

west Louisiana. However, Neely (1956), working in South Carolina, found only a 19 per cent deterioration of domestic rice under flooded conditions for a period of 90 days.

It is well known that ducks prefer to feed in flooded fields but that they will feed on dry land. Since it is apparent that the losses of rice will be extremely high whether the land is flooded or not, it is recommended that the rice be made available for quick utilization by waterfowl as soon as they arrive on the wintering ground. Therefore, it is recommended that newly harvested ricefields be flooded about October 25 just prior to the time heavy flights of ducks normally arrive in Louisiana. Earlier flooding would prevent depredations by passerine birds and mammals but it would also allow a longer time for deterioration and would attract early flights of teal. Early and prolonged shallow flooding of extensive areas should be considered as a possibility to hold teal and pintails that normally go to more southern wintering areas.

The results of this study as well as results from studies by Harmon (1960), Rumsey (1961) and Davis (1961) show that the rate of loss of seeds from wild plants is much less than for domestic rice. It was also shown in this study that the loss was much reduced under flooded conditions.

Fallow ricefields contain large quantities of seed of wild plants and seldom contain seeds of domestic rice. When seed predators are not overly abundant, it is recommended that fallow fields be flooded about November 25. This would provide an abundant food supply for ducks about the time the waterfowl hunting season begins. It is likely that ducks would use these fields until spring migration. If seed predators are abundant, flooding should be done at an earlier date.

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WOOD DUCK TRAPPING TECHNIQUES

BY

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Presented at
Seventeenth Annual Conference
Southeastern Association of Game and Fish Commissioners
Hot Springs, Arkansas
October, 1963

INTRODUCTION

The recent decline in waterfowl populations has not only focused attention on year-round habitat needs but has, in fact, placed increased emphasis on "species management." One species that has particular management significance in the Atlantic and Mississippi Flyways is

the wood duck. The management potential of this species is readily apparent. It nests in hardwood bottomlands throughout the eastern half of the U. S. and is apparently little affected by drought and drainage. It has a relatively high rate of productivity and has shown a willingness in many areas to accept artificial nesting sites. So long as hardwoods are permitted to grow in the bottomlands along the major drainageways, and wintering populations are not overharvested, the wood duck's future is relatively secure.

There are important problems relating to the management of the wood duck, however, which must be solved if this species is to continue to play a major role as a migratory game bird. Chief among these is the need for determining annual population trends and the effects of hunting regulations.

Because of the type of habitat utilized by the wood duck, aerial and ground survey techniques of the type used in censusing other waterfowl are unsatisfactory for this species. While the search for more suitable wood duck census techniques continues, it is believed that banding, combined with wing collection surveys, can provide the information that is desired. In recognition of this fact, the Atlantic and Mississippi Flyway Councils endorsed a wood duck banding program that encompassed all of the States in the two eastern flyways.

Banding goals designed to provide a reliable level of recovery data were established in each State and the respective State wildlife conservation agencies in cooperation with the Bureau undertook to band the number of birds required. While good progress was made in banding in some areas, certain difficulties were encountered that have prevented the program from being successful in the two flyways as a whole. The major problems experienced concern (1) insufficient participation in the program, particularly in the South, and (2) poor trapping success.

For several years it was the general consensus that wood ducks could not be trapped in satisfactory numbers in the Southern States and that trapping was a waste of effort. A few very successful banding projects have been conducted during the past three years in South Carolina, Tennessee, Mississippi and Arkansas, however, that helped materially to disprove this theory. This paper reviews trapping techniques that can be employed to trap wood ducks in a variety of situations and brings to light several little "tricks of the trade" that often spell the difference between failure and success.

TRAPPING METHODS*

There are three basic methods of capturing wood ducks: bait trapping, roost trapping, and chasing. Bait trapping is the most universally used and time-tested method. Roost trapping is a version of drive trapping, modified for capturing ducks that are roosting. Chasing is a term used to describe two newly developed methods which employ the use of a retriever, and a boat and dip net. The latter methods are in the experimental stages of development and have not been adopted for widespread use.

