purpose. The methods described have been extremely successful in producing snipe fields satisfactory to landowners. However, there is more to be learned about snipe field management. It is hoped that this paper will serve to encourage research biologists to further studies.

Specific management for snipe requires the production of vegetation left in a close-cropped condition, and a dependable supply of food. Since snipe diet is about 83 percent animal food, methods to favor earthworms and other animal life must be used. Natural vegetation is a ready source of humus.

Water control for depth-of-flooding is of utmost importance in a snipe field. A puddled field condition is the most desirable. Flashboard risers, along with a suitable water source, best serve the water control needed.

The manner of shooting is an influence in snipe field management. The size of field and the frequency of shooting must be considered.

Nature alone does not abundantly provide areas suitable to snipe requirements. Lack of suitable wintering grounds is suggested as the limiting factor for this species.

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WINTER FOODS OF MALLARDS IN ARKANSAS

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INTRODUCTION

Food habits of mallards in the Mississippi River Valley have been the subject of study by several authors. Martin and Uhler (1939) collected 382 stomachs from all species of ducks in Arkansas, five of which were collected from the same area covered in this report. McAtee (1918) examined 1,725 gizzards, many of which came from Arkansas. Both authors included Arkansas data with that from several other states. Farming methods have changed considerably since these papers were published, and analytical methods have been improved, too.

The present study depends primarily on gullet contents rather than gizzards; and is limited to the winter foods of the mallard population in Arkansas. Several gizzards were collected along with well-filled gullets for comparison of food content. The collections were made from fresh-killed mallards brought to be dressed at business houses in Stuttgart and Little Rock. The methods of collection and analyses were suggested by Davison (1940).

DESCRIPTION OF AREA

The area of collection is one of the major rice-growing areas of the United States. It is also one of the major duck-wintering areas. In 1958, the rice acreage in Arkansas was 336,184 acres. Many rice fields are flooded for hunting after the grain is harvested, as reported in Louisiana by Dillon (1959). Others are flooded for the purpose of growing foodfish (buffalo, bass, and catfish) and bait minnows. Approximately one-half of the rice-lands are rotated with soybeans, cattle, fish, and cotton. Bottomlands along the streams and rivers are flooded when heavy rains occur, exposing good feeding grounds under oaks, especially pin oak, and interspersed stands of smartweeds and native grasses. Several thousand acres of oak woodlands are flooded artifically each fall by use of levees to provide shooting for duck clubs. The water is taken off during the spring and summer to keep the trees alive to produce acorns.

OBJECTIVES OF THE STUDY

An important step in agricultural management of waterfowl is the study and evaluation of the foods eaten readily. The present study is an attempt to gain needed information leading to more dependable management of foods for mallards.

RESULTS

The ducks bagged in 1957 were approximately 95 percent mallards, 3 percent pintails, and 2 percent other ducks at the Stuttgart and Little Rock duck-cleaning businesses. Only mallard gullets are reported in this paper.

Table I shows that 65.9 percent of the foods eaten by these 583 mallards was rice (47.4 percent) and grass seeds (18.5 percent) associated with rice culture. Dillon (1959) reported that the foods of mallards in Louisiana marshlands were 90 percent rice and seeds of associated plants. In the present study, barnyardgrass and jungle rice (11.1 percent) were not separated. Both plants are serious pests in rice fields.

TABLE I

MAJOR FOODS IN 583 GULLETS COLLECTED DURING HUNTING SEASONS FROM NOVEMBER, 1957 TO JANUARY, 1959 IN THE CENTRAL ARKANSAS RICE-GROWING AREA

Common Name	*Scientific Name*	*Times Used**	*Avg. Vol. Percent*
Rice, domestic	*Oryza sativa*	340	47.4
Acorns	*Quercus* spp.	148	24.0
Barnyardgrass and Junglerice	*Echinochloa crusgalli* } *Echinochloa colonum* }	185	11.1
Soybeans	*Glycine soja*	43	6.1
Paspalum, bull	*Paspalum boscianum*	79	5.1
Signalgrass, broadleaf	*Brachiaria platyphylla*	23	1.1
Corn	*Zea mays*	4	.7
Flatsedge (seeds)	*Cyperus* sp.	14	.6
Witchgrass, common	*Panicum capillare*	14	.5
Sumpweed	*Iva* sp.	4	.4
Crustaceans	Crustacea	14	.3
Unidentified plant material	———	–	.3
Smartweed, marshpepper	*Polygonum hydropiper*	5	.3
Rice, red	*Oryza sativa* var.	5	.3
Mudplantain	*Heteranthera* sp.	6	.3
Snails	Gastropoda	20	.2
Paspalum	*Paspalum* sp.	2	.2
Smartweed, swamp	*Polygonum hydropiperiodes*	1	.2
Insects	Insecta	6	.1
Japanesemillet	*Echinochloa crusgalli* var.	2	.1
Sorghum, grain	*Sorghum vulgare*	1	.1
Beggarticks	*Bidens* sp.	4	.1
Lespedeza, annual	*Lespedeza* sp.	6	.1

* Occurring in quantities of more than 1% in individual gullets.

TABLE I—*Continued*

MAJOR FOODS IN 583 GULLETS COLLECTED DURING HUNTING SEASONS FROM NOVEMBER, 1957 TO JANUARY, 1959 IN THE CENTRAL ARKANSAS RICE-GROWING AREA

Common Name	*Scientific Name*	*Times Used**	*Avg. Vol. Percent*
Paspalum, longtom	*Paspalum lividum*	4	.1
Smartweed, unclassified	*Polygonum* sp.	2	.1
Spikesedge	*Eleocharis geniculata*	4	.1
Smartweed, Pennsylvania	*Polygonum pensylvanicum*		
Grape, wild	*Vitis* sp.		
Spikesedge, blunt	*Eleocharis obtusa*	–	.1
Smartweed, curltop	*Polygonum lapathifolium*		
Panicum	*Panicum* sp.		
Ragweed, unclassified	*Ambrosia* sp.	–	T
Canarygrass	*Phalaris* sp.	–	T
Beakrush, horned	*Rhynchospora corniculata*	–	T
Mussels and clams	Pelecypoda	–	T
			100.0%

Red rice made up only 0.2 percent of the mallard diet. Dillon (1959) reported 8 percent in Louisiana. Martin and Uhler (1939) gave red rice as an important food in Louisiana and Texas, but did not mention Arkansas.

Acorns accounted for about 24.0 percent of the food in this study, and is the major difference with Dillon's Louisiana studies.

Barnyardgrass and junglerice (11.1 percent), bull paspalum (5.1 percent) and broadleaf signalgrass (1.1 percent) together made up 17 percent of the foods eaten. All occur in abundance on fallow rice fields and in other low areas. During the winter months water frequently stands on these areas for long periods. Good stands of smartweed occur occasionally on these areas.

Soybeans accounted for about 6 percent of the food. Large numbers of mallards were observed to feed occasionally on dry fields of soybeans. However, the soybeans deteriorate very rapidly in water, making management less than satisfactory for ducks.

Other than rice, acorns, soybeans, bull paspalum, barnyardgrass and junglerice, only the following plants made up as much as 50 percent of the volume in one or more gullets: signalgrass, witchgrass, sumpweed, corn, grain sorghum, swamp and marshpepper smartweed, flatsedges, annual lespedeza, and *Paspalum* sp. Corn, grain sorghum, and the smartweeds are known definitely to be primary mallard foods. These other plants can not be classified clearly between primary and secondary foods due to their limited availability.

Acorns comprised approximately one-fourth of the volume-percent of all foods eaten, and they occurred as 100 percent of the food in 124 gullets out of the 148 which contained acorns. The remaining 24 gullets also had small quantities of rice, barnyardgrass, junglegrass, bull paspalum, and crayfish. Traces of snails, insects, and other crustaceans were found too in many of the acorn-filled gullets.