Bait Trapping

Bait trapping is a technique that can be varied to meet a number of widely divergent conditions. Methods used in some situations may or may not be effective in others and vice versa. Fortunately there are several types of traps and baits that have been used with success and can be tried if difficulty with one or the other is experienced.

Bait. Baits frequently employed include shelled corn, ear corn, cracked corn, wheat, milo, oats, barley, rye, sudan grass, acorns, white

* The authors wish to acknowledge that the trapping methods and techniques hereinafter discussed were not developed by them, but represent an accumulation of work by many people including State as well as Bureau personnel. Reports by Harvey Nelson, John Eadie and N. F. Williamson of the Bureau of Sport Fisheries and Wildlife were particularly informative and were freely drawn upon. The authors' purpose in making this presentation is to consolidate information relating to trapping techniques and methods with the hope that interest in the wood duck banding program will be stimulated and a greater banding effort put forth in the future.

potatoes, and various mixtures and combinations thereof. Yellow shelled corn is the most universally used and preferred.

Baiting Methods. Establishing a productive trapping site can be very easy or extremely difficult depending to a great extent upon the attractiveness of the bait that is used and the availability of natural foods in the general area. When possible, bait should be distributed in the area where birds are believed to be currently feeding. The closer to the exact feeding site, the better; however, it is sometimes necessary because of the character of the bottom or the depth of the water to bait a short distance away.

Pre-baiting may or may not be of benefit depending upon the circumstances. This practice can be an aid where the location of feeding sites is not known and sufficient traps are not available to place one at each site. It is also a means of attracting ducks from a site which is unsuitable for trapping to a more desirable location. Disadvantages of this practice concern the attractiveness of pre-baited areas to raccoons, deer, opossums, and various seed-eating birds.

Most trappers believe it is a good idea to leave the traps open for a couple of days after they are first erected to permit birds to feed into and through them to dispel any would-be dangers. This may or may not be important and should be left to the discretion of the trapper. It has been found beneficial, however, to open the traps and bait the general area rather heavily for a couple of days when trapping, after having been productive for some time, begins to taper off. This appears to quell the fears of birds which might have been trap shy and serves to attract a number of new birds to the area. Leaving the traps open for a couple of days every week or so also gives the trapper a much-needed rest.

The manner in which a trap is baited is an extremely important aspect of a trapping project. The major portion of the bait should be placed inside of the trap. Only a couple of handfuls of bait should be used outside of the trap and this should be sprinkled in a narrow band leading into the throat to provide direction for birds seeking to enter. Bait lines used to direct ducks in the direction of the trap are generally believed to be unnecessary once the birds become oriented to the trap site. There is also the danger, with use of bait lines, that ducks will obtain all they want to eat outside of the trap and upon reaching the throat, have no desire to enter.

Another helpful hint in maintaining a successful trapping operation is to keep the bait fresh. On the Savannah and Santee National Wildlife Refuges in South Carolina it was learned that bait, particularly shelled corn, often begins to ferment and will not attract ducks after it has been in the water a few days. It is necessary, therefore, to remove unused bait from a trap every two or three days during the summer trapping season to prevent fermentation or move the trap a few feet to a new location.

Trap Site. The ideal trapping site appears to be one with about three to five inches of clear water and a firm sandy bottom. Traps can be easily erected and tended under these conditions and ducks can see the bait while either swimming or flying nearby.

In areas where the water is excessively deep, water levels fluctuate rapidly, or the bottom is quite soft, consideration should be given to placing the bait and the traps on floating platforms or on dry ground nearby.

Good trapping success has been achieved in densely wooded areas, shrub swamps, sparsely vegetated pools, on banks or cleared ground adjacent to water, and in open shallow water ponds. Over 2,000 wood ducks have been captured in the past two years in an open shallow water pond on the Santee National Wildlife Refuge in South Carolina. Prior to two years ago, personnel at the Santee Refuge were trapping ducks, with somewhat less success, in a pond which contained considerable emergent and low shrubby vegetation. Trapping was not attempted in the open pond where the present operation is being conducted because it was believed that wood ducks would not feed in open areas.