Several species of acorns occurred in the analyses. Those positively identified were pin oak (*Quercus palustris*), white oak (*Q. alba*), southern red oak (*Q. falcata*), and water oak (*Q. nigra*). The largest acorn found was tentatively identified as a red oak acorn, which measured 20 by 14 millimeters (slightly over one-half inch in diameter and three-fourths inch long).

WEATHER EFFECT ON AVAILABILITY OF FOOD

There were some noticeable differences in the percentages of foods eaten in the two collection seasons. Careful notes were kept on water conditions over the bottomlands. The 1957-58 season was very wet, with most bottomlands flooded from November 10 to January 1. The 1958-59 season was relatively dry, with only one wet period from November 17 to November 26. Table II compares volume-percent analyses for the two seasons.

TABLE II

COMPARISON OF MAJOR FOOD ITEMS IN MALLARD GULLETS DURING THE 1957-58 AND 1958-59 HUNTING SEASON

	Average Volume (Percent)	
	1957–58 *	*1958–59* †
Rice	45.3	49.5
Acorns	35.5	12.6
Barnyardgrass and junglerice	6.5	15.5
Bull paspalum	3.9	6.4
Soybeans	3.0	9.0
Signalgrass	.2	2.0
Corn	1.3	. .
Common witchgrass	.9	.2
Flatsedge (seeds)	.7	.5
Marshpepper smartweed	.3	.2
Annual lespedeza	T	.2

* Total number gullets, 291. † Total number gullets, 292.

Acorns comprised approximately three times the volume-percent in 1957-58 as in 1958-59, because more water in the woodlands made the acorns available. Agricultural crops and their associated plants were used more heavily in the dry season (1958-59). It was noticed also in day-by-day analyses that the ducks immediately increased their use of acorns as the weather changed from dry to wet.

Freezing weather may have affected the day-by-day feeding of mallards. When rice fields were frozen, the ducks used the moving water in bayous and rivers.

GIZZARD ANALYSIS

Fifty-nine gizzards were taken, along with their corresponding gullets, for comparison of contents. Each gizzard contained approximately the same foods as did the gullet, except that several also contained indigestible seeds of blackgum (*Nyssa sylvatica*), hawthorn (*Crataegus* sp), Alabama supplejack (*Berchemia scandens*), dogwood (*Cornus* sp), and rose (*Rosa* sp). None of these seeds were found in the 583 gullets. The seeds of these plants are very hard and their worn surfaces gave evidence of being in the gizzard for long periods. Whether the indigestible, stone-like seeds are taken accidentally or as gravel is not important. Dillon (1957) gave comparisons of gullet and gizzard contents, showing how certain hard-seeded plants could give undue importance in volume percent. (Davison (1940) recognized this first in analyzing quail craws and gizzards.

MANAGEMENT SIGNIFICANCE

Prior to this study, many people interested in duck management in Arkansas considered the flooded woodlands and rice fields as the only method to attract ducks, except to feed them artifically. This study indicated the importance of the woodland and cropland foods eaten by mallards, and both kinds of land are managed chiefly by agricultural owners. The Soil Conservation Service and other agencies interested in wild duck management are now studying the specific plants which can be planted on agricultural land to favor ducks.

In 1958, two idle fields, one 39-acre rice field and the other a 10-acre meadow, were planted to browntopmillet (*Panicum ramosum*). The fields were flooded by use of small, rice-type levees. The water depth was less than eight inches—resulting in delayed use by ducks as they would not alight except in open-water areas. Future plantings will include open ponds within the fields for ducks to alight. The browntopmillet in both fields was completely utilized by mallards in a period of less than one month, after the browntopmillet had fallen beneath the water and created open areas. Sixteen mallards killed over the fields yielded almost 100 percent browntopmillet seeds in the gullets with only a few barnyardgrass and junglerice seeds present.

One 30-acre field was planted with the following plants: corn, grain sorghum, soybeans, and rice (harvested with a combine). The field was flooded with water in October to a depth of 12 to 16 inches of water. Ducks used all the plants named except the grain sorghum. Owners reported that blackbirds ate all the sorghum grain before the ducks arrived. The soybeans decomposed shortly after the mallards came. However, good use of the soybeans by the ducks was observed during the short period available.