Another instance in which a pre-conceived idea did not reflect the

actual situation concerned bait trapping in a roosting area. Wood duck trappers in the North have long reported that wood ducks could not be bait trapped in a roosting area. In the South, particularly in the coastal plain of South Carolina and Georgia, shallow swamp ponds appear to be used for both feeding and roosting. Bait trapping was attempted in such an area and fair success was achieved. This proves only one thing—until more trapping experience has been gained and more learned concerning what will and will not work, no reasonable trapping possibility should be passed by.

Traps. Many kinds of traps can be effectively used to capture wood ducks including: (a) the standard walk-in type frame trap, (b) the "Ohio" type trap, (c) the lily pad trap, (d) the cloverleaf trap, (e) floating traps, and (f) the cannon net trap.

Walk-in traps varying in size from 4' x 8' x 6' with one throat, to 8' x 20' x 6' with three throats have been very successful in catching wood ducks on certain National Wildlife Refuges in the Southeast. On the Santee National Wildlife Refuge, over 1,500 woodies were trapped in 1962 with walk-in type traps. Similar success is being achieved with walk-in traps this year on the same area and it is the concensus there that within reasonable limits, the larger the trap the greater the degree of success.

It is generally believed that large traps such as the one mentioned above should be used where there are possibilities of catching large numbers of ducks and where the trapping site affords the opportunity to transport trapping materials by truck or jeep. Smaller traps such as the 3' x 6' x 3' Ohio trap, which can be folded into a compact unit, or the lily pad trap are preferred where trap sites are inaccessible except by boat or by walking.

The recommended wire for trap construction is 1" mesh poultry wire or 1" x 2" mesh welded wire. Both have certain advantages and disadvantages, but either is satisfactory. Regardless of the type of wire used in making the trap, poultry wire is far superior to welded wire for constructing the throat or funnel.

The throat setting is the most critical feature of a wood duck trap. While the total height of the narrow, vertical opening may vary to allow for fluctuating water levels, the width of the opening must be within a range of 2½ to 3 inches. If the opening is any narrower, the birds may have difficulty or be reluctant to enter. If the opening is wider, it is likely that many birds will escape. The height of the opening must be a minimum of three to four inches above the surface, and the depth of the opening a like distance below the surface. The throat tapers toward the inside of the trap and should be set in such manner that entering ducks must push slightly to get in. The flaps or sides of the throat should spring back, once the bird has pushed through, to form the same size opening as before, thus making escape difficult if not impossible.

Traps may be constructed either with or without a bottom. If a wire bottom is used, it is a good idea to cover the wire in the entrance and the throat with a shallow layer of dirt or sand to prevent ducks from becoming suspicious as they enter. Traps which do not have a bottom are equally if not more satisfactory to use but care must be taken to peg down the corners to prevent ducks from escaping under an edge.

The cannon net can also be a successful means of bait trapping wood ducks. Wood ducks have demonstrated a willingness to feed in corn fields, on oak flats, and on banks along streams, often quite some distance from water. Where it is possible to bait them into an opening along a road or trail, on a dike margin, or on a mud flat where a net can be rigged, a cannon net can be very effective. In order to make trapping with a net worth while, however, it is usually desirable to pre-bait until a number of birds are using the site.

Predation. Predation can be a serious obstacle in bait trapping wood ducks, particularly predation by raccoons. If raccoons are active in the area during the daylight hours, it is best to remove them through trapping. If they appear to be active only at night, running the duck traps early in the evening, preferably just before dark, will prevent

most losses. Inasmuch as wood ducks actively feed during the early morning and the late afternoon, it is recommended that the traps be run twice each day, preferably about 9 a.m. and 6:30 to 7 p.m. Leaving ducks in the traps overnight is an open invitation to predation.

Depredation by seed-eating birds and animals is also a problem, and frequently a change in the type of bait that is being used to attract ducks is necessary to discourage "bait stealers." Personnel at the Tennessee National Wildlife Refuge found that wheat is less attractive to blackbirds and raccoons than corn, and the wood ducks like it just as well. It was found in North Carolina that sudan grass is a good wood duck bait and holds no attraction to raccoons.

Roost Trapping

The need for improved trapping success prompted research in trapping methods and resulted in the development of the roost trapping technique. Experimentation with roost trapping methods was conducted by Mr. Dale Hein, while a graduate student at Iowa State in 1961. It was not until the fall of 1962, however, that the method was successfully developed. Credit for this goes to Mr. Vernon Stotts of the Maryland Game and Inland Fish Commission and personnel at the Migratory Bird Populations Station at Patuxent.

Roost trapping is largely a matter of driving birds into a trap and is not difficult if the proper preparations have been made. The key to success appears to hinge on several factors including (1) the type of trap that is used; (2) the arrangement of the trap with respect to the roost; (3) the manner in which the drive is conducted; and (4) the time of the drive.

The Trap. The basic trap is rectangular in shape and varies in size depending on the location. Generally the trap should be 30 to 60 feet long, 8 to 10 feet wide and about 4 feet high. Either 1" mesh poultry wire or 1" x 2" mesh welded wire may be used in trap construction. If available, cotton netting of the type used for cannon nets or fish seines should be used on the top of the trap instead of wire to reduce the danger of injury to birds which attempt to take flight. Since roost trapping may result in the capture of a large number of birds during a single operation, it is recommended that the back of the trap have rounded corners to prevent injury to the birds from piling up.

The opening to the trap or the throat should be quite large to permit birds to enter without undue fear. An opening as large as two feet high and four feet wide is recommended for use in situations where one of the drivers can reach the trap to close the throat before birds which have reached the opposite end become unduly disturbed. Proportionately smaller openings should be used with shorter traps.

Leads or wings should extend a sufficient distance to either side to divert the main body of roosting birds into the trap. The angle formed by the leads should not be greater than 80 to 90 degrees for best success. The leads can be made of wire or nylon netting and need not extend more than a few inches above the water. Eighteen-inch poultry wire in rolls 50 feet in length is recommended for lead construction.

The construction of a catch pen in conjunction with the main trap is recommended for use in confining trapped birds to a small area to facilitate handling. To prevent injury and/or drowning as a result of possible overcrowding, the catch pen should have rounded corners and a bottom that is above the surface of the water.

Trap Location. The trapper has little choice over the type of roost that wood ducks choose; however, linear shaped roosts are the most desirable for trapping purposes. Traps can be placed near one end with the leads extending to each side and the entire roost can be driven and trapped in one operation. If roosting areas are wide as well as long, consideration should be given to constructing two traps at about the same latitude with W shaped leads stretching across the main body of the roosting area. Traps would be located at the apex of each V of the W. Usually, one trap if correctly placed, will catch as many birds as can be processed conveniently at one time.

Care should be taken to locate the entrance of the trap some dis-

tance from shore since birds will flush if it appears that they are being driven toward shore.

The Drive. Several factors should be considered in preparing for and conducting the drive.

1. Drives should be conducted on a dark night without the aid of artificial light. Moonlight nights are unsuitable.
2. A constant noise is necessary to keep the birds moving. Continual talking in normal voice tones is suggested.
3. Drivers should be spaced no more than 150 feet apart, preferably closer.
4. The drive should be conducted at a rate of speed not to exceed about 600 feet per hour.
5. The drive should be oriented to avoid large openings in the vegetation. Birds have a reluctance for being driven across openings and will often flush.
6. Consideration should be given to conducting drives during pre-dawn hours in order to take advantage of natural light conditions for banding, sexing and aging.

In addition to the successful roost trapping operations conducted by Mr. Vernon Stotts and the staff of the Migratory Bird Populations Station in Maryland, the roost trapping technique was also successfully employed at the White River, Noxubee and Piedmont National Wildlife Refuges in Arkansas, Mississippi and Georgia, respectively.

Chasing

Chasing and catching, while not a trapping technique as such, is a procedure that can be effectively used to capture flightless adults and young wood ducks. Conceived for use on the northern breeding grounds, this method involves the use of a retriever which catches the birds and brings them unharmed to its master. United States Game Management Agents in western Kentucky modified this technique to capture flightless wood ducks and during May and June of 1963 caught and banded 274 in this manner.

The procedure involves two men, a boat and motor, a dip net or tow bag and a retriever. Individual broods of wood ducks are located on a stream or river by patrolling in a boat. Upon the approach of the boat the hen and brood seek cover along shore while the boat and men close in as if to catch them. The ducks climb out on the bank and attempt to hide in the weeds and brush along the shore. One man goes ashore with the retriever which is then released and commanded to catch the ducks. The second man remains in the boat, cruising about, close to shore to prevent the ducks from returning to the water. The ducks are caught one at a time and placed in the dip net or bag until all have been captured. The man and dog then return to the boat where the birds are banded, sexed, aged and released. This method is very specialized and requires the use of a "soft mouthed" dog, preferably a Labrador.

Flightless wood ducks can also be caught without the aid of a retriever, although much less successfully. In Tennessee, a U. S. Game Management Agent, with the help of State Conservation Agents and Boy Scouts, was successful in capturing wood ducks by locating broods on rivers and streams with the aid of a boat and capturing them directly with dip nets as follows: when the birds go ashore to seek protection, two men go ashore and drive the ducks back to the water. Other men go ashore and stand between the ducks and the water and net the birds as they come within reach. This method is slow and the number of ducks banded per hour of effort is very low.

A somewhat similar method has been developed by personnel of the Tennessee Game and Fish Commission for capturing wood ducks at night. Equipment includes a boat and motor, generator and headlight or battery operated light and a long handled dip net. Ducks are located by patrolling creeks and streams and searching under overhanging brush and vegetative growth with the aid of a strong light. When roosting ducks are spotted, an effort is made to hold them in the beam of the light until the boat can be maneuvered close enough to capture them with a large dip net.

SUMMARY

Wood ducks can be successfully trapped using any one of several methods and techniques. Bait trapping is the most universally used and accepted method because of its adaptability to a wide variety of situations. Roost trapping can result in a large number of ducks being trapped with a minimum of effort; however, its use is limited to the fall and winter seasons and to special roosting situations. Various State and Bureau personnel are making experimental use of methods which involve the capture of ducks with the aid of a retriever and with dip nets.

Success in trapping wood ducks hinges upon man's persistence and ingenuity. Trappers who have had success state that their secret is to "think like a duck" and try new methods if known procedures do not work. An outstanding example of this was at the Okefenokee National Wildlife Refuge, where little trapping success was realized until sliced white potatoes were used as bait.

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NOTES ON COTTONTAIL RABBIT STUDIES IN MISSISSIPPI

BY LOUIE P. HEARD

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Figures given me not too long ago by Mr. Harold Murphy, Secretary of the Pearl River Beagle Club of Jackson, Mississippi, speak for the popularity of the cottontail rabbit. He told me that, "From the field trial standpoint there were 497 organized beagle clubs in the United States at that time. Twelve of these clubs are in Mississippi with their membership owning an estimated 3,000 pedigreed beagles. Only five clubs existed in the state 10 years ago." This increased interest in the sport of beagling is also apparent from the requests we receive from hunters throughout the state about cottontail management. In order to give recommendations dealing with local conditions and to further promote the sport of rabbit hunting, the Mississippi Game and Fish Commission initiated the cottontail study upon which this report is based.

The study was begun in July 1959, and some phases are still in progress. Objectives were to determine as much as possible about the life history and needs of the cottontail with additional phases aimed at habitat improvement on small areas.

Location and Description of Area

The study area is located in Copiah County in the southwest portion of Mississippi. The forest type is shortleaf-loblolly and upland hardwoods while the typical ground cover is broomsedge grass (*Andropogon sp.*). Loessial clay of low fertility constitutes the soil type.

Methods

Data have been collected several ways. A 100-acre study area was established on the Copiah County Game Area. One hundred permanent trap sites were located on a grid system and the area was type-mapped in detail.

To supplement trapping data, collections on the game area were examined for litter sizes and internal and external parasites. Most