Where woodland is managed, trees and shrubs such as blackgum, dogwood, hawthorn and others having no value to ducks, may be removed since only acorns showed up in this study of woodland foods. Further study, however, might reveal some other choice woodland food. Openings created by removal of useless trees could be planted with choice foods like browntopmillet, Japanesemillet, or bull paspalum. Openings also favor volunteer stands of smartweeds, sedges, barnyardgrass and junglerice. Thinning also increases the production of acorns by the oak trees.

Management of harvested rice fields for duck hunting is common in the area studied. Dillon (1959) reported that as much as 347 pounds of rice per acre may be lost during normal harvest operations. Arkansas farmers take advantage of this waste rice by flooding the fields for duck hunting after the rice is harvested. Additional management is not necessary except to regulate hunting pressure.

SUMMARY

1. A total of 583 mallard gullets was examined during the 1957-58 and 1958-59 hunting seasons to determine the foods of the mallard in Central Arkansas. The area studied is one of the major rice-growing and duck-wintering areas in the United States.

2. Weather conditions affected the food percentages. Ducks ate acorns more during the wet year, 1957, when all bottomlands were flooded by heavy rains.

3. A summary of land management for ducks is given including rice fields, woodland, and special planted duck-fields. Experience with special duck-fields planted to browntopmillet is included. The browntopmillet proved to be a choice food of mallards when managed properly. Experience with other duck-fields including corn, soybeans, and grain sorghums is also given.

4. The study indicates the importance of rice and associated plants in feeding mallards. Rice and grass seeds associated with rice culture accounted for 65.9 percent of the foods eaten.

5. Acorns, barnyardgrass, browntomillet, Japanesemillet, junglerice, paspalum (bull), rice, and soybeans are choice winter foods of mallards in Arkansas. Though this study does not prove it, corn, marshpepper and swamp smartweeds, and grain sorghum are known to be choice foods. No definite conclusions can be drawn to rate the quality and acceptance of the following foods which were found in minor amounts: beggarticks, flatsedge (seeds and tubers), lespedeza (annual), plantain (mud), signalgrass, witchgrass, sumpweed, canarygrass, beakrush, paspalum (longtom), spikesedge, smartweed (Pennsylvania and curltop), and ragweed. On the other hand, blackgum, dogwood, hawthorn, rose, and applejack are shown to be unimportant, indigestible foods by comparison of the contents in matched gullets and gizzards.

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MANAGEMENT OF NEEDLERUSH FOR IMPROVING WATERFOWL HABITAT IN MARYLAND

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Control of needlerush (*Juncus roemerianus*) for improving waterfowl habitat has received much attention in the Southeast in recent years. Solid stands of needlerush have no value for waterfowl but receive considerable use when interspersed with water areas or other vegetational types. As needlerush dominates about 600,000 acres of marshlands (Shaw and Fredine, 1956), there are significant potentialities for habitat improvement. For example, at the Chassahowitzka National Wildlife Refuge in Florida, increased waterfowl use followed control of this plant (Myers, 1955).

Our investigations on needlerush control in Maryland were started in 1952. The objectives were to develop and refine procedures for control, then find how best to apply these procedures as a tool for improving waterfowl habitat.

These investigations capitalized on findings from studies by Francis M. Uhler [1] in Maryland, Barber (1952) and Wilson (1952-54) in North Carolina, and Myers (1955, 1959) in Florida. Most of our work was done on a cooperative basis. William Nicholson, formerly of the Maryland Game and Inland Fish Commission, and John R. Longwell, Maryland Department of Research and Education, participated in these studies. Clark Webster, formerly with the U. S. Fish and Wildlife Service, and student assistants Edward Burgee, Otto Florschutz, James B. Whelan, and Gerald Townsend helped in the field investigations during successive summers. Chemical companies furnished herbicides and technical advice.

STUDY PROCEDURES

Previous studies by Barber (1952) showed that needlerush is most susceptible to treatment during the period of flowering through early fruiting. Accordingly,

1 Patuxent Wildlife Research Center, Laurel, Maryland